THE RELEVANCE OF AUTOMOTIVE TECHNOLOGY GRADUATES FROM THE UNIVERSITY OF EASTERN AFRICA, BARATON TO THE AUTOMOTIVE INDUSTRY IN KENYA

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DECLARATION

Declaration by the Candidate

This thesis is my original work and has not been submitted for any academic award in any institution; and shall not be reproduced in part or in any format without prior written permission from the author and/or University of Eldoret.

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Declaration by the Supervisors

This thesis has been submitted for examination with our approval as University Supervisors.

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DEDICATION

This work is dedicated first and foremost to Almighty God, and secondly to my wife Ruth and our children Caroline, Abraham and Alex for their moral support and perseverance during the study.

ABSTRACT

This study sought to establish the relevance of automotive technology graduates from the University of Eastern Africa, Baraton (UEAB) to the automotive industry in Kenya. The study focused on relevance in terms of knowledge, attitudes and skills possessed by UEAB's automotive technology graduates working in the industry and the requirements by the automotive industry. UEAB is a pioneering University in Kenya offering automotive technology program at bachelors degree level. The study covered selected leading automotive companies and garages in Nairobi and Eldoret. A total of 68 respondents who included 40 automotive technology graduates working in industry, 20 employers and 8 UEAB's automotive technology lecturers participated in the study. The design of the study was a descriptive survey and a purposive sampling technique was employed to select the respondents. The study generated information using questionnaires, and document analysis, the combination of these methods limited the effects of extraneous variables. Data obtained was coded and classified under several categories as per variables of the study. It was then analyzed using descriptive statistics like percentages and frequencies in tables. Computer excel package was used to compute data so as to provide information and basis for description, analysis of data, make conclusions and recommendations. Findings revealed that knowledge, attitudes and skills possessed by UEAB's automotive technology graduates working in the Kenyan automotive industry matched those required by the industry. The conclusion based on the findings was that the automotive technology graduates from UEAB were relevant to the industry, and it recommended that, relevance could be further enhanced by the University through training in collaboration with industry and increased practical sessions.

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LIST OF ABBREVIATIONS, ACRONYMS AND SYMBOLS

ABS Antilock Braking System

AVA Associated Vehicle Assemblers

BMI Business Monitor International

BST Bachelor of Science in Technology

BT Bachelor of Technology

CAD Computer Aided Design

CKD Completely Knocked Down

CMC Cooper Motor Corporation

CNC Computer Numerical Control

CUE Commission for University Education

Co Company

CR Credit hours

DIY Do it yourself

ECM Electronic Control Module

EFI Electronic Fuel Injection

FKE Federation of Kenya Employers

GDI Gasoline Direct Injection

GM General Motors

GMEA General Motors East Africa

GOK Government of Kenya

GST General Systems Theory

Hp Horse power

HVAC Heating, Ventilation and Air conditioning system

ICE Internal Combustion Engine

ISO International Systems Organization

KMI Kenya Motor Industry Association

KNBS Kenya National Bureau of Statistics

KPH Kilometers per hour

KVM Kenya Vehicle Manufacturers

MDG Millennium Development Goals

MIG Metal Inert Gas

MOEST Ministry of Education Science and Technology

MPH Miles per Hour

NACOSTI National Commission for Science, Technology and Innovation

OAW Oxygen and Acetylene welding

OBDI Onboard Diagnosis I

OBDII Onboard Diagnosis II

PWC Price –water house coopers

R&D Research and development

SDA Seventh Day Adventist

SMAW Shielded Metal Arc Welding

STI Science Technology and Innovation

TAM Trans Africa Motors

TEP Technical Education Programs

TIG Tungsten Inert Gas

TMC Toyota Motor Corporation

TVET Technical Vocational Education and Training

UEAB University of Eastern Africa, Baraton

UK United Kingdom

USA United States of America

VVTi Variable Valve Timing With intelligence

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CHAPTER ONE

INTRODUCTION

1.0 Introduction.

This chapter covers the background information of the study, statement of the problem, purpose of the study, research objectives, research questions, assumptions of the study, significance of the study and theoretical framework.

1.1Background Information of the Study.

Education is generally viewed as an avenue through which people in any society are prepared to tackle current and future challenges confronting the society. It enables people to make positive contributions to the society they live in (Reid *et al*, 2004). According to Raja (1994), various studies have shown that education in most parts of the world is suffering from a "relevance gap". This is due to the fact that education has lost relevance and relationship to its philosophy and purpose. So much of what is included in various educational programs in different fields and levels of study has no relevance to students' live during their studies and at world of work after studies (Raja, 1994).

Relevance is the heart of any educational endeavor, there has been a need to always make Kenyan education relevant and responsive to the needs of the society. This quest is evident in the formation of various education commissions to probe into the education system in Kenya. The main purpose of the commissions was to make education more relevant to the needs of the society. Some of the notable education commissions were the

Ominde (1964), the Gachathi (1976), the Mackay (1981), Kamunge (1988) and the Koech (2000). All of them held the view that relevance should be the goal of education in Kenya. The Kamunge commission report of 1988 and the Koech commission report of 2000 specifically pointed out that education in Kenya should emphasize on relevance and quality in order to achieve the much needed development.

Kenyan government in 2007 came up with a long term development plan for the country titled "Kenya Vision 2030". The aim of Vision 2030 was to make Kenya a globally competitive and a prosperous nation characterized by high quality living standards to all its citizens by the year 2030. It was a result of a consultative and inclusive process carried out between October, 2006 and May, 2007 whose motivation was a collective aspiration for a much better society socially, politically and economically (GOK. 2007). The vision 2030 is anchored on three pillars of economic, social and political governance. It proposed an intensified application of science, technology and innovation (STI) in improving productivity and efficiency across the three pillars. It also recognizes the role played by research and development (R&D) in accelerating economic developments in all the newly industrialising countries of the world (GOK, 2007). On the human resource requirements of industrializing the economy in Kenya, vision 2030 highlighted the need for human resource development through the creation of a globally competitive and adaptive human resources. It suggested the use of life- long training and education and establishment of new technical training institutions and the enhancement of closer

collaboration between industry and training institutions. The Government created the STI policy framework to support Vision 2030. More resources would be devoted to education through scientific research, technical capabilities of the workforce, and in raising the quality of teaching mathematics, science and technology in schools, polytechnics and universities (GOK, 2007).

In the modern automotive industry, technology used in the various automotive systems is very dynamic. It is continuously changing and getting revolutionized (Tom, 2004). The changes are motivated by the need to improve on customer satisfaction, safety, and cost-efficiency in production of the various makes and models of automobiles (Helmut, 2006). These changes rely heavily on other scientific discoveries, research, manipulations and innovations (Tom, 2004). In order to cope with these technological dynamics, the institutions of learning especially the Universities like the University of Eastern Africa, Baraton (UEAB) must play a key role of producing the much needed manpower for the industry. Their training should be relevant and responsive to the ever changing market demands in terms of knowledge, attitudes and skills levels among the graduates (Tom, 2004).

UEAB offers among other degree programs a four year bachelors of Science in Technology (BST, automotive option). The goal is to produce graduates who can either be employed in the automotive industry or be creators of jobs by establishing their own automotive service businesses. According to Kitainge (2003), there has been a continuous

effort by the Kenyan government since independence to make her education relevant and job market driven. To achieve this, various commissions of inquiry into the education systems have resulted in various government policies on education and training, the Kamunge (1998) report contained in the sessional paper No. 8 of 1998 stated that the future policies in education and training should emphasize and give priority to relevance and quality, development of science and technology, vocationalization of education and research, this concerns came out clearly in the study.

The pragmatist view describes education as a change that is dynamic, what is taught in education institutions should be dictated by the needs of society. Education curriculum should be relevant and responsive to current and future needs of society. This view asserts that permanence is not the essence of reality (Tuckman and Monetti , 2011). Educators and educational institutions must therefore be ready to modify methods and policies in the light of new knowledge and changes in the society (Shiundu and Omulando, 1992). Amimo (2012) holds the view that due to the rapid changes in the job market, it is always important to study the job market trends to ensure that the training institutions are preparing students for successful integration into the job market. Educators should make their curriculum relevant to the job market so as to produce graduates who will fit into the industry. There should be collaboration and partnership between the institutions of learning and the industry in the education and training process (Tuckman and Monetti, 2011).

Dewey's view of education in Tuckman and Monetti (2011) is that education is for employment, and that the only adequate training for occupations is training through the occupation. Job knowledge, attitudes and skills are changing, new technologies are emerging and new opportunities are being created. All these require learning and re-learning, learning in school context and learning from experiences as they emerge at work environment, learning from teachers and learning from those in the work job market (Farrant, 2006).

According to Muindi (2011), Universities in Kenya would be ranked according to the rate their graduates are employed or create employment, which shows that those whose education and training was not relevant to job market cannot be employed and cannot be job creators by themselves. There is no better marketing tool for Universities than to thrive on the fact that their graduates are relevant in the job market. The competitive job market in Kenya can only accept and retain relevant graduates. Federation of Kenyan Employers (FKE) should supply data on employment trends of graduates from various Universities so as to be used on ranking the Universities (Muindi, 2011). Relevance in University education should turn the Universities into centers of innovation, enterprise and knowledge. Muindi (2011) added that: indicators for evaluating University education include relevance of the courses, volume of research undertaken, the student/lecturer ratio and the impacts of their research findings to the society.

Automobile industry is a symbol of technical marvel by human kind. Being one of the fastest growing sectors in the world, its dynamic growth phases are explained by nature

of competition, product life cycle and consumer demand (Erjavec, 2005). Today's global automobile industry is concerned with consumer demands for styling, safety, comfort; labour relations and manufacturing efficiency. The industry is at the crossroads with global mergers and relocation of production centres to emerging developing economies, this has brought rapid changes in technology (Biswajit *et al*, 2007).

1.2 Statement of the Problem.

Relevance is the key requirement for adoption or use of virtually anything. In the education and training process, if the graduates who are the products of education process do not possess the right knowledge, attitudes and skills that are required by the job market, then they are not relevant to the job market (Farrant, 2006). This is because they do not satisfy the needs of the society, they cannot participate as expected of them in solving the various societal problems. The automotive technology graduates from UEAB are not exceptional, they are expected to possess the relevant knowledge, attitude and skills that would enable them be effective and efficient workers in the automotive industry. Graduates are only absorbed and retained by industry if they are relevant to the industry in terms of knowledge, attitudes and skills. According to Kamunge (1998) education and training institutions in Kenya should lay emphasis on and give priority to the quality and relevance of education and training. But in spite of this, Ondari (2008) argues that there are numerous complaints from Kenyan job market regarding the quality and relevance of University graduates to the job market.

The Kenya's vision 2030 highlighted the need for trained personnel in the various sectors of the economy. This need is a clear evidence of shortage of manpower in the various sectors of the economy (GOK, 2007), this is an indicator that there may be a relevance gap between the graduates from institutions of higher learning and the job market demands. It is from these concerns that the study sought to investigate the relevance of automotive technology graduates from UEAB to the automotive industry in Kenya.

1.3 The Purpose of the Study.

The purpose of this study was to establish the relevance of automotive technology graduates from UEAB to the Kenyan automotive industry. It concentrated on relevance in terms of knowledge, attitudes and skills possessed by UEAB's automotive technology graduates and the knowledge, attitudes and skills required of automotive technology graduates by the Kenyan automotive industry.

The study also sought the views of the graduates and their employers regarding the state of affairs in automotive industry. It also sought to find out from UEAB's automotive technology lecturers about curriculum coverage, and finally factors affecting the sharing and counter-transfer of automotive technology knowledge, attitudes and skills between the University and the Kenyan automotive industry.

1.4 The research Objectives.

The specific objectives of this study were to:

i) Compare the automotive technology knowledge required by the Kenyan automotive industry and the knowledge attained by the UEAB's automotive technology graduates working in the Kenyan automotive industry.

ii) Compare the automotive technology skills required by the Kenya's automotive industry and the skills possessed by the UEAB's automotive technology graduates working in the Kenya's automotive industry.

iii) Compare the attitudes required by the Kenyan automotive industry and the work attitudes possessed by UEAB automotive technology graduates working in the industry.

1.5 Research Questions.

The following questions guided this study:

i) How does the automotive technology knowledge attained by UEAB's automotive technology graduates match the knowledge required by the Kenyan automotive industry?

ii) How does automotive technology skills possessed by UEAB's automotive technology graduates match the skills required by the Kenyan automotive industry?

iii) How does the job attitudes possessed by the UEAB's automotive technology graduates match the job attitudes required by the Kenyan automotive industry?

1.6 Assumptions of the Study.

(i) The respondents provided true responses as per their personal experiences and observations.

(ii) The modern automotive technology and systems are incorporated in automobiles in Kenya.

(iii) The respondents were objective in their responses.

1.7 Significance of the Study.

This study provided information on the relevance of UEAB's automotive technology graduates to the automotive industry in Kenya. It provided information about relevance in terms of knowledge, attitudes and skills. The information is useful to automotive industry stakeholders in Kenya since it provided some clue about the knowledge, attitudes and skills, which is required by the automotive industry. It was particularly useful to the UEAB administrators, automotive lecturers and automotive students since it generated information about the current needs of the automotive industry.

The study results could also be used by the curriculum developers in UEAB to come up with a more market driven curriculum for the automotive technology programs. The information could be used by the Kenyan Government to come up with technical

education strategies in line with the global millennium development goals and the realization of the Kenyan Vision- 2030.

1. 8. Theoretical Framework.

The theoretical framework which laid a foundation and guided this study was the General systems theory (GST) whose proponent was Ludwig von Bertalanffy. This theory is also referred to as Systems Approach and it is a process of the application of logical thinking in the solution of problems. Its nature is derived from the term 'system' which is broadly defined as a set of parts put together in an interactive and interdependent manner to achieve specified objectives (Banathy, 1992). A theoretical framework entails a set of broad ideas and principles that are intended to explain why something happen or exists, it is taken from relevant fields of enquiry and used to structure a subsequent presentation.(Crotty, 1998).

According to Weick (as cited in Boyce, 2003), a University viewed as social learning system /organization. Senge (1990) stated that: learning organizations are places where people continually expand their capacity to create the results they truly desire by undergoing a positive change, and where new and expansive patterns of thinking are nurtured. A learning organization has various parts which play different roles but with common objective (Senge, 1999). Education at UEAB was viewed as a process with the various parts/elements put into a continuum made up of inputs, process, outputs, and environment. As put in the general systems theory, every organization has a goal to look forward to, has inputs, process through which the inputs are worked on to produce the

required product (output). Success and relevance of each organization is based on the acceptability of its products by the outside world (in this case the industry/environment). For the educational organizations to remain relevant, they must produce outputs in terms of graduates who have the right skills, knowledge and attitudes required by the industry/ work environment. All systems have goals and the philosophical stance in this study was borrowed from the General Systems Theory (GST). A system has inputs, process, outputs and environment. The outputs in this study are compared with the needs of the automotive industry. All systems are surrounded by an environment, and hence the need for them to be aware of the environment it surrounds them especially in terms of knowing what the environment can accept or reject, this is done through environmental scanning (Banathy, 1992).

According to Bertalanffy (1969), environmental scanning is the process of acquiring and using information about the trends, events, needs, relationships in an organization's external environment. The knowledge obtained is used to assist the management in planning so as to remain competitive by being relevant and responsive to the environment. Environment entails factors that the system has no control over yet they have significant effect on the system's behavior and relevance. They include labor market, technological changes, and economic trends. Environment should never be ignored, institutions of learning should actively be watchful to the environment by having environmental scanning, and through this, the institutions would identify environmental variables that could affect their performance and survival. Environmental scanning

findings would show the nature and dynamics of the variables, and any decline in quality of a product of a system can lead to a call for change in the system or the termination of the system (Banathy, 1992). The rate of change, magnitude of change and guidelines to putting in place plans of action to counter the changes are important. Awareness is the key for each institution looking forward to respond to its environment. Awareness is achieved if there is information about something from the past, present and the future.

In this study, the interaction between UEAB and environment is in a form of a continuum, and from this type of relationship yields two types of systems namely *the closed* and *open systems*. A closed system is a self contained system with less and well controlled and predictable interactions with the environment, institutions with such system are not aware of the changes in their environment. Such systems are not ideal for learning institutions, and institutions with such systems don't survive long. Open system is a system which has many interactions with their environment, the interactions are frequent and unpredictable and such systems are aware of changes in their environment (Mukhopadhyay, 2005).

In this study, the inputs were the learners admitted into the automotive technology program, the change process is the teaching learning, and training processes, the outputs are the automotive technology graduates, and the environment was the automotive industry in Kenya. Graduates of a university were said to be relevant if they are acceptable by the environment/industry/workplace with respect to the performance

standards and quality. This is normally measured by the absorption and retention rate by the industry (Ondari, 2008).

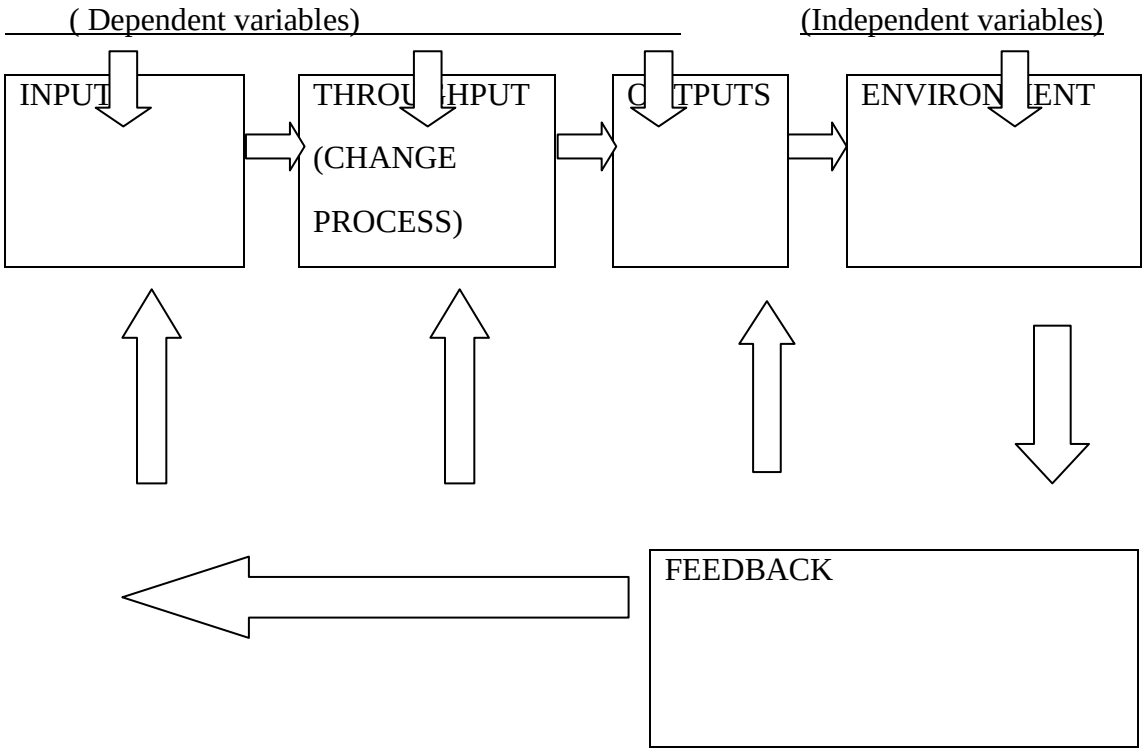

Figure 1: Theoretical framework

Source: skyttner (2001, p.74)

1.9 Operational Definition of Terms

Attitude - UEAB's automotive technology graduates' likes or dislikes at work place, it includes their learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object, person or situation at work place.

Automotive - Self propelled vehicles which are driven by engines especially the internal combustion engines.

Automotive industry - refers to the automotive sector dealing with assembly, sales of vehicles, sale of parts, repair, service and maintenance of automobiles.

Automotive technology - refers to a variety of knowledge and skills associated with the understanding of automotive systems, how this systems work, problem diagnosis and solving the various problems associated with the automotive systems.

Automotive technology graduates- UEAB's graduates of a Bachelor of Science in Technology, BST (automotive option) or Bachelor of Technology, BT (Automotive option) and are working in the Kenyan automotive industry.

Credit hours-This refers to the number of hours a student attend lecture/ class session per week in a given semester.

Environmental scanning- is the process of acquiring and using information about the trends, events, needs, relationships in an organization's external environment. The knowledge obtained is used to assist the management in planning so as to remain competitive by being responsive to the environment.

Feedback - Information about some aspect of data or process results that could be used to evaluate and monitor the system and to guide it to more effective performance.

Industrial attachment - the period of time UEAB's automotive technology students are sent to the real working environment relevant to his/ her training. Automotive technology students are sent for industrial attachment to automotive service industries.

Input – Students admitted into automotive technology program at UEAB and are to to be transformed by a system (teaching and learning process), they undergo a positive change.

Jua- Kali- (the informal work environment in Kenya). This is where the artisans earn a living by doing variety of repair works like motor vehicle mechanics, machine repairs, household item repairs. "Jua Kali" is a Kiswahili word for "hot sun" and refers to the fact that garages are located in the open.

Knowledge - an understanding of factors of principles related to automotive systems, a justified true belief, or an actionable information that resides in the graduate's mind.

Lifelong learning- is all learning activity undertaken throughout life with the aim of improving knowledge, skills and competence within a personal, social or employment related perspective.

Modern Vehicle – an automobile whose engine, body and transmission systems are controlled and run by a computer.

Onboard Diagnosis I- OBD I- Computerized automotive fault code system, it stores various automotive faults that can be read/retrieved using a scan tool (generation 1, used in year 2000 and earlier vehicles).

Onboard Diagnosis II- OBD II- Computerized automotive fault code system that stores various automotive faults that can be read/retrieved using a scan tool (generation 2, used in year 2000 and later vehicles)

Output- The product or service which results from the system's throughput or processing of technical, social, financial & human input.

Oxy-acetylene welding- Is a welding equipment that burns acetylene gas in oxygen to produce heat if fission for welding

Practicum- is the procedure of placing a learner on live work at the real working - environment, automotive students on UEAB are normally placed in busy automotive garage for a total of 450 hours before being allowed to proceed for industrial attachment.

Process - Series of things that are done to achieve a particular result

Relevance - is the degree to which knowledge, attitudes and skills held UEAB's automotive technology graduates match with what the automotive industry requires.

Skill- a general capacity related to performance of a set of tasks combined with abilities and capabilities that are developed as a result of training and experiences

System- set of two or more parts united together in an interactive and interdependent manner to achieve a specified objective.

Subsystem - smaller system which is part of a larger system, they can work parallel to each other or in a series with each other.

Technology - is a way of doing things easily, it includes technical methods, skills, processes, techniques. When it is combined by another term such as "automotive technology" it refers to the state of the respective field's knowledge and tools

Throughputs- The processes used by the system to convert raw materials from the environment into products that are usable by either the system itself or the environment.

Work Experience- this is a mode of training where UEAB's automotive technology students are is placed to work in various offices, laboratories and workshops to enable them gain a good interpersonal relationship and to appreciate the dignity of labor.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter examined the various materials available on the developments of automobiles, automotive, history of the automobile, internal combustion engines (ICE), early vehicles, modern vehicles, automotive industry in selected countries, the need for competent automotive technology graduates in automotive industry, career opportunities in automotive industry, technology and its nature, automotive technology, the role of institutions of higher learning in the production of needed technical manpower in Kenya, the history of education in Kenya, automotive technology taught at UEAB, relevance in education and training, knowledge, attitudes and skills and chapter summary.

2.1 A Brief History of Education in Kenya.

Education systems had been in Kenya since pre-colonial times, it began as an informal system with a goal of training individuals to fit into their societies as useful members and to participate in the general development of the society. The systems provided knowledge, skills and values relevant to the society (Eshiwani, 2011). Formal education began in Kenya in 1884 at a mission school in Rabai near Mombasa and rapidly expanded between 1900 and 1910 during the scramble among missionary bodies for supreme influence in different parts of Kenya (Eshiwani, 2011).

The country inherited a formal education system from the British colonial government and the Christian missionaries in early1960's. Since then, societal needs have been changing and education has been seen as an answer to most of the societal problems both at present times and in the future. As stressed in the Kenya's Vision 2030, education attainment is an important factor in human development because it determines the knowledge and skill levels of individual in the various sectors of the economy. This therefore made the Kenyan government to start reviewing its education system with respect to the emerging societal problems. The aim of reviewing the education system was to make citizens relevant and of beneficial to the country by solving the myriad of problems that inflict the Kenyan society, all these efforts were geared toward making the education outputs relevant to the needs of the society. There are a number of commission reports, proposals and recommendation on education in Kenya since independence, Ominde (1964), the Gachathi (1976), the Mackay (1981), Kamunge (1988) (Eshiwani, 1990) (Obagi , 2000), and the Koech (2000) Commissions. Ramani (2002) just to mention a few were the examples of work that has been done by the Kenyan government to re-evaluate her education system so as to make it more responsive to the needs of the country. The major objectives of the commissions arose due to due to the emphasis the government and the people of Kenya had given to education and partly the way education had failed to respond to the various national needs. All the commissions pointed at the issue of relevance in education and training which is an important factor for national development.

The Kamunge (1998) and Koech (2000) commission reports particularly suggested that the education system in Kenya should direct its strength on relevance and quality so as to make the education useful in the development goals of the Nation. The Mackay Commission report (1981), stated that education in Kenya should be aimed at enabling the youths to play a more effective role in the life of the nation by imparting to them the necessary skills, knowledge and inculcating in them the right attitude (Eshiwani, 2011).

According to Shiundu and Omulando (1992) there is nothing like a perfect curriculum, as the environment changes and the society portray new needs and challenges, the curriculum must change to address these needs. All these changes in society would provoke respective changes in the curriculum and other elements of the educational process, for this to be done harmoniously, studies and research must be conducted to investigate the situations in industry versus the existing curriculum, then weigh if the former is in harmony with the latter in terms of content and quality. It is only through research that a practical base for curriculum change to enhance relevance in education can be achieved.

The future policies in education and training should lay emphasis on and give priority to; the quality and relevance of education and training, the eradication of illiteracy, the development of science and technology, the vocationalization of education, research,

management and entrepreneurship training, the development of the handicapped, and the development of centers of excellence (Kamunge,1988).

According to Kerre (1995) the main purpose of technical education is to provide, alongside general education, knowledge, attitudes and skills in technical and vocational fields. This is aimed at meeting the national manpower requirements in transportation, agriculture, business, industry and other technical services. The transportation industry cannot be isolated from the automobile industry since automobile industry is a major part and component of the transportation industry. According to Kerre (1995) technical education is a key to manpower requirements in any industry, and hence the need for the respective industries and institutions of higher learning to work together in training. This would enhance the production of relevant, well trained, knowledgeable and skilled technical staff to work in the industry.

According to Bennell (1993) the formulation and implementation of industrial training policies is a complex social and political process, it has unintended consequences like: establishment of clear priorities in allocation of public resources, agreement with the training process, provision of high quality general education as an essential foundation, integration of industrial training with general education, decisive involvement of the state, and establishment of partnerships with industry. The central objective of technical and industrial training is improvement of productivity in the job market. Training should be relevant to the needs of employers, and there is an ever increasing need for re-training and curriculum modification due to the dynamics that revolve around the technological

changes in the work environment (Bennell, 1993; Kerre, 1990). Kerre (1990) further suggested from a global perspective that the framework for technology education for any given nation must be drawn from within the following:

1. A widely recognized and acceptable national conceptualization of the role of technology and national development, the need to compete favorably in an international market. The elements of technical education curriculum and emphasis be given in the school curriculum, a clearly defined and articulated vocational and technical training system that responds to the needs of society, industry and individuals.

2. A clearly defined national policy framework that have legislative backing, identifies and encourages the development of appropriate technologies which will enable the nation to meet its national development needs as well as remain competitive in a technological international market, supports comprehensive and continuing vocational technical training, and encourages and stimulates employment creation through self employment in both the formal and non-formal sectors of the national economy.

Kerre and Kwende (1995) concluded that African Nations could also benefit from technical education and TVET. However, this would only be possible if the governments and senior policymakers show a more practical commitment to the importance of technical education. This can only occur when technical education is established within the accepted academic environment, competent teachers are prepared and upgraded, policymakers are familiar with the theories and practices of vocational and technical

education and training. To enhance all this, there is a need for an elaborate environmental scanning by the educational institutions, governments and policy makers.

There is an intuitive appeal underpinned by political and economic considerations to the claim that schooling should be made more relevant to the world of work. This claim has been particularly strong in developing countries where governments have tried to curb educational 'over-production,' limit the demand for higher education, inhibit the drift from the rural areas to the towns and strengthen the contribution of the education system to economic growth. This appeal is indicating the need for the health collaboration between the educational institutions and industry in the training of the much needed technical manpower (Fisher, 1993).

According to Mbithi (2007), no society can remain ignorant and free for long, societies are always changing as its peoples' aspirations and needs grow and thus the curriculum. In this context, the curriculum must be designed to make the individual learner attending any formal education and training a creative, skilled, knowledgeable and productive person with desirable attitudes so that upon completion of training, they can play a role in the renewal of the society. This is in the light of the new social, economic and technical demands (Mbiti, 2007). For the general public in Kenya, the investment function overrides the consumer service function.

In conformity to this argument, Shiundu and Omulando, (1992) asserts that the Kenya's education system would be expected to fulfill two basic objectives namely:

a) The technical objective of furnishing future manpower with the necessary knowledge, attitudes and skills.
b) The social objective of inculcating those values which apart of contributing to the enrichment of people's lives will also be essential to the maintenance of a cohesive and productive society, all these were in harmony with the Kenya's 1970-1974 development plan (Shiundu and Omulando, 1992).

Mwigiri in Amimo (2012) argues that the graduates of Kenya's formal education system are generally not able to readily apply their knowledge and skills appropriately in workplace. According to Ondari (2008), Universities and other institutions of higher learning in Kenya have continuously produced graduates in technical fields at an increasing rate. These graduates hold various positions in respective industries in Kenya, among them the automotive industry, but despite of this important contribution made by Universities to provide the much need workforce, there are numerous complaints from Kenyan job market regarding the quality and relevance of University graduates to the industry/job market (Ondari, 2008). The goal of University education in Kenya is to provide an opportunity for appropriate education and training whose performance indicators is the production of graduates who are adaptable to challenges of workplace and relevant to the respective industries (MOEST, 2005).

2.2 The Automobile, Motor Vehicle and Automotive.

The terms motor vehicle, cars, automobile, and automotive have been used to mean the same thing. According to Volti (2006), the terms automobile and automotive are mostly used interchangeably in our day-to-day conversations, automobile is a noun meaning a car in American English where automotive mostly used before a word to show that is connected with vehicles that are driven by engines on a road surface. Volti (2006) defines the term automobile as a self propelled vehicle that runs on a road surface, the word was coined from a Greek word "Autos" meaning self and Latin word "mobilis" meaning moving. It means a vehicle that is capable of moving by itself rather than being moved by external power like being pulled or pushed by another vehicle or an animal. The term was coined in fourteen century by Martini who was an Italian engineer. And as per this definition, Nicholas Cugnot a French inventor is credited with the invention of automobile (Jain & Asthana, 2002).

According to Glancey (2003), alternative word for automobile is "car" which is believed to have originated from Latin word "carrus" or "carrum" meaning a wheeled vehicle, or the middle age English word from old northern France "carre" meaning cart, or from Gaulish word "karros" meaning chariot. Jain & Asthana, (2002) defined an automobile as a self-propelled vehicle driven by an internal combustion engine and is used for transportation of goods and passengers on ground.

2.3 History of Automobiles.

According to Michael (2011), the exact inventor of the automobile is lost in the mists of history. Many innovators and engineers from different countries worked on the same general lines in the middle of the nineteenth century deriving inspiration from the early steam buses and coaches. According to Michael (2011), the wheel is the most distinguishing feature of the invention of automobile. In the first two and four wheeled wagons, the wheels were firmly splinted to the axle made of wood and the wagons had no steering systems.

Archaeological discoveries have shown the evidence that the technology of wheeled transport has for long a time been undergoing gradual revolution. Evidence dating back to 2600BC such as the Ur cart shows the antiquity of the wheeled transport technology (Eric, 2001).

Automotive developments borrowed a lot from several other innovations to improve human communication and cargo transportation, the bicycle for example made great influence on the early automobiles, the chain and sprocket drive, pneumatic tires, ball bearings, tension spike wheels and brazed tube frames had a great deal in common to the bicycle industry of eighteen century (Volti, 2006).

By 1850, there was a noticeable and remarkable improvement in the wagon technology and at this period, the modulated braking was introduced in the form of linkages actuated brake blocks like those still found today on freight wagons (Eric, 2001). Beginning of 18^{th} Century came the period known as the "Age of enlightenment" which saw the first

scientific study of wagon building, hundred years later the steam locomotive was invented. During this period, scientific research into the theories of wagon building was witnessed and according to Eric, (2001) this resulted in publications of dissertations, studies and books on the wagon technology. To improve on total utility of the wagon there was a need to venture into other means of ensuring the wagon could be self propelled and this resulted to the need of steam engines and internal combustion engines to propel the wagons (Glancy, 2003).

According to Eric (2001), Most of the invention credit of internal combustion engine (ICE) was given to Belgian inventor Jean Etienne Lenoir who patented a two stroke spark ignition ICE engine in 1860. The engine's limitation was that of noisiness and overheating (Heitmann, 2009). The engine was also in-efficient, it used a mixture of coal and air (Jain and Aathana, 2002). In 1876, Nicholas Otto made improvements on the ICE and developed a single cylinder-four stroke cycle, the engine was a flame ignition and this ended a 200 year long period for the search for engine suitable for needs of automobile and other industries. Nicholaus Otto invented an effective gas motor engine in 1876 (Eric, 2001). In 1883 Gottleib Daimler, Karl Benz Daimler and William Maybach produced the first ICE capable of running at four times the speed of Otto's engine. In 1885, German mechanical engineer, Karl Benz designed and built the world's first practical automobile to be powered by an internal-combustion engine. On January 29, 1886, Benz received the first patent (DRP No. 37435) for a gas-fueled car. It was a three-wheeler; Benz built his first four-wheeled car in 1891. Benz & Cie., the company started by the inventor, became the world's largest manufacturer of automobiles by 1900.

Benz was the first inventor to integrate an internal combustion engine with a chassis (Eric, 2001).

Later Otto, Daimler and Maybach designed an engine that could produce 1.5 hp (horsepower). Maybach invented a modern carburetor for the engine (Heitmann, 2009). Carl Benz in 1887 build his own vehicle powered by gasoline engine and improved the carburettor by fitting it with a surface float and pre-heat system and to make the engine operate smoothly, he fitted it with a vertical flywheel (Eric, 2001).

By 1816, there was a rapid growth of new motor industry. Conrad Krauss designed and patented the under floor engine mountings, the idle control, the friction disc foot-operated clutch, cam-actuated intake valves, foot operated brakes, reverse transmission and four wheel drives (Eric, 2001). By 1890, there were only four gasoline engine automobile manufacturers: Benz, Daimler, Peugeot and Panhard. Emile cars and their development of ignition system, dry sump, lubrication system and the use of shock absorbers came soon (Eric, 2001). This marked the start of design competitiveness, all the car manufacturers struggled to make cars that were customer friendly in terms of engine power, initial cost, the cost of operation and maintenance, weight, aerodynamics, aesthetics, speed and safety among other customer needs like auto sports (Nick, 2001). In 1908, Ford started large scale manufacturing, it started with 20,000 units with the design objectives in mass production as the most cost effective way and by 1920, there was a gradual change in requirement of automobile design, safety, performance, speed and

comfort became the issue, water cooled spark ignition engines became the order of the day, engines were placed in the front of the chassis (Heitmann, 2009).

2.4 Modern Automobiles.

In this study, modern automobile was a vehicle manufactured after the year 2000. It is a transport equipment with many systems managed electronically by a computer or sets of computers. The modern automobile is a complex machine whose design and construction has been guided by a myriad of forces like the economic, safety, and customer preference (Jain and Asthana, 2002). There is an endless model offensive by all automobile manufacturers in every segment. The battle for automobile markets has brought far-reaching changes in the industry (Helmut, 2006; Kluyver, 2010).

2.5.0 Automobile Industry in Selected Countries.

Automotive industry is among the most important sectors in the modern economy globally. Many other industries depend on the industry since it consumes products from other industries in form of components (Doner *et al*, 2006). Automotive industry is an industry on the move, it is rapidly changing and the change is initiated by automakers in their scramble for a fair market share of customers in the competitive world (Cooney & Brent, 2007). The changes are seen in general vehicle designs, performance, user friendliness, cost of production, fuel economy and emission control. The industry has developed networks, alliances and cross-shareholding across regions and nations and this have made it a globalized industry (Lansbury *et al*, 2002). Globalization has made

leading automakers to venture into other countries with the Japanese and US automakers in the lead (Cooney and Brent, 2007).

2.5.1 Automotive Industry in United States of America (USA).

Automotive industry occupies a vital place in the US economy and American culture (Hillstrom, 2005). According to Helmut (2006), the first successful US gasoline-engine propelled motor vehicle, was designed and built by Charles E. Duryea and his brother Frank in 1893. They established the Duryea Motor Wagon Company in 1895 which was the first American company to build gasoline powered cars. There was a rapid growth of automotive industry in USA. In 1896, Henry Ford successfully operated his two-cylinder, 4-hp "Quadricycle" in Detroit and Ford Motor Co. was incorporated in 1903 with Henry Ford as Chief Engineer. In 1900 Henry Leland established the Cadillac Automobile company and built the Cadillac models and William Durant founded General Motors Co in New Jersey in 1908 (Helmut, 2006).

Henry Ford is credited for mass production of automobiles. In 1914 the Ford Motor Co. introduced the first moving assembly line of all time (Freedman, 2011). According to Cooney & Yacobucci (2007), the general production and sale of automobiles in the US was the highest in the word after the second world-war, the industry was a pillar and a beneficiary of American growth and economic achievement. Ford company with its Model - T started motor vehicle mass production in 1920's and proposed a design that could be a "world car" (Davis, 2007). President Franklin Roosevelt's 1942 order to all

civilian automotive makers to dedicate their operations in defence contracts to produce jeeps, tanks, trucks, aeroplane engines for warfare mobility together with artillery and bombs made the US automakers grow faster during and after the war (Freedman, 2011). The 1940s and 1950s were termed as the "Golden Age" of the US automotive industry due to the limited competitions and high demand for their products, it is in this period also that a number of break through innovations were introduced into the automotive industry, this included: self adjusting brakes, key operated starter switches, electric windows (power windows), self cancelling signals and the introduction of tetra-ethylene lead to gasoline by GM to eliminate engine knock or pre- ignition (Hillstrom, 2005). Other notable innovations during the "Golden Age" included the power steering systems, automatic transmission and the power assisted brake systems (Hillstrom, 2005).

According to Lansbury *et al* (2002), US automotive producers dominated the world after the second world-war up to the 1970s when globalization of the auto industry began and the competitive Japanese automaker, the Toyota penetrated the US market. Due to the 1970 fuel crisis, the fuel economical Toyotas gained market compared to the huge American fuel guzzlers gain market in the US. Cooney & Yacobucci (2007) holds the view that the globalization of auto industry despite threatening the US auto industry made the leading US automakers Ford and GM sell their automotive technologies in form of motor vehicle parts, systems and assembly operations to the global market.

2.5.2 Automotive Industry in Germany.

History of the German automotive industry dates back in the second half of the 19th century, serious work began in 1930s by the Volkswagen in pursuit of Nazi policy (Blanpain, 2008). German automotive industry players include: Daimler Chrysler, Opel, Volkswagen, Audi, BMW, Ford, and Porsche. Germany produced 10 million units annually 1990s, and to safeguard its international competitiveness due to globalization of the industry, the German automakers have taken drastic measures by setting up production sites abroad and working closely with the Original Equipment Manufacturers (OEMs) to produce quality components at competitive prices (Helmut, 2005). Some of the leading global OEMs include: Denso of Japan, Delphi of US and Robert Bosch (Bosch) of Germany (Doner *et al*, 2006).

2.5.3 Automotive Industry in Japan.

The Japanese automobile industry began much later compared to American and European. In 1904, Torao Yamahane produced first automobile in form of a steam bus in his home garage. Work was sponsored by two wealthy Okayama businessmen. The first car to be built with an internal combustion engine was introduced in 1907and was named after its principal investor, Shintaro Yoshida who owned a bicycle shop in Tokyo. The car was developed by Russian-educated engineer Komanosuke Uchiyama and between10 to 15 “Yoshida-type” vehicles were produced in 1908 (Shimokawa, 1994). After several trial models by Shintaro and Kamanosuke, partners of Otomobiru Shokai produced a trial

car powered by 12hp- 2cylinder American engine, by 1923 Hakuyosha produced 250 Otomogo automobiles, this became the largest output of any make of motor vehicle in Japan (Shimokawa, 1994).

Just before the Second World War, the Japanese automakers were under the instruction of the government to concentrate in the production of military trucks, the Mitshubishi Heavy Industries and Hino motors were in the lead in the production of military trucks and weaponry (Shimokawa, 1994). By 1952, Japanese were still trailing Europe and USA in automotive technology but owing to their wisdom, Japanese automakers begun technical associations with the already globalized European and American manufacturers and examples of such association included: Nissan- Austin and Hino- Renault. In 1960, the Japanese came up with more auto makers namely: Fiji Heavy Industries (makers of Subaru), Toyo Kogyo company (mazda), the Honda Motor company (Honda) and the Daihatsu motor company-Daihatsu (Shimokawa, 1994). Due to their effective adoption of new automotive technology and the existence of a skilled labor pool, by 1970s the Japanese experienced a rapid growth in their automotive industry (Lansbury *et al*, 2002)

2.5.4 Automotive industry in Korea.

According to Doner *et al*, (2006), Korea is second only to Japan as the most successful entrant to the auto industry in Asia. However, it remained weaker in design, parts and quality. The industry grew impressively after making a breakthrough to mass production in 1980s and some of Korean leading auto makers include: Hyundai, Kia (in partnership

with Ford and Mazda), Ssang Yong and Daewoo (partnering with GM) most of which continued to depend on their foreign partners for technical assistance. (Doner *et al*, 2006).

2.5.5 Automotive industry in China.

Chinese auto industry is one of the fastest growing yet youngest in the world. It started in 1980s when most of her competitors like the US, Germany and Japan were well established (Richter, 2000). An astonishing number of vehicle manufacturers have sprung up in China to satisfy the public demand for automobiles in domestic and international markets, there seems to be no general agreement on what is the total number of automobile makers in China but estimates put it at between 100 and 150, on the same note it has been difficult to keep up with the number of models from Chinese car makers (Trippon, 2008).

Due to the rapid growth of demand for cars and automakers in China, the country in 2003 overtook Germany as the third largest market for vehicles and France as the fourth largest producers of vehicles in the world (Doner *et al*, 2006). According to Anderson (2012), another strength for rapid growth of the Chinese auto industry was the positive direction by Chinese automakers to acquire the relevant automotive technology from abroad and use it to assemble their cars and even design and build own cars using the technology they have developed. Anderson (2012) argues that much of what counts for "innovation" in China is merely copying and tweekening of foreign technology, Chinese

concept of “Shanzhai” is used to describe products that are imitations of famous brand-name products.

According to Fernandez & Fernadez (2007), the rapid growth of Chinese automotive industry have resulted in many foreign automakers forming partnerships with Chinese companies in their quest to secure market share in China. The most notable partnerships being: Shanghai Auto Industries (partnering with GM), First Auto Works (FAW) with Volkswagen, Chang’an (with Ford and Suzuki), Guangzhou Automobile (with Honda and Toyota), Dongfeng (with Nissan, Kia and Citroen), Beijing Auto (with Hundai), Cherry- Chrysler, Fiat, Brillince China (with BMW).

Best selling models from China include: Volkswagen Jetta, Volkswagen Sontana, Buick Excelle, Toyota Camry and the Cherry models (Trippon, 2008). Unfortunately, unlike the Japanese and Korean makes and models, Chinese automotive brands still fall short of consumer expectations globally and even in domestic market due to quality (Anderson, 2012).

2.5.6 Automotive Industry in Kenya.

Due to the globalization of automobile industry, the Kenyan automobile industry relies heavily on imports of used spare parts, new parts, used vehicles, new vehicles, vehicle accessories, and completely knocked down parts for assembly plants. The imports are from; Japan, Korea, India, United States, Germany, Britain and France. These automakers are in the peak of extreme competition characterized by the endless model

offensive, innovations of new systems and component improvements in vehicle manufacturing. This is motivated by the need to remain competitive in the market by ensuring customer satisfaction, safety, and affordability of their units (Helmut, 2006).

According to Juma (2013), more than half of the new vehicles sold in Kenya in 2012 were assembled locally, the move was driven by dealers' bid to lower taxes and offer competitive pricing. Imports of parts used in assembly were exempted from the 25 per cent import duty levied on fully built cars hence giving room to the assemblers to produce cheaper vehicles (Juma, 2011).

Data from the Kenya National Bureau of Statistics (KNBS) shows that 5,456 vehicles were assembled in Kenya in 2012, representing 52.3 per cent of the 10,422 new vehicles sold in the same period. Imports of completely knocked down parts used in local assembly were exempted from the 25 per cent import duty levied on fully built cars thus enabling assemblers to produce cheaper vehicles. Major vehicle assemblers in Kenya included: Kenya Vehicle Manufacturer (KVM), Associated Vehicle Assemblers (AVA) and General Motors East Africa (GMEA). Most of the assemblers are running at about 10percent capacity.

Peak production of vehicles was realized in 1985, this was due to the country's favorable economic status then and the liberalization of the auto market in the 1990' which paved way for cheaper second-hand imports. In 2012, AVA was making 2,500 units compared to a peak of 10,000 units in 1985 (Juma, 2013).

In 2012, General Motors East Africa (GMEA) which accounted for half of total assembled units in Kenya produced 2,294 units of its Isuzu trucks and buses. The vehicle assembler was expected to gain from increased demand for her products by global vehicle manufacturers, the global manufacturers wanted to gain from friendly taxes on locally assembled units (Juma, 2013).

In 2010, Toyota Kenya and Simba Colt Motors assembled their pick-ups and light commercial trucks at AVA, Marshalls and Simba Colt each had a 50 per cent stake at AVA. CMC Motors and DT Dobie assembled their buses and pick-ups at KVM and they each controlled 32.5 per cent stake while the government had 35 per cent. Marshalls was another local automotive company who partnered with Tata of India to assemble commercial trucks and pickups, Ashock Leyland also had an interest in Kenyan market and had started assembling commercial trucks and buses (PWC, 2006). Most of the automotive assemblers in Kenya have licenses to import completely knocked down kits (CKDs), assemble and distribute motor vehicles on behalf of principal car manufacturers from abroad especially Japan, UK, and Germany (Okath *et al*, 2011).

Kenya is attracting investment due to continued import tax exemptions and the expanded market within the East African Community. It is attracting more global vehicle firms that had an interest in setting up assembly plants in the Country like Tata Motors, Foton East Africa, Chery Automobile. Toyota Kenya was expected to start assembling more than 6,000 units of their vehicles annually in the medium term. Commercial vehicle manufacturer Beiqi Foton Motor launched its first domestically produced trucks in 2011,

after establishing a local subsidiary in the country in late 2010. Foton pick-up truck was assembled in 2011 at the Kenya Vehicle Manufacturers facility. Chery Automobile is another Chinese carmaker investing in Kenya with its local franchise holder Stantech Motors (Business Monitor International, 2012).

According to Kenya Motor Industry (2013), Honda had dealership in Kenya, with full sales, spares and service facilities dealing with model ranges like the Honda Brio, CR-V and Accord. The operation runs as a division within Trans Africa Motors (TAM), a Dubai-based industrial conglomerate that already represents four commercial vehicle franchises in Kenya, supported by Honda Motor South Africa in Nairobi.

Toyota Kenya have invested Sh500 million in a Toyota truck and bus assembly plant in Mombasa, the plant Hino Motors was expected to produce 40 trucks and buses monthly and hoped to sell 1,200 Hino units by 2015. Hino is a Tokyo based subsidiary of Toyota Motor Corporation, the company have signed a memorandum with the Kenyan government on commitment to attaining Vision 2030. Plans were underway to transfer latest automotive assembly technology to Kenya through the placement of Japanese engineers at the AVA plant (Marete, 2013). The motivation for setting up of a Hino truck and bus plant was the existence of a huge market for commercial vehicles mainly pick-ups, trucks and buses in Kenya (Herbling, 2013).

In 1980s, the Kenyan government had an ambitious plan of manufacturing a car in the country (Nyayo Pioneer car), the government wanted to build a purely Kenyan car

industry without help from any car manufacturer by using only the technology that was available in Kenya. In1986, University of Nairobi's school of engineering designed a low cost car which was to be made in Kenya, efforts were made to obtain information about car manufacturing from leading car manufacturers abroad and teams of professionals were placed strategically all over the world to gather the much needed technology and information. As a result of the effort, by 1990, several prototype Nyayo cars and pick-ups were launched (Hornsby, 2013).

The government of Kenya formed Nyayo Motor Corporation to oversee the vehicle production but the company was soon faced with challenges, the first challenge was lack of funds due to the fact that the country was still developing and the government never allowed any foreign investor to touch the project, secondly the Railway workshops who was the main component producer lacked the capacity to produce components which were sufficiently accurate to build a car and finally the mismanagement and corruption completely destroyed the project (Hornsby, 2013).

Nyayo Motor Corporation collapsed in 2011 and was later renamed Numerical Machining Complex Ltd (NMC) which is an ISO 9001 : 2008 Certified engineering firm incorporated under the companies Act, the purposes was to manufacture motor vehicles, vehicle spare parts and metal-based engineering products. The company offers mechanical and engineering services to the Agricultural, Industrial and Automotive sectors in the East Africa market. NMC is equipped with Computer Numeric Controlled

(CNC) machines, a foundry with a modern disamatic sand-moulding machine, heat treatment and Computer Aided Design (CAD)

2.6 The Demand for Qualified Automotive Technology graduates in Automotive Industry.

According to Erjavec (2005), Servicing today's motor vehicles is much different than it was just few years ego, this is due to the complexities in the vehicle systems, there are forces and demands pushing automakers to build more reliable, cleaner, safer and most fuel-efficient vehicles and this have drastically changed the way automobiles are build, operated and serviced. Today's automotive technicians must keep in phase with the changes in technology and those who couldn't keep in phase have been forced out of the industry. Those wanting to enter the industry may find it difficult to gain the required knowledge, attitudes and skills. Some who enter the industry without the relevant skills, knowledge and attitudes normally don't stay long (Erjavec, 2005). Rapid change in automotive system technology requires a responsive training of automotive technicians. Otherwise, the result will be a shortage of qualified technicians. There are excellent career opportunities for skilled, knowledgeable and competent staff in automotive industry (Erjavec, 2005).

According to Wang and Kathleen (2008), workers in various industries need to be better educated especially in the field of technology and due to rapid changes and advancement in the various forms of technology, workers would need a continuous training to keep them in phase with the technological changes. Technical Education Programs (TEP) such

as automotive technology need to keep with changes in technology. Automotive service sector is experiencing drastic changes due to use of computers in engine mangement. Automotive technology trainees therefore need to be trained adequately in automotive computer diagnostics if they are to successfully enter, stay and remain relevant to the automotive industry. One of the ways through which technical education programs can produce quality and relevant automotive technology graduates is by collaborating with automotive industry players in training (Wang and Kathleen, 2008).

The rate at which technology is changing in the automotive industry has far reaching consequences, in the developing world like Kenya, the biggest challenge being that of ensuring a continued imparting of requisite competencies to automotive technicians, this is so as to make them relevant in industry and able to cope with these changes in technology (Erjavec, 2005). The better way of matching the technological changes and the supply of trained personnel in industry is by using the educational institutions especially the universities to impart the required knowledge, attitudes and skills to the automotive technology trainees. For this to be realized, the work environment which is the recipient of the changing technologies and the graduates must be in constant touch with the training institutions (Tom, 2004).

The automobile started as a simple invention and has developed to become a complex sophisticated machine with complex systems, it requires competent service technicians to diagnose and solve the various automotive system problems. Service technicians are trained personnel who can assess various vehicle problems, perform all the necessary

diagnostic tests and completely repair and or replace faulty components, such knowledge and skills to do the job is pegged on a sound understanding of all the principles behind automotive system technologies, the job experience, the right attitudes, the right tools and equipment and most important is continuous training in new and emerging automotive technologies as they are introduced to the industry (Erjavec, 2005).

2.7 Career Opportunities in Automotive Industry.

According to Erjavec (2005), life changed globally when the first automobile rolled down the street over a century ego. Automobile is a necessity to all people especially the industrialists, businessmen, and the working class all of which without automobiles, going about their businesses and duties could be difficult. This has made the demand for automobile increase and hence the need for the industry to manufacture, sell and service more automobiles. The rapid growth of the industry has resulted to the increased need for trained workforce. According to Giles (2009), automotive technicians could enjoy various types of careers in the automotive industry. As long as technicians possess the right knowledge, attitudes and skills required by the industry, they can work in the following areas of the industry:

a) **Dealership**-They can serve as a link between the vehicle manufacturers and customers in a privately owned franchised operation arrangement, this is where the technicians sign a contract with particular vehicle manufacturer to sale and service a particular brand of car.

b) **Independent service shop owners and operators**- Technicians can become their own bosses and start own automotive service shops which deal with a variety of car brands.

c) **Franchised repair shops**- shops run by large automotive companies.

2.8 Technology.

According to Clarke (2005), technology plays an important role in our daily lives; we need therefore to understand it better. When describing individual technologies, we need to refer to consistent distinguishing characteristics. Concepts like automotive-technology, information-technology, exist side by side yet each relies on a different descriptor.

Various scholars have tried to come up with a concise definition of the term technology. The term technology was coined from Greek words Techne- meaning practical art and Logos meaning human reason. Grubler (2003) defines technology as a system or means to particular ends that employs both technical artefacts and information know-how. Arthur (2009), defined technology as: a means to fulfill human purpose and it entails assemblage of practical and competent methods, devices, and engineering practices available to a culture..

According to Clarke (2005), Technology is defined as created competence expressed in technological entities consisting of devices, procedures and acquired human skills. From this definition, there are points to note that will further describe the components of technology, this are created, competence, entity, device, procedure, and acquired human

skill. According to Clarke (2005), the following are some of the attributes of technology: it is created, procedural, is an entity, a device and is acquired.

2.9 Nature of Technology.

According to Grubler (2003) technology has a dynamic nature. It grows in three stages- invention/discovery, innovation (first commercial application) and diffusion (widespread replication). Technology, basically consist of manufactured objects with the purpose of enhancing human capabilities and enable humans to perform tasks they could not perform otherwise. Grubler (2003) further argues that, Technology has the following characteristics: uncertain, is dynamic, is undergoing systematic evolution and its change is commulative. It ends in technology diffusion which is widespread replication of a technology and assimilation in a socioeconomic setting. Diffusion is final stage and can be the most satisfying or painful state of an innovation, painful if the innovation cannot create a niche of its own. Technology is not free, it is the result of deliberate research and development in universities, government and private laboratories, companies, innovators, and creative individuals and hence has a cost attached to it (Grubler, 2003).

2.10. Knowledge.

In virtually every aspect of our lives, we deal with knowledge and we use the phrase "knowledge is power" frequently in our conversations especially when one is having a conversation or delivering a speech with the aim of telling the audience about the importance of education (Eliezer, 2008). Various scholars have tried to define knowledge

and according to Keith (2000), all agree that knowledge is a valuable possession of mankind, but they disagree about what knowledge is about and how it is acquired.

According to Shajahan and Shahajan (2004) knowledge is defined as an understanding of factors of principles related to a particular subject. Nonaka and Takeuchi (1995) defines knowledge as actionable information and states that knowledge resides in the human mind. Plato defined knowledge as a justified true belief (Keith, 2000). Knowledge is also defined a familiarity with something for example facts, information, practical skills or theoretical understanding of a subject. Knowledge acquisition involves a complex cognitive process of perception, learning, association and reasoning and it is associated with the capacity of acknowledgement in mankind.

Bali (2005) argues that the meaning of knowledge could be answered by exploring the ways in which knowledge is structured, looking into the elements of knowledge, examining the nature, dynamics and progress of knowledge, uses of knowledge in the daily lives of people and examining how individuals apply the knowledge in social and economic affairs of their communities (Bali, 2005). In this study, the knowledge dealt was concerned with the correct information sense. The role of this type of knowledge in human reason is essential to human nature and among the very essential roles of knowledge is the use of it to reason out to conclusions in man's day-to-day activities, to confirm some hypotheses and refine others (Duncan, 2010). This type of knowledge is called human knowledge and is described as a technological and economic asset of

human beings, this knowledge deals with the intellectual property and is viewed as a factor of production of goods and services (Nonaka and Takeuchi, 1995).

Keith (2000) argues that Knowledge was coined from the Greek word "know" meaning to be acquainted with something or to recognize something as true. Knowledge can be formal or systematic. Keith (2000) further pointed out that knowledge has some prerequisites namely: knowledge must have truth in it, should be universally accepted and justifiable. According to Duncan (2010), the two common prerequisites of possessing knowledge are that: One has to belief in the relevant proposition, idea or plan and the belief has to be true and there should always be a match between what we think is true and what the case is/ real truth.

Noraka and Takechu (1995) hold the view that there are two types of knowledge namely: Tacit knowledge entailing of practical experience and explicit knowledge which entails a rational sequential theoretical experiences. Harry (2010) added that tacit knowledge is not explicated. According to Duncan (2010), there are two types of knowledge namely: Propositional knowledge based on a proposition and ability knowledge also referred to as know-how knowledge based on manifestations of ability to do something or accomplish a task. This study looked at the tacit, explicit, propositional and ability knowledge of automotive technology required in Kenyan automotive industry and that possessed by the UEAB's automotive technology graduates. The government of Kenya recognizes the need to equip its citizens with knowledge that will enable them be responsive to the problems facing the Kenyan society (GOK, 2007). There is therefore a need to ensure

that the Education in Kenya and Universities should equip the students with knowledge that matches with the needs of the society.

2.11.0 Attitudes.

Attitudes are an important aspect of work place behavior, they play a role in employee's turnover (Shahajan and Shahajan, 2004). We use the term attitude in our daily lives to mean different things but most of the times it is used to mean some form of outlook on life. Attitudes have been defined differently by various scholars. Gerd and Michaela (2002) defined an attitude as anything that a person hold in the mind, they further described attitudes as containing affective, behavioral and cognitive human responses and attitudes are central parts of human individuality. Gregory and Geofrey (2010) defines attitudes as a person's likes or dislikes and that attitudes are important values of human being since they influence how people view the world, how they respond to various situations, how they think and what they think, how they view work and work place, and also what people do in their daily lives. Attitudes are very important in understanding human thoughts and behaviors. Attitudes also influence someone's likes, dislikes and change over time. Greenberg and Baron (1997) defines attitudes as stable clusters of feelings, beliefs and behavioral predispositions towards specific objects, people or situation. They further argue that attitudes may consist of three major components namely: evaluative, cognitive and behavioral components.

Shajahan and Shahahan (2004) defined attitude as a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object. The object of an attitude can be anything in a person's environment and it includes physical objects, issues, ideas, events and people. Lakshmi (2003) holds the view that attitude is an emotional reaction towards a person, a task, thing or a situation.

Gregory and Geofrey (2012) argue that attitudes are not directly observable but can only be inferred from their responses. Different measures of attitudes are distinguished on the basis of whether they are explicit or implicit, explicit attitudes are direct and require while implicit attitude are indirect. Laton (2006) asserts that attitudes cannot be directly observed but are inferred by a person's behavior. Rao and Narayana in Shajahan and Shahajan (2004) hold the view that measuring attitude is concerned with valence and extremity in favorableness or un-favorableness towards an attitude object. Katz in Shajahan and Shahajan (2004) argues that attitudes serve the following functions: adjustment, ego-defensive, value expressive, and knowledge functions.

2.11.1 Attitude Formation.

According to Shahajan and Shahajan (2004) information and beliefs about an object leads to the formation of attitudes, information and positive beliefs about an attitude object leads to positive attitudes. Shahajan and Shahajan (2004) further argued that attitudes are dynamic since they change. The forces of attitude change are within the person and in the person's social environment. Attitude change happens due to: norms in social group,

something that persuades a person to shift his/her attitudes and lack of comfort with some a person's beliefs about an attitude object.

2.11.2 Work Place Attitudes.

Workplace attitudes are associated with numerous and important aspects of organizational behaviors inlcuding the overall job performance. Greenberg and Baron (1997) defined work place attitudes as attitudes relating to any aspect of workplace settings and it consists of lasting feelings, beliefs and behavioral tendencies towards various aspects of a job itself, settings in which job is done and the people involved in the job. In this study, the researcher concentrated on workplace attitudes possessed by the UEAB's automotive technology graduates working in the Kenyan automotive industry. According to Greenberg and Baron (1997) positive workplace attitudes normally set a stage for productivity, harmony and good performance in workplace. According to Laton (2006) the indicators of positive or good work place attitudes includes: showing up for work in time, giving advance notice for absence, adhering to the organizational rules and regulations and not steeling from the employer among other desirable qualities. Laton (2006) further argues that qualities that infer highly acceptable attitudes are sought by every employer. They include; initiative, good interpersonal skills, dependability and discipline.

2.12 Skills.

According to Schimidt (2008), skill is defined as a general capacity related to performance of a set of tasks combined with abilities and capabilities. Skill is developed as a result of training and experiences, skills are often categorized as psychomotor

activities and are measured in terms of ease and precision evident in the performance of some task. Schimidt (2008) further argues that training and development generally focus on changing or improving the knowledge, skills and attitudes of individuals, training typically involves providing employees with the knowledge and skills needed to do a particular task or job through attitude change.

Werner and DeSimone (2009) hold the view that a skill is acquired characteristic, and its acquisition occurs in three phases namely: declarative knowledge, knowledge compilation and procedural knowledge phases. There are many types of skills but to distinguish them, a descriptor is used before to word skill(s) so as to distinguish the various types of skills for example motor- skills, communication- skills etcetera. Education and technical training programs normally narrows the scope to teach a particular skill area of knowledge, the most important type of skill required when training automotive technicians is the motor skills (Werner and DeSimone, 2009).

Schimidt (2008) defines Motor skill as a proficiency a person demonstrates when performing a movement, the determinant of success is the quality of movement that the performer produces. Motor skills are learned by practicing the movement and doing so that the quality of movement improves or is perfected, it involves using our bodies to manipulate something.

The education system should provide the skill that are required to steer Kenya to the economic and social goals of Vision 2030, the government acknowledged the problems of mismatch between the levels skills imparted by education system as a whole and the

requirements by the industry (GOK, 2007). There is a need therefore for Universities and other institutions of higher learning in Kenya to produce graduates whose skill levels matches with the requirements by the industry.

2.13. The Role of Institutions of Higher Learning in Training Technical Manpower in Kenya.

Raju (1973) describes institutions of higher learning as those institutions which offer post secondary education, and their primary purpose is teaching and research. This therefore qualifies the universities as institutions of higher learning. Universities in Kenya participate in the training of high level professional manpower and in research into problems of national concern and are therefore seen as having a clear and important role in National development; a role which has been described by successive development plans in Kenya including the millennium development goals (MDGs) and the vision 2030.

Based on the work force demand changes in late 1970s, the Mackay (1981) commission was set to look into the education system in terms of relevance to the needs of the society then, it strongly recommended for the establishment of the second University in Kenya which was to be technology based with the aim of producing the much needed university trained technicians and engineers to help in solving the technical problems of the country and this was viewed as a path through which development could be achieved. This led to the establishment of Moi University in Eldoret. A university is viewed by the society as a

source of high level manpower and what universities in Kenya produces in terms of knowledge generation through research and knowledge, attitude and skills transmission via teaching is a major factor in the calculations and projections of development plans (Kenneth, 1991).

Universities in Kenya are basically western in their ethos and approach to intellectual training (Damtew & Philip 2003). The society readily assumes that university students form an in elite group. However, there are a myriad of problems facing the higher education in Kenya, they include the following: student political activism, political interference, unemployment of university graduates, poor state of research and publishing. Other problems are brain drain, mismanagement of the limited resources and relevance of curriculum to the work environment (Damtew & Philip 2003).

2.14. Relating Training to Work Place Requirements.

No society or Nation can remain unattached and free from its environment for long. Society is always changing as its peoples' aspirations and needs grow, thus the curriculum of any society's educational institutions must in as much as possible, serve as a tool for directing various forces of change towards the desired goals (Bertalanffy, 1969). It is from this context that institutions of higher learning endeavour to make their graduates relevant to job market. They do environmental scanning and use the findings to re- design their curriculum so as to make their graduates relevant to the job market. According to Koech (2000), any individual learner attending any formal education and

training should upon graduation be a creative, skilled and productive person with highly acceptable work place attitudes, so as to help in the renewal of the society. The education and training must supply job market with workforce that has the necessary knowledge, attitudes and skills. The government and the institutions of higher learning should improve on their policies and practices so as to create elaborate links between world of work and institutions of learning, this is aimed at ensuring the graduates from learning institutions are relevant to the world of work (Koech, 2000).

2.15 Relevance of Education and Training to Work Place.

Relevance is the key requirement for adoption or use of virtually anything. If something is not relevant, it may not be of use ("Relevance of Formal Education", 2005). Relevance can also best be defined as the degree to which a resource or activity matches an end user's needs. Wehmeier (2000) defines relevance as having ideas that are valuable and useful to people in their lives and work ("Relevance of Formal Education", 2005). The closer the match, the greater the potential value, and within education system, relevance is a subjective concept. This is evident in the reports by the various commissions of inquiry into the Kenyan education, examples of this reports are contained in Gachathi (1976), Ominde (1964), Mackay (1981), Kamunge (1988), and the Koech (2000) all of which strongly pointed out the need to make education relevant to the needs of the society. The Koech (2000) and Kamunge (1988) reports particularly stressed the need for education and training institutions in Kenya to lay emphasis on and give priority to the quality and relevance of education and training. Further, GOK (2007) in the Vision 2030

have stressed the need for the country to have a highly educated and skilled workforce who can readily be integrated into the job market. This can only be realized through the provision of relevant education and training by the institutions of learning.

2.16.0. University Education in Kenya.

In Kenya, there are quite a number of higher institutions of higher learning comprising of public universities, chartered private universities, University colleges, Private Universities with interim letter of authority and the National Polytechnics some of which have recently changed to Technical Universities. According to the statistics from the Commission for University education (CUE), in 2013, there were a total of 68 institutions of higher learning bearing the name university, out of which 22 were fully accredited public Universities, 9 constituent colleges for the public universities, 17 Chartered private Universities, 9 constituent colleges of the private universities, 12 Universities with letter of interim authority and 2 registered private universities (CUE, 2013). Appendix V, shows the list of universities that were authorized to operate in Kenya by June, 2013.

Most of the public universities offered training up to Doctorate level in almost all fields of study and a few chartered private universities train up to Doctorate level in few and limited areas especially education, theology and business areas (CHE, 2012)

The training capacities from most Universities in Kenya especially the public universities have been badly overstretched due to double intakes of both regular and parallel programs. By 2013, there were are over 110,000 students enrolled in total in universities in Kenya.

2.16.1 University of Eastern Africa, Baraton (UEAB).

The University of Eastern Africa, Baraton (UEAB) is a pioneer chartered private university in Kenya and a pioneer institution which offers a bachelors degree in automotive technology in Kenya. It is currently the only university in East Africa community who offers a Bachelors of Science degree in Automotive Technology. The university was established in 1983 as an affiliated College of the Andrews University in Michigan State, USA. It is run by the Seventh Day Adventist Church (SDA). The university's motto is oriented to a holistic education of developing her students' mental, physical and spiritual domains. The University's mission statement is: To provide and advance holistic quality Christian education which develops men and women to be earnest seekers of truth and be adequately equipped with appropriate knowledge, skills and attitudes for the service to God and humanity (UEAB Bulletin, 2010).

2.16.2 Automotive Technology Taught at UEAB.

With regard to the nature of knowledge, UEAB beliefs that all true knowledge has its source from God and is made available to man through a variety of channels. Knowledge enables man to appreciate life and to face problems that arises. The university seeks to provide an opportunity for developing proficiency in discovering knowledge that is relevant to life (UEAB Bulletin, 2010). The UEAB's mission is to provide and advance holistic quality Christian education which develops men and women to be earnest seekers of truth and be adequately equipped with appropriate knowledge, skills and attitudes for the service to God and humanity.

The university has various schools and among them is the school of science and technology under which the department of technology falls, the department offers bachelors degree programs in automotive and electronics technology. The automotive students have two options to pursue, the BT- Bachelors of Technology (automotive option) or BST- Bachelors of Science in Technology (automotive option) the main difference between the two choices is that the former has more business management courses than the later, the University runs in a trimester system, each academic year having three trimesters. The degree programs runs over a period of 4 academic years and after the 3rd year, the automotive technology students are expected to have completed at least three quarters of the academic credit hours as stipulated in the governing bulletin and 450 hours of practicum. Practicum is the teaching strategy where the students are engaged in live-study activities in the automotive garage run by the technology department. After this, the students are ready for another 450 hours of industrial attachment in the relevant industry preferably the automotive service industries, garages and even automotive assembly plants. The industrial attachment is normally completed within a period of three months or within one semester (UEAB, Bulletin, 2010).

During the practicum sessions, students are guided with strict supervision to put in practice the knowledge and skills they have learned in class and in lab sessions. The venue of practicum is the UEAB's automotive garage. Activities in the garage are very similar to what learners will encounter with in the world of work. The practicum

supervisors are normally the teaching staff assisted by qualified automotive technicians. Upon completion of 450 practicum hours, most of the general educational requirements, core, concentration and cognates, the students are send out to the real working environments for industrial attachment where they are placed in a real working environment, they face and solve real life automotive problems. In this session, the students are exposed to the new automotive technologies incorporated onto the newer car models and are exposed to the real systems problems, diagnosis and solutions.

According to the UEABs bulletin (2011), automotive technology students undergo a training involving the general knowledge, spiritual knowledge, technical knowledge, live and work attitudes and work skills together with specific automotive professional skills and work ethics. They cover the specific areas of academic work successfully before they graduate and get into the automotive industry to earn a living by working in the industry, they cover the following cluster of courses:

2.16.3 General Education Requirements.

The General Education Courses are intended to give students a broad view of knowledge and certain useful skills which are common to liberal arts and education. The program affirms a holistic approach to the development of the student by not only dealing with the intellect, but by the inclusion of those areas that will assist the student to develop spiritual strengths, religious values, and social abilities. It is hoped that the program would assist the student to construct a thoughtfully conceived world view that recognizes the roles of

Scripture, and nature as sources of truth. Goals of the programs are achieved through the following General Undergraduate Curriculum: Religion, languages and communication, general work experience, vocational skills, health principles and environmental awareness.

2.16.4 Core Automotive Technology Courses.

This are courses that provides a foundation to the learners so as to understand automotive technology, do interpretation of the complex automotive systems, and to explain the various phenomena associated with the automotive systems. The core technology courses are listed in appendix VI.

2.16.5 Concentration Courses

These are the courses covering the real automotive systems and related contents in details. It covers system components, system design, system operations, problem diagnosis and problem solving procedures. The concentration courses are listed in appendix VI.

2.16.6 Cognates.

These are courses which equips the learners with support knowledge and skills while practicing as automotive technicians in the job market or as owners of automotive service garages. The courses assist the graduates particularly in financial management, understanding some phenomena in management, work ethics and making projections. List of courses under the cognates are shown in appendix VI.

After completing the above courses which makes up an automotive technology program, the automotive graduates are expected to have adequate knowledge and skills to cope with the needs of industry and are expected to be relevant to the automotive industry in Kenya.

2.17 Critical Review.

From the review of literature, several facts come out clearly, the most notable ones being those of automotive industry taking a global shape and rapidly changing. This is caused by the automakers' scramble for a fair global market share. The competition is centered in technology used in automobile systems, quest for affordable automobiles, fuel economy, low operation and maintenance costs, low emissions and high safety. This have resulted in rapid changes in automotive system technology. The changes are too fast and complex for most of the educational institutions to cope with. There is a need for institutions of higher learning to be responsive to the rapid changes in technology. This can be achieved by making the curriculum match with the needs of industry. The goal of any institution of learning like UEAB therefore should be to produce graduates who are relevant to the industry, failure to do so will automatically lead to emergence of a technological gap between industry and education institutions.

2.18. Operational Definition of Terms.

Completely Knocked Down components- individual automotive components that are in unit pieces which are put together in assembly plants to assemble automobiles

Globalization- the process of international integration arising from the interchange of products, ideas, knowledge, skills, culture, technology and resources

Innovation- Process of introducing something new or different, it entails the application of new solutions that meets new requirements or existing market needs, it is accomplished through more effective products, processes, services, ideas or technologies.

Original Equipment Manufacturer (OEM)- manufacturer of products or components that are purchased by another company and retailed under that purchasing company's brand name, OEM refers to the company that originally manufactured the product. When referring to automotive parts, OEM designates a replacement part made by the manufacturer of the original part that was used in the automotive during its initial assembling.

World car - A dream car whose design, operation, and usage was to be standardized so as to be accepted and preferred all over the world.

2.19 Chapter Summary.

This chapter presented a review of literature related to the relevance of UEAB's automotive technology graduates to the Kenyan automotive industry. It described: the career opportunities in automotive industry, relevance in education and training, automotive technology competencies and the need for qualified automotive technology graduates to work in the Kenyan automotive industry. The chapter also reviewed university education in Kenya, studies regarding relevance in education, and the needs of automotive industry in terms of competencies held by automotive technology graduates.

It also looked at the global outlook of automotive industry and presented a concise review of automotive industry in selected countries.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This chapter focused on the research design and methodology of the study. It discusses the procedures followed in collecting the data for the study. The chapter covers the study area, study population, sample and sampling techniques, data collection instruments, research instrument administration and methods used in the data analysis.

3.1 Research Design

This study employed a descriptive survey research design to gather opinions, facts, views and suggestions from UEAB's automotive technology graduates working in Kenyan automotive industry, their employers and UEAB's automotive technology lecturers. According to Mugenda and Mugenda (1999), research design is a master plan specifying the methods and procedures for collecting data and analyzing the data to yield the needed information. Kothari (2004) holds the view that research design is a conceptual structure within which research is conducted, it includes the blue print for the collection, measurement and analysis of data. Mugenda and Mugenda (1999) further added that research design is a framework or blueprint that plans the action for a research project. Cohen *et al* (2000) argues that research design is governed by the notion of fitness of purpose, and as such, there is no single blueprint for planning research. The objectives of

the study determined during the early stages of the research were included in the design to ensure that the information collected was appropriate for solving the problem at hand. Research design guides the arrangement of the collection and analysis of data in a manner that it aims at combining relevance to the research purpose. It is a conceptual structure within which research is conducted (Kothari, 2004).

Research design represents a logical set of statements which informs the researcher on credibility and dependability of research finding (Yin, 2003). The research design under which this study fell was survey. Survey is the most commonly used method of collecting primary data. In this study, sample survey method was used to collect data from a sample of a population, the sample was composed of UEAB's automotive technology lecturers, automotive technology graduates working in the Kenyan automotive industry and the employers of UEAB's automotive technology graduates.

According to Morrison (1993), Surveys involves the collection of information at one or several points in time (gathering of data on a one shot basis) from scientifically designed probability samples. It is a very economical procedure to use. Information is usually collected by means of questionnaires, interview schedules and tests, at times sometimes by means of observation schedules. The information collected is usually from a probability sample selected from a tightly defined population. The data is generally for descriptive purposes, but may also be analyzed for relationships among variables. In some cases, causal path models are developed and tested (Don, 2005). Descriptive

research includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present (Kothari, 2004).

According to Koul (1993), descriptive survey provides information that is useful to the solutions of common problems and produces data that can form basis of research of a more fundamental nature and sometimes it is the only means through which views, opinions, and suggestions can be collected.

3.2 StudyArea.

The study was done in UEAB's main campus, Eldoret town and Nairobi city. UEAB is located in the Rift Valley province of Kenya in Nandi County. It is 330 km North-west of Nairobi city and 46 kilometers from Eldoret town and 10 km off the Eldoret-Kisumu highway. It is a chartered private University run by the Seventh-Day-Adventist Church. It was founded in 1983 as an affiliate college of the Andrews University in Michigan State, USA. The study was also conducted in Eldoret town at major automotive garages which employ or are owned by the UEAB automotive technology graduates, some of the garages selected in Eldoret included X-touche which is owned by and employs the UEAB,s automotive technology graduates, Autocraft and associated motors,

The study was also conducted in Nairobi within the Nairobi's industrial area where the major automobile industry players are located in Kenya and this is where majority of the UEAB's automotive technology graduates are employed. Some of the automotive garages and companies from which the researcher collected data from were; the Auto

Solutions along enterprise road, the Toyota Kenya, Stantech Motors and Mantrac along the Uhuru Highway, the General Motors, Tata, Truck Mart (Ashock Leyland), and Simba Colt along the Mombasa road, CMC along Bunyala road, Subaru Kenya on Athi River Road and Kenya Motors on Addis Ababa road, the Kenya Grange Vehicle Industries (Scania) along the Kitui road.

3.3 Study Population

Study population refers to all possible units being studied, it can entail a collection of people, object, and other things that share similar characteristics of interest (Kalof *et al*, 2008). According to Mugenda & Mugenda (2003), population refers to entire group of individuals, events or objects having common observable characteristics. The target population for this study included all the automotive technology graduates from UEAB who graduated between the year 1999-2010 and work in the Kenyan automotive industry, the employers of the graduates and the automotive technology lecturers from UEAB. The group of graduates of the year 1999-2010 was selected due to their range of experiences, they had experience of between zero to ten years and as such their responses yielded information from fresh graduates and experienced ones who had been in the field for a period of ten years.

The units of statistical analysis in this study were the UEAB's automotive technology graduates, their employers and their lecturers, According to data from UEAB's office of the registrar (2012), a total of 101automotive technology majors had graduated between

the years 1999 to 2010, there are 10 automotive technology lecturers, and 23 accessible employers of the graduates.

3.4 Sampling Techniques.

The study used purposive sampling technique to select a sample with desired characteristics from the UEAB's automotive technology lecturers, automotive technology graduates and their employers (automotive companies and garages in Kenya). Stratified sampling was then used to select respondents from UEAB's graduates and their employers. Snowballing sampling method was used to locate most of the graduates and their respective employers. The desired characteristics of the graduates were those working in automotive industry in Kenya while for employers were automotive companies dealing with vehicle sales, service and repair. From a population of 101 graduates, a sample of 60 was selected out of which 40 participated as respondents in the study while 20 participated during piloting, a sample of 40 respondents from a target population of 101 shows that the sample was 39.6percent of the target population. According to Gay cited in Mugenda and Mugenda (2003), Ten percent (10%) of accessible population is enough sample to yield reliable results in a descriptive study, hence the 39.6 percent used in the study was sufficient enough. A sample of 40 graduates was picked from twenty (20) automotive companies using a stratified sampling technique. This was used so as to achieve a desired representation from various departments within the employer companies. From the academic staff of UEAB, a target population of 10 technology lecturers, the entire population was picked due to its accessibility and size. Finally, a stratified random sampling technique was used to select

respondents from each of the employer organizations, from an accessible population of 20 companies, a respondent who supervises the graduates was picked, thus a sample of 20 respondents.

3.5 Research Instruments.

In this study, a questionnaire was the main tool for data collection since the data collected was largely quantitative in nature. Document analysis was also used but in a smaller extend. Questionnaire was considered the most suitable instrument for collecting data within a shortest economic time period (Oso and Onen 2005). The use of questionnaire was also effective owing to the fact that the respondents were largely literate and could easily comprehend the items in the questionnaire.

3.6 Validity and Reliability of Research Instruments.

Research findings assessment is largely centered on the issues of validity and reliability (Kalof *et al*, 2008). In research, we try to maximize the reliability and validity of the data collected and for this to exist, the data collection techniques must yield information that is both relevant to research objectives, research questions and are correct (Mugenda and Mugenda, 2003).

3.6.1 Reliability

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials (Mugenda and Mugenda, 2003). According to McNeil and Chapman (2005), reliability means that, if anybody else uses an instrument or if same person use it in another time, it would yield/come up with the similar results.

In this study, the questions in the questionnaire were properly worded so as to be well understood in similar manner by the subjects, double barreled and ambiguous questions were avoided. In as much as possible, the researcher limited the use of open ended questions and made the questionnaire as short as possible yet captured all the necessary information that yielded useful data for the study. The researcher enhanced reliability by the use of test-retest methods to estimate the degree to which the same results could be obtained with a repeated measure of accuracy of the same concept. In order to determine the reliability of the instrument, Piloting of the study was done in UEAB, it involved three automotive technology lecturers, 20 graduates and 3 employers were also involved in the piloting of the study. The researcher interacted freely with the respondents in order to analyze the responses given with respect to the questionnaire items, the constructed questionnaire was given to subjects who were identical to the ones in the main study, responses were then scored. Same questionnaire were administered to the same group of subjects after a period of two weeks and responses scored. The responses from the two questionnaires which were identical in content and intend were compared and analyzed using the Pearson-Product Moment Correlation Coefficient formula to establish the instrument's consistency in yielding the same responses each time it was administered. Piloting was done at UEAB and Subaru Kenya. The computation of correlation-coefficient was calculated using the Pearson's correlation formula which resulted in a coefficient of 0.89 (79.21 % coefficient of determination) for the graduates' questionnaire and 0.85 (72.25 % coefficient of determination) for employers. The scores were checked

against a 0.5 level of significance and were found to be highly reliable and a few corrections on questionnaire wording were done to make them clearer.

3.6.2 Validity

Validity refers to the extent to which a test measures what we actually wish to measure (Kothari, 2004). According to Ross (2005), the most important characteristic to consider when constructing or selecting a test or measurement technique is validity and a valid test or measure is that which measures what it is intended to measure. The researcher sought expert help from the seasoned researchers and the teaching staff from the technology education department of University of Eldoret. Researcher's colleagues also gave advice in form of suggestions, references, clarifications and other useful inputs, the necessary changes made to enhance validity. Validity of the research instruments was also ascertained by researcher's supervisors from the department of technology education in the school of education, University of Eldoret, who were given to proof read and provide the relevant advice after assessing whether the instruments would yield the required data that could be meaningfully analyzed. The researcher also addressed issues of various forms of validity by enhancing honesty, depth, richness and scope of the data achieved, the participants approached, the extend of triangulation and disinterestedness or objectiveness of the researcher. The researcher improved validity through careful sampling, appropriate instrumentation and appropriate statistical treatments of the data. However, it is impossible for research to be 100 per cent valid (Cohen et al, 2000). According to Cohen et al (2000) the test of reliability is another important test of sound

measurement. A measuring instrument must be reliable if it is to provide consistent results. Reliable measuring instrument does contribute to validity, but a reliable instrument need not be a valid instrument. Accordingly, reliability is not as valuable as validity, but it is easier to assess reliability in comparison to validity.

To further enhance validity, piloting was done and it enabled the researcher to enable the researcher implement the necessary modifications in the instrument items. The results from the pre-test administration were used to make the necessary corrections and adjustments to the questionnaire before it was used in the main study, through this, the validity was improved.

3.7 Ethical Considerations.

According to Mcneill and Chapman (2005), research can have a powerful impact on people's lives and as such, researchers must always think, behave and plan in a manner that cannot bring any harm to the subject of research or the society in which the study is conducted.

In order to uphold the ethics which are necessary for any research, the researcher sought permission, and a research permit was issued by the National Commission for Science, Technology and Innovation (NACOSTI). Privacy of the respondents was assured by not allowing them to write their names on the questionnaire, the respondents were treated with respect and were given adequate information about the study, the purpose of the study, the significance of the study and where the research findings will be used. The

respondents were assured and given accessibility to the research findings through the provision of physical address, telephone number and e-mail address of the researcher and lastly, confidentiality of information given by the respondents was assured.

3.8 Data Analysis.

According to Kalof *et al*, (2008) data analysis is an ongoing process which may occur throughout a research with earlier analysis during planning stage of research informing later data collection, there are two types of data namely quantitative and qualitative data, quantitative data are numeric while qualitative data are non numeric in nature though both have a tendency to edge into each other and as such it is very difficult to find research reports which do not entail both quantitative and qualitative data analysis.

Data collected was analyzed using different methods of analysis depending on the suitability of a method on the type of data. Both quantitative and qualitative methods were used in a complementary manner (Kalof *et al*, 2008). The strengths and weaknesses of each approach were taken into consideration, emphasis of strength was considered for best results (Schofield and Anderson, 1984).

The major goal of both qualitative and quantitative methods is to achieve better understanding about the world, they achieve the goal differently and researchers selects between qualitative and quantitative approaches depending on the nature of their research problem.

Data obtained from this study was coded and classified under several categories as per variables of study. It was analyzed using descriptive statistics through percentages and frequencies then presented in tables containing number of responses per item. Computer excel package was used to compute data so as to provide basis for analysis and description of data, make conclusions and recommendations.

The open ended questions in the questionnaire were used to make the respondents avail original and fast hand information which was part of their experiences (Blaxter *et al*, 2006). The responses from open ended questions from the questionnaire were in the form of quotes from different respondents, and were analyzed and the results included in the recommendations, discussion and conclusion remarks of the study.

3.9 Chapter Summary

This chapter focused on the research design and methodology of the study. It discussed the procedures followed in collecting the data for the study. The chapter covered the study area, study population, sample and sampling techniques, data collection instruments, research instrument administration and methods used in the data analysis.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

4.0 Introduction.

This chapter presents the data and findings of the study. The study investigated the relevance of automotive technology graduates from UEAB to the Kenyan automotive industry. It looked at relevance in terms of knowledge, attitudes and skills.

To determine the relevance, the study focused on the following objectives:- investigate the match in terms of knowledge, attitudes and skills possessed by the graduates UEAB's automotive technology graduates, and the knowledge, attitudes and skills required of automotive technology graduates by the Kenyan automotive industry. It also investigated the ways through which relevance in education and training can be further enhanced in UEAB's automotive department. The study also sought to determine background information of the respondents.

4.1 Respondents' Demographic Profile and Other General Information.

A total of 40 graduates were surveyed and the results shown in table 4.1; 95% were male and 5% were female, with 82.5% having pursued BST degree option and 17.5% BT degree option.

Table 4. 1: Background information of the graduate respondents

		Frequency	Percent
Gender	Male	38	95.0
	Female	2	5.0
Degree option	BST	33	82.5
	BT	7	17.5
Experience	0-2	18	45.0
	2-5	22	55.0
Total		**40**	**100**

As per years of experience in industry, 55% had an experience of between 2 and 5 years, and 45% had an experience of 0 to 2 years.

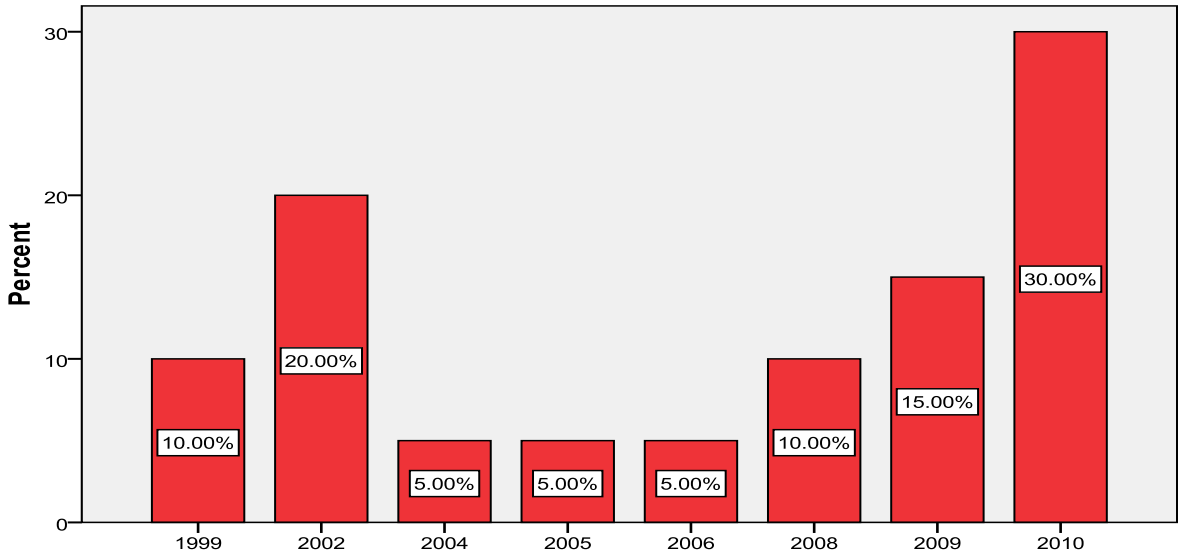

Figure 2: Percentages of Graduates as per year of graduation

The steady rise of graduates between the years 2004 and 2010 could be attributed to the rising demand for more qualified automotive technicians in Kenya. The demand made more young people to enroll in the automotive technology degree program. The findings

in table 4.1 also indicated that fewer females ventured into automotive technology program at UEAB compared to their male counterparts. The study further sought to establish the year of graduation of the respondents and according figure 1; 30% graduated in 2010, 20% in 2002 and 15% in 2009 indicating that there is a variation in number of graduates that graduate from UEAB each year.

Figure 2 shows the number of respondents as a percentage in each year from 1999 to 2010. Figure3 shows that 55% of the respondents had worked elsewhere before joining the current company and had some experience while 45% had never worked elsewhere.

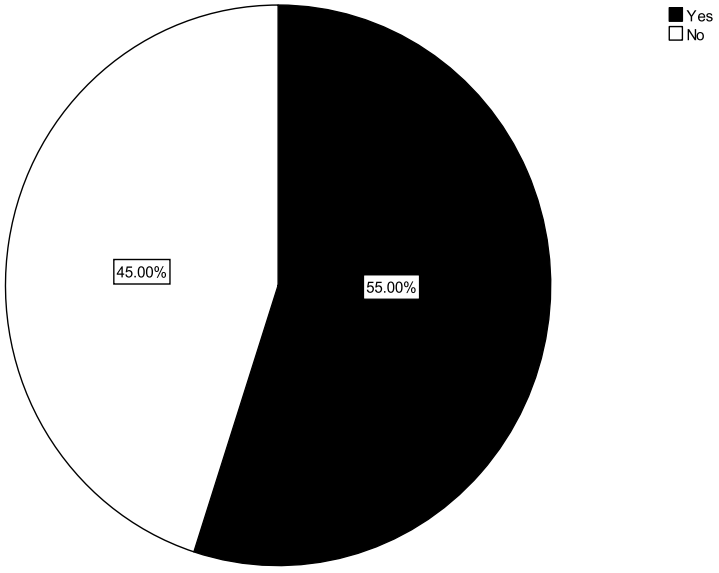

Figure 3: Graduate's work experience

It was necessary to also find out the sections or departments where the respondents were working in the respective automotive companies. According to table 4.2, it was established that 17.5% were in suspension section, 12.5% in engine section, 12.5% in

parts section, 10% in tire centers, 10% in service bay, 10% in Body section, 7.5% in electrical Electronic section, 7.5% in training sections, 5% in diagnosis/ OBD, 5% in Transmissions and 2.5% in customer care sections.

Table 4. 2: Graduate deployment (Sections/ departments they are deployed in)

Departments/section	Frequency	Percent
Suspension	7	17.5
Engine section	5	12.5
Parts	5	12.5
Tire centre	4	10.0
Service bay	4	10.0
Body	4	10.0
Electrical and electronic	3	7.5
Training section	3	7.5
Diagnosis/ OBD	2	5.0
Transmission	2	5.0
Customer care	1	2.5
Total	**40**	**100.0**

According to table 4.2, UEAB's automotive technology graduates were fairly deployed in all sections of automotive companies. This implies that they possess the requisite competencies in all automotive systems. The deployment further implies that the graduates were highly acceptable by the Kenyan automotive industry.

It was necessary to find out the type of activity each of the employing companies deal with. The respondents representing employer companies indicated that they deal with automotive services and repair, automotive sales both new and selected used, automotive parts and a few are in automotive assembly. When asked about the number of trained technicians they employ, according to table 4.3, 70% of the companies employed one to twenty workers and 30% employed above fifty workers.

Table 4. 3: Grouping of companies as per the number of automotive technicians they employed

		Frequency	Percent
Number	11-50	14	70.0
Of workers	50 and above	6	30.0
	Total	**20**	**100.0**

Findings in table 4.3 indicated that most of the companies where the UEAB's automotive technology graduates were employed were established and busy, as evidenced by the number of trained and qualified automotive technicians employed per company, the numbers ranged between 11 and above 50 technicians.

4.2 Automotive Technology Required by Industry

In order to cope with the automotive system technology dynamics, the education institutions training automotive technicians especially the Universities and other institutions of higher learning like the national polytechnics must play a key role in training the much needed manpower in the automobile industry. It was therefore important to investigate the UEAB's automotive technology knowledge.

Table 4. 4: Graduates' knowledge on various automotive systems

AUTOMOTIVE SYSTEM	N	Min	Max	Mean	Std. Deviation
Engine cooling system	40	4.00	5.00	4.6750	.47434
Braking system	40	4.00	5.00	4.6750	.47434
Suspension system	40	4.00	5.00	4.5750	.50064
Lubrication system	40	4.00	5.00	4.5750	.50064
Fuel system(E.F.I)and (GDI)	40	3.00	5.00	4.2750	.75064
Engine rebuilding	40	3.00	5.00	4.2250	.61966
Engine tune up	40	3.00	5.00	4.1500	.76962
The transmission systems	40	3.00	5.00	4.1250	.64798
Auto body repairs and major panel repair	40	2.00	5.00	4.1250	.72280
The HVAC System	40	3.00	5.00	3.9750	.69752
OBC code reading	40	3.00	5.00	3.9000	.84124
Human resource management and costing	40	2.00	5.00	3.8250	.84391
Electrical and electronic system	40	2.00	5.00	3.6750	.82858
Welding technology (all processes used in automotive industry	40	2.00	5.00	3.6500	.73554
Paint blending & custom refinishing	40	2.00	5.00	3.5500	.67748

The findings in table 4.4 show that the graduates' knowledge levels in various automotive systems was a mean of 3.550, implying that in general, the graduates had adequate knowledge and understanding of the various automotive systems.

The mean indicated that the graduates generally had adequate knowledge and understanding of the various automotive systems. This meant that the graduates possessed the automotive technology knowledge required to work in the automotive industry.

Table 4. 5: Graduates' Automotive Technology Skill Levels

AUTOMOTIVE SYSTEM	N	Min	Max	Mean	Std. Deviation
Suspension system	40	4.00	5.00	4.675	.4743
Braking system	40	4.00	5.00	4.675	.4743
Transmission system	40	4.00	5.00	4.575	.5006
Fuel system (E.F.I & G.D.I)	40	4.00	5.00	4.575	.5006
Electrical and electronic system	40	3.00	5.00	4.275	.7506
Engine tune up	40	3.00	5.00	4.225	.6197
Engine rebuilding	40	3.00	5.00	4.150	.7696
Lubrication system	40	3.00	5.00	4.675	.4743
Engine cooling system	40	2.00	5.00	4.125	.7228
The HVAC System	40	3.00	5.00	3.975	.6975
OBD II code reading & interpretation	40	3.00	5.00	3.550	.8412
Paint blending	40	2.00	5.00	3.650	. 6775
Auto body repairs	40	2.00	5.00	3.675	.8286
Welding technology	40	2.00	5.00	3.900	.8412
Human resource management & costing	40	2.00	5.00	3. 8250	.8439

On automotive technology skills, the findings in table 4.5, indicates that, the graduates' minimum mean was 2.00 and a maximum of 5.00 on a five scale rating. This implied that the graduates possessed a minimum of basic skills in some areas, there were four areas where graduates' skill levels were rated at 2.00 on average. They were: paint blending, auto body repairs, welding technology and human resource management and costing. This deficiency perhaps could be attributed to the inadequate time the graduates spent during their training in body shop, welding shop and in managing the human resource.

Further the results showed that graduates understood and could solve most automotive system problems. The employers gave their opinion on the performance of the graduates on solving the various automotive system problems and according to table 4.5, a mean of 3.55 - 4.67 was found. This indicated that the graduates understood very well the automotive system technology, competent, knowledgeable and could solve most of the automotive system problems.

Table 4.5, further revealed that there was a notable slight deficiency of knowledge in some areas like paint blending and custom refinishing, electrical and welding technology.

Table 4. 6: Employers' Opinion about the Graduate's automotive technology skills

AUTOMOTIVE TECHNOLOGY SKILL	N	Mini	Maxi	Mean	Std. Deviation
Customer care and communication	20	3.00	5.00	4.0000	.85840
Automotive engine tune up	20	3.00	5.00	4.0000	.85840
vehicle transmission system	20	3.00	5.00	4.0000	.85840
vehicle electronic and electronic systems	20	3.00	5.00	3.9500	.82558
Major panel repair	20	2.00	5.00	3.6500	1.30888
Body repairs, spray painting , and major panel repairs	20	3.00	4.00	3.6500	.48936
Automotive engine rebuilding	20	3.00	4.00	3.6500	.48936

Findings from table 4.6 indicated that the graduates' rating by their employers on various skills ranges from a minimum mean of 3.65 and a maximum of 4.00. This implies that the employers held the view that the graduates had either sufficient or good skills in solving various automotive system problems. Further, the findings in table 4.6 have shown

highest variance in major panel repair skills, this implies that the employers differed widely in their opinion about the graduates' major panel repair skill levels.

According to table 4.7, when asked about the system knowledge needed in the Kenyan automotive industry, the employers' gave and overwhelming response that knowledge on all the automotive systems is always needed in the industry.

According to table 4.8, the automotive technology incorporated in various automotive systems of vehicles in Kenyan automobile industry is complex and all the employers who participated in the study are of this opinion.

As for the automotive technology knowledge needed in the Kenyan automotive industry, a good knowledge is always needed in all the automotive systems, according to table 4.7, a good knowledge in all the automotive systems is needed in workplace/industry.

The study further sought to find out if the graduates are able to cope with the challenges that are associated with the newer models of cars since this are the skills and knowledge that is required in the market and according to table 4.7, 100% indicated that they can cope with them.

Table 4. 7: Automotive System knowledge needed in industry

KNOWLEDGE NEEDED	**N**	Always needed	Not always needed
Engine cooling system	20	**20**	0
Braking system	20	20	0
Suspension system	20	20	0
Lubrication system	20	20	0
Fuel system(E.F.I)and (GDI)	20	20	0
Engine rebuilding	20	20	0
Engine tune up	20	20	0
The transmission systems	20	20	0
Major Auto body repairs	20	20	0
The HVAC System	20	20	0
OBC code reading	20	20	0
Human resource management and costing	20	18	2
Electrical and electronic system	20	20	0
Welding technology	20	20	0
Paint blending & custom refinishing	20	20	0

From table 4.7, two out of the 20 employers held the view that human resource management and costing knowledge is not always required of automotive graduates. This may be attributed to the fact that most of the automotive companies have different human resource and accounting departments with qualified personnel to deal with issues pertaining to human resources and costing. However, knowledge in human resource and costing would be imparted to graduates venturing into their own business.

Table 4.8: Employers' Opinion on the Complexity of Automotive System in Kenyan Automotive Industry

	Complexity		
automotive systems	**basic**	**complex**	**N**
Vehicle electrical and electronic systems	0	20	20
Vehicle transmission and power train systems	0	20	20
Engine and engine management system	0	20	20
Body and body management systems	0	20	20
Fuel systems	0	20	20
Suspension systems	0	20	20

Findings from table 4.8 indicated that all the automotive companies held the view that the automotive technology in the Kenyan automotive industry was complex.

It was necessary to also find out how the UEABs' automotive graduates were rated by their employers in terms of workplace attitudes. According to table 4.9, it was revealed that the employers overwhelmingly rated the graduates as possessing the right automotive industry work attitudes.

Table 4. 9: Ratings of UEAB's Automotive Technology Graduates's Work Place Attitudes buy their Employers

Graduates' workplace attitudes	N	Min	Max	Mean
Are orderly, maintains cleanliness and appropriate attire at work place	20	2.00	2.00	2.00
Readily to learn new technology and adapt new skills	20	2.00	2.00	2.00
Are dependable	20	2.00	2.00	2.00
Adapts readily to the new work environment and are flexible	20	2.00	2.00	2.00
Are satisfied with their work and strive for maximum productivity	20	2.00	2.00	2.00
Are able to work in challenging environment	20	2.00	2.00	2.00
Treats other workers, senior and juniors with courtesy	20	2.00	2.00	2.00
Are good in communication skills	20	2.00	2.00	2.00
Time conscious	20	2.00	2.00	2.00
Have adequate problem diagnosis and solving skills	20	2.00	2.00	2.00
Ready to learn from others willing to teach others what they know	20	2.00	2.00	2.00
Work with minimum or no supervision	20	2.00	2.00	2.00
work with other technicians as a team(appreciates team work)	20	2.00	2.00	2.00
creativity	20	2.00	2.00	1.00
Valid N (list wise)	**20**			

These could be attributed to the various general requirement courses like the practicum and work experiences that exposed the graduates to work environment under practical guidance from university lecturers and staff.

Table 4. 10: Employers' opinion on Graduates' ability to cope with the challenges of modern automotive systems

Ability to cope with the challenges in modern automotive systems		
	Frequency	Percent
Yes	20	100.0

According to table 4:10, findings revealed that graduates had ability to cope with the challenges associated with the modern automotive systems. Modern automotive systems have incorporated complex electrical, electronics, computer and mechatronics in the management and operation of the various systems, such complexities have come as a challenge to automotive technicians in Kenya. According to table 4.11, it was revealed that the automotive technology graduates understood the technology used in the modern automotive systems.

Table 4. 11: Graduates' Understanding of automotive systems

Understand of the systems			
		Frequency	**Percent**
Valid	Yes	38	95.0
	No	2	5.0
	Total	**40**	**100.0**

4.3 The Relevance of Automotive Technology Taught in UEAB

The relevance of UEAB's automotive technology course contents was determined, and according to table 4.12, the graduates indicated that the automotive technology course content was relevant to the automotive industry in Kenya, they felt that whatever they learned made them acceptable to the industry since they possessed what the market required of them in terms of knowledge, attitudes and skills. The content also entailed experiences and scenes that were relevant in automotive industry.

Table 4. 12: Relevance of UEABs' automotive technology curriculum to the Kenyan automotive industry

	N	Min	Max	Mean	Std. Deviation
Relevant	40	1.00	2.00	1.0500	.22072
Valid N(list wise)	40				

According to the findings, majority of graduates indicated that the course content was relevant.

4.4 Factors that affect the sharing and counter transfer of Knowledge and skills between UEAB's automotive department and automotive industry in Kenya.

To investigate the factors that affected the sharing and counter transfer of knowledge and skills in automotive technology between UEAB and the automotive industry, the researcher sought to find out from graduates whether they were able to share practically

and effectively what they learned at UEAB with other technicians in place of work. According to table 4.13, curriculum and lecturer were the most important factors.

Table 4.13: Factors affecting the sharing and counter transfer of automotive technology knowledge, and skills between UEAB and the automotive industry in Kenya

	N	Minimum	Maximum	Mean	Std. Deviation
Curriculum design	40	1.00	2.00	1.2000	.40510
Lectures	40	1.00	2.00	1.0500	.22072
Valid N (list wise)	**40**				

Inadequacy in syllabus coverage has been proven to be a problem in many institutions of learning and a factor for lack of competence among graduates. According to table 4.14, a number of UEAB's automotive technology graduates had the opinion that engine management system and fuel systems were not adequately covered in their training at the University. Perhaps this could be attributed to rapid changes in automotive fuel systems.

Table 4.14: Coverage of the various automotive systems in the automotive technology curriculum at UEAB

COURSE CONTENT	Adequately covered		Not adequately covered	
	Freq	%	Freq	%
Body and body management	22	55.0	18	45.0
Automotive electrical and electronic system	16	40.0	24	60.0
Suspension system and alignment	26	65.0	14	35.0
Transmission system	16	40.0	24	60.0
Diesel and gasoline engines and engine management systems	14	35.0	26	65.0
Use of on board Diagnosis	18	45.0	22	55.0
Braking systems and the ABS/ Antilock braking system	17	42.5	23	57.5
GDI and EFi fuel system	13	32.5	27	67.5

4.5 Other Factors Affecting the Gaining of Automotive Technology Knowledge and Skills

The main purpose of technical education is to provide, alongside general education the knowledge, attitudes and skills in technical and vocational fields. This education is aimed at providing the national manpower requirements in transportation, agriculture, business, industry and other technical services. To achieve this, the training institutions must ensure that the curriculum is market driven, policies both government and the institutional must be right, and learning materials made adequate. It was necessary for the study to investigate these factors since they affected the gaining of automotive technology competencies. According to table 4.12, 100% of the graduates were positive that curriculum affected them, 92.5% were positive that lectures affect them, 75% and

85% were positive that University and government policies affected them and 92.5% were positive that learning materials and resources affected them.

Table 4.15: Factors affecting the process of gaining the required automotive technology knowledge, attitudes and skills in the training process

FACTORS AFFECTING THE PROCESS OF LEARNING	**Positive**		**Negative**	
	Freq	%	Freq	%
The curriculum	40	100.0		
Teachers/lecturers	37	92.5	3	7.5
University policies	30	75.0	8	20.0
Government policies	34	85.0	4	10.0
Learning materials	37	92.5	3	7.5

The findings also revealed that rather that coverage of syllabus, there were other factors that contributed to the gaining of skills and knowledge in automotive system. The researcher also sought to find out graduates' attitudes towards the institution by finding out if the graduates can recommend the institution for further training to other staff in the company they were working with. According to 4.16, 95% indicated "yes" showing that they could recommend the institution (UEAB) to play a role in re-training their workmates and 5% indicated they would not recommend.

Table 4.16: Recommendation by the Graduates to their current employer to use UEAB to re-train their staff

		Frequency	Percent
	Yes	38	95.0
	No	2	5.0
	Total	40	100.0

Automotive industry is very dynamic, those working in the industry requires in service training so as to be updated on new technologies. When asked about the preferred method of doing in- service training for automotive graduates working in industry, according to table 4.7, 27.5% preferred the use of specialized programs, 35% were for use of industry tailored programs and 37.5% were for the provision of industry based training.

Table 4. 17: Preferred methods of in- service training of automotive graduates working in industry

	PREFERED METHOD OF IN- SERVICE TRAINING	Frequency	Percent
	Providing specialized programs in various automotive system	11	27.5
	Providing of industry tailored programs	14	35.0
	Conducting industry based training	15	37.5
	Total valid	40	100.0

Finding from the study also revealed that UEAB's automotive technology lectures agreed that there was a little gap between automotive technology taught at UEAB and that in the industry. However, according to table 4.18 , the gap was little and limited to some areas of automotive systems only

Table 4. 18: Lecturer's view about automotive technology taught at UEAB and the technology in the Kenyan automotive industry

Existence of a gap	**frequency**	**percentage**
There is no gap at all	0	0%
There is little gap in some areas	9	90%
There is a gap in most areas	1	10%
There is a gap in all areas	0	0%
N	**10**	**100%**

According to table 4.19, majority of the lecturers also were of the view that the small gap which existed between what was taught at UEAB and what existed in the industry could be bridged through collaborative training with industry.

Table 4. 19: Ways of bridging the gap between automotive technology taught at UEAB and the technology in Kenyan automotive industry

Ways of bridging the gap		frequency	percentage
Curriculum overhaul		0	0.0%
Through curriculum evaluation an improvement		1	10%
Improvement of training facilities		2	20%
Through training in collaboration in industry		7	70%
	N	**10**	**100%**

4.6 Chapter summary

This chapter presented and analyzed the findings of the study. The study sough to determine the relevance of automotive technology graduates from UEAB to the automotive industry in Kenya. To determine the relevance the study focused on the following objectives:- investigated the match in terms of knowledge, attitudes and skills possessed by the graduates of automotive technology from UEAB, and the knowledge, attitudes and skills required of automotive technicians by the Kenyan automotive industry. It also investigated the ways through which relevance in education and training can be further enhanced in the UEAB's automotive department. The study also sought to know the background information of the respondents.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter highlights the purpose of the study, discussions, conclusions, recommendations and suggestions for further research. The study sought to establish the relevance of automotive technology graduates from UEAB to the automotive industry in Kenya. The specific objectives of the study were to investigate the current automotive technology skills requirements by the Kenya's automotive industry and the skills possessed by the UEAB's automotive technology graduates working in the industry; to investigate the current automotive technology knowledge required by the Kenyan automotive industry; the knowledge attained by the UEAB's automotive technology graduates working in the Kenyan automotive industry; and finally to investigate the attitudes required by the Kenyan automotive industry and the work attitudes possessed by UEAB automotive technology graduates working in the industry.

5.1.0 Discussion

The purpose of this study was to establish the relevance of automotive technology graduates from the University of Eastern Africa, Baraton to the automotive industry in Kenya, it looked at the graduate's relevance in terms on knowledge, attitudes and skills

possessed by the graduates working in the Kenyan automotive industry and the knowledge, attitudes and skills required by the industry

5.1.1 Match between Automotive Technology Knowledge Required by the Kenyan Automotive Industry and knowledge Possessed by the UEAB's Automotive Technology Graduates

The findings revealed that UEAB's automotive technology graduates working in the Kenyan automotive industry possessed the knowledge that matched with that required by the industry, the graduates were knowledgeable in all the automotive systems. The study further revealed that the graduates understood most of the automotive systems, system problems and could solve all the automotive system problems. Perhaps this could be attributed to the automotive curriculum at the University. According to the employers, the graduates understood automotive systems and could solve most of the problems associated with the systems (table 4.4). The findings differed with assertions by Ondari (2008) that there were numerous complaints from the job market regarding the quality of university graduates in Kenya. The findings were also contrary to Mwigiri cited in Amimo (2012) that the graduates of Kenya's formal education system are generally not able to readily apply their knowledge appropriately in workplace.

5.1.2. Match between Automotive Technology Skills Possessed by UEAB's Automotive Technology Graduates and the Skills Required in the Kenyan Automotive Industry

As regards skills, findings from the study revealed that the automotive technology graduates from UEAB possessed the skills that matched those required by the Kenyan automotive industry. Most of the employers held the view that the graduates could solve most of the automotive system problems themselves, this could be attributed to the following facts:

i) In addition to the three hour lab sessions per week for the various automotive courses, students were instructed using real objects and participated in diagnosing and solving the various automotive system problems during the lab sessions.

ii) The 450 practicum hours where the automotive students worked in the automotive garage diagnosing and solving problems in customer vehicles.

iii) The three months on the job training (OJT) or industrial attachment where the automotive students spent three months in automotive industries.

The findings were also contrary to Amimo (2012) that the graduates of Kenya's formal education system are generally not able to readily apply their skills appropriately in workplace. The findings revealed that industry requires a technical manpower with adequate skills in solving all the automotive system problems. The study also revealed

that the automotive technology graduates from UEAB had adequate skills in performing the various tasks geared towards solving all the automotive system problems. The study, however, revealed that there are some areas of automotive technology where the graduates had some deficiencies, this areas included custom refinishing, human resource management and costing as per table 4.4.

5.1.3. Match in work Attitudes Needed by the Kenyan Automotive Industry and the Work Attitudes Possessed by UEAB Automotive Technology Graduates.

The findings of the study revealed that UEAB's automotive technology graduates working in the Kenyan automotive industry possessed the highly favorable work place attitudes. This was in agreement with Laton (2006) who asserted that graduates entering into any job market were required to posses highly favorable work attitudes. Qualities of work place attitudes which were sought by most companies include: initiative, reliability, honesty, adaptability, creativity, proper use of time, team work and good interpersonal skills all of which infers a positive work attitude. According to table 4.9, all these highly favorable work place attitudes were found among the UEAB's automotive graduates working in the Kenyan automotive industry. The graduate's highly acceptable work attitudes may be attributed to the wholistic education policy adopted by the University where Mental, Physical and Spiritual aspects of human life were imparted in the education and training process. The University in her curriculum had the general education courses under which the trainees were socially developed to enable them have

a positive work and life attitudes. Findings from the study revealed that the Kenyan automotive industry required a technical workforce with highly acceptable work attitudes like honesty, responsibility, creativity, focused, dignity to manual labor, ability to work as a team, adaptability and good use of time.

The findings also revealed that the graduates were in possession of highly favorable attitudes that were required in the automotive industry. The employers agreed that the graduates were always ready to learn new technology, were orderly, dependable, receptive to change, had good interpersonal relations, honest, adhered to safe working practices and upheld team work (table 4.9).

5.2 Conclusions.

In conclusion, automotive technology graduates from the University of Eastern Africa, Baraton were relevant to the automotive industry in Kenya, they possessed the knowledge, attitudes and skills that matched those required by the automotive industry. Findings revealed that the graduates were found to be working in different departments in supervisory positions. These positions required high levels of understanding in automotive system technology and right attitudes to work with people (table 4.9). The graduates were found to be working in suspension, engine section, parts, tire centre, service bay, body, electrical and electronics, training, diagnosis/ OBD, quality control, transmission and customer care sections in various leading automotive companies. This suggested the graduate relevance and competitiveness in the Kenyan automotive industry.

On knowledge, the graduates were found to be knowledgeable in automotive systems. They understood and could deal with all the automotive system problem diagnosis and repair, this was attested in table 4.4, it showed that majority of the graduate employers held the view that that the graduates were knowledgeable and possessed the knowledge required by the industry.

Regarding skills processed by UEAB's automotive technology graduates, the findings showed that the graduates had the right skills required by the automotive industry, they were skillful and could perform repairs, this was attested in table 4.5, where findings showed that the graduates were skillful in performing the various automotive system problem diagnosis and repair.

And finally the attitudes possessed by the graduates matched those required in the automotive industry. The graduates possessed highly acceptable work place attitudes as shown in table 4.8.

5.3.0 Recommendations.

Based on the research findings as outlined in chapter 4 and discussions in chapter five, the following recommendation were formulated to further enhance continued relevance of UEAB's automotive technology graduates to Kenyan automotive industry.

5.3.1.Collaboration with Industry.

The University should partner and collaborate with industry in their education and training processes. This will enhance teaching that was relevant to the needs of the

industry and responsive to technological changes in the industry. Collaboration would also allow the sharing of resources especially equipment by the industry and UEAB.

5.3.2. More Practical Sessions.

In technical fields like automotive technology, practical sessions in form of laboratory, practicum, field trips, and industrial attachment should be given equal emphasis together with the sciences that form the basis for technical education.

5.3.3. Environmental Scanning

The institutions of higher learning must continuously do environmental scanning so as to be aware of what was required of their graduates by the word of work.

5.3.4. Teaching Staff Continued Training.

Automotive technology teaching staff should have a continuous interaction with industry through industrial attachment so as to be in phase with the rapid changes in technology.

5.4. Suggestions for Further Studies.

The study recommends that:

i. A study on the effect of government and institutional policies on sharing and counter-transfer of knowledge and skills between institutions of higher learning and the industry in Kenya.
ii. A study be done on the relevance of Kenyan University Education to the needs of the Kenyan Society.

iii. The Role of Kenyan Automotive Industry in Enhancing Relevance of Automotive Technology Training In Kenya

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APPENDICES

Appendix I:

Cover Letter

Dear Respondent:

I am a student of University of Eldoret pursuing a Masters of Education Degree. I am carrying out a study entitled **"The Relevance of Automotive Technology Graduates from the University of Eastern Africa, Baraton to the Automotive Industry in Kenya".** The purpose of this study is for academic pursuit and is done as partial fulfilment for the award of degree of Master of Philosophy (Technology Education) in the School of Education, Technology Education Department of University of Eldoret. Your responses may help in comparing the knowledge, attitudes and skills possessed by UEAB's automotive technology graduates working in Kenyan automotive industry and the knowledge, attitudes and skills required by the Kenyan automotive Industry.

Participation in this study is voluntary and you should feel free and confident about responding to the questionnaire because:

1. Confidentiality is assured, no respondent's name should be written anywhere on or in the questionnaire and all the information given on this questionnaire will be held in strict confidence and used only for the purpose of this study.

2. If any question in the questionnaire may be inappropriate to your circumstances, you may not give a response.

Your help in filling in the questionnaire will be highly appreciated and for any further clarifications, responses and questions, do not hesitate to contact the researcher, phone-0733579524, e-mail: kiturev@yahoo.com or in the Technology department of the University of Eastern Africa, Baraton)

Yours faithfully,

Kitur Evans

Appendix II:

Questionnaire for Automotive Technology Graduates from University of Eastern Africa, Baraton (UEAB)

INSTRUCTIONS: 1. Do not write your name on the questionnaire.

SECTION A: **Background information**. (Tick what best describes you).

a) Gender- Male ( ) Female ( ), Your Age ------years
b) Have you worked elsewhere before joining the current company? Yes ( ), No ( )
c) Degree option BST ( ) BT ( )
d) Years of experience in industry. 0-2years ( ) 2-5years ( ) above 5years
e) Year of graduation ----------
f) Which Section are you deployed in?

Sales ------- ( )	Customer care ------ ( )	OBD ---------- ( )
Parts-------- ( )	Electrical &electronic( )	Suspension --- ( )
Body ------- ( )	Tire center ---------- ( )	Transmission- ( )
Engines----- ( )	Service bay --------- ( )	

SECTION B:

Upon completion of automotive technology program at UEAB, and now working in the Kenyan automotive industry, how do you rate yourself in terms of knowledge attained at UEAB with respect to demands in the industry? Circle the value that best describe your knowledge level in each of the following automotive systems.

KEY:

(1) No knowledge and understanding at all
(2) Little knowledge and understanding
(3) Have some knowledge and understanding.
(4) Have adequate knowledge and understand of the automotive systems.

(5) Competent, very knowledgeable, and have clear understanding of all the automotive systems and problem diagnosis.

1. Engine cooling system ---------- (1) (2) (3) (4) (5)
2. Braking system ---------- (1) (2) (3) (4) (5)
3. Suspension system ---------- (1) (2) (3) (4) (5)
4. Lubrication system ---------- (1) (2) (3) (4) (5)
5. Fuel system (E.F.I and G.D.I) ---------- (1) (2) (3) (4) (5)
6. Engine rebuilding ---------- (1) (2) (3) (4) (5)
7. Engine tune up ---------- (1) (2) (3) (4) (5)
8. Transmission systems ---------- (1) (2) (3) (4) (5)
9. Auto body repairs and major collision work ---------- (1) (2) (3) (4) (5)
10. The HVAC System ---------- (1) (2) (3) (4) (5)
11. OBD code reading and interpretation ---------- (1) (2) (3) (4) (5)
12. Human resource management and labor costing ---------- (1) (2) (3) (4) (5)
13. Electrical and electronic systems ---------- (1) (2) (3) (4) (5)
14. Welding technology ---------- (1) (2) (3) (4) (5)

SECTION C:

Upon completion of automotive technology program at UEAB, and now working in the Kenyan automotive industry, how do you rate your skill levels in solving the various automotive system problems? Circle the value that best describe your skill levels in dealing with the following automotive system problems.

KEY:

(1) No Skill at all
(2) Basic skills.
(3) Adequate skills
(4) Skillful and can solve most of the system problems.

(5) Very skillful and competent in diagnosis and solving of all the system problems.

1. Suspension system----------(1) (2) (3) (4) (5)
2. Braking system----------(1) (2) (3) (4) (5)
3. The transmission systems----------(1) (2) (3) (4) (5)
4. Fuel system (E.F.I) and (G.D.I) ----------(1) (2) (3) (4) (5)
5. Electrical and electronic system ----------(1) (2) (3) (4) (5)
6. Engine tune up----------(1) (2) (3) (4) (5)
7. Engine rebuilding----------(1) (2) (3) (4) (5)
8. Lubrication system ----------(1) (2) (3) (4) (5)
9. The engine cooling system----------(1) (2) (3) (4) (5)
10. The HVAC system----------(1) (2) (3) (4) (5)
11. OBD code reading & interpretation----------(1) (2) (3) (4) (5)
12. Paint blending----------(1) (2) (3) (4) (5)
13. Auto-body repairs and major panel repairs----------(1) (2) (3) (4) (5)
14. Welding technology ----------(1) (2) (3) (4) (5)
15. Human resource management and costing---------- (1) (2) (3) (4) (5)

SECTION D- Tick against you most preferred opinion.

1. Was the Automotive technology course content at UEAB relevant to the market demands? (Yes)__(No)__ IF NO, briefly explain----------
2. Are you able to cope with the challenges that are associated with the newer car models which are entering the market in the present year? (Yes)__(No)__
3. Do you understand the technology that comes with the systems of modern cars? (Yes)__(No)__
4. Were the methods of instruction during your study adequate? (Yes)__(No)__ if NO, Explain ----------
5. Were the learning resources like text books adequate? (Yes)-----, (N0)------

6. Was the laboratory equipment adequate? (Yes)____, (No)____,
7. Are you able to share practically and effectively what you learned at UEAB with other technicians in the work environment? (Yes)------ (No)---
8. Were there any University policies and practices that supported and encouraged her students to interact with the work environment/industry for the purposes of sharing and counter transfer of automotive technology? (Yes)------ (No) -------,
9. If the answer in question 8 above is "Yes". State some of the policies and practices which were supportive. ----------
   ---
10. Did you noticed any University policy and practice that DID NOT support the sharing and counter transfer of automotive technology between UEAB and the work environment/industry? (Yes)----- (No)---------- If yes, mention some of them----------
    ---
    ---
11. Did your automotive technology lecturers facilitated in the process of making you have some kind of interaction with industry? (Yes) – (No) ------
12. Was the curriculum designed so as to have adequate provisions to ensure that there was relevance to the automotive industry? (Yes)--- (No) -----

SECTION E: RESPOND TO THE FOLLOWING QUESTIONS REGARDING YOUR STUDIES AT UEAB. (Use separate paper provided if you have more explanation)

1. How do you think about the coverage of each of the following automotive systems?

   KEY- Tick (1) For adequately covered.

   (2) For not adequately covered.

   i) Body and body management system----------(1) (2)

   ii) Automotive electrical and electronic systems----------(1) (2)

iii) Suspension system and alignment ----------(1) (2)

iv) Transmission system----------(1) (2)

v) Diesel and Gasoline engines and engine management systems-- (1) (2)

vi) Use of OBD- Onboard Diagnosis ----------(1) (2)

vii) Braking systems and the ABS- Antilock braking system----------(1) (2)

viii) GDI and EFi fuel systems----------(1) (2)

2. How do you think the following factors affected the gaining of automotive technology knowledge, skills and attitudes during your study at UEAB?

   KEY : Negative (Neg) or Positivel (Pos), TICK ONE

   (i) The curriculum----------(Neg.) (Pos)

   (ii) Teachers/lectures ----------(Neg.) (Pos)

   (iii) University policies----------(Neg.) (Pos)

   (iv) Government policies----------(Neg.) (Pos)

   (v) Learning materials----------(Neg.) (Pos)

3. What would you like to be improved and how would you like the improvement done in the automotive technology program at UEAB?

   i) What ----------How ----------

   ii) What ----------How ----------

   iii) What ----------How ----------

   iv) What ----------How ----------

   (Use separate paper if necessary)

4. Do you think UEAB could be of good help in providing training to other staff in your company? (Yes)_____, (No)_____, if yes, which of the following methods can help in providing training to stall already working in your company/industry. Tick against the method which can be used as per your opinion.

   ( ) Providing specialized programs in various automotive systems

( ) Provision of industry tailored programs

( ) Conducting industry based training

( ) others (please specify)

_____

_____

Appendix-III:

Questionnaire for UEAB's Automotive Technology Lecturers

Instructions: Do not write your name on any of the questionnaire papers

SECTION A: **Background information**

1. Gender Male ( ) Female ( )

2. Years of teaching experience , 0-5years ( ), 6-and more years( )

3. Professional qualifications BSc ( ), BST ( ), BT ( ), MSc. ( ), PGDE( ), MEng( ) Mphil ( ), Med( ) **,**Dphil( ), PhD ( ), Others (pecify----------)

SECTION B: Tick against the choice that best describe your opinion

1. What do you think about the match in automotive technology taught at UEAB and the technology Kenyan industry currently?

   a) There is no gap at all---------- ( )
   b) There is little gap in some areas – -( )
   c) There is a gap in most areas -------- ( )
   d) There is a gap in all areas ---------- ( )

2. How do you think the gap between automotive technology taught at UEAB and the technology in the industry can be bridged?

   a) Curriculum overhaul---------- ( )
   b) Through curriculum evaluation an improvement---------- ( )
   c) Improvement of training facilities ---------- ( )
   d) Through training in collaboration in industry ---------- ( )
   e) Others (please specify) -

   _____

   _____

3. In your own judgment, how do you think each of the following automotive systems was covered in the automotive curriculum at UEAB?

KEY: (1) Adequately covered.

(2) Not adequately covered.

(i) Body and body management system----------(1) (2)

(ii) Automotive electrical and electronic systems----------(1) (2)

(iii) Suspension, alignment and power trains ----------(1) (2)

(iv) Transmission system A/T and M/T----------(1) (2)

(v) Diesel and Gasoline engines and engine management systems-(1) (2)

(vi) Engine rebuilding----------(1) (2)

(vii) Use of OBD- Onboard Diagnosis ----------(1) (2)

(viii) Workshop practice and ethics----------(1) (2)

(ix) Communication skills----------(1) (2)

4. How do you think the following factors affect the relevance of automotive technology graduates from UEAB when they join the industry?

KEY: (1) Positively affected, (2) Negatively affected

(i) The curriculum----------(1) (2)

(ii) Teachers/lectures ----------(1) (2)

(iii) University policies----------(1) (2)

(iv) Government policies----------(1) (2)

(v) Learning materials----------(1) (2)

(vi) Student's attitude---------- (1) (2)

(vii) If necessary, briefly explain how the above factors affect relevance of the graduates and how each can be re organized so as to positively affect the graduate's relevance in industry (use separate paper if necessary)----------
---

(viii) Do you think relevance can be improved among the UEAB graduates of automotive technology though the following strategies? Tick where applicable

a) Curriculum overhaul---------- (Yes)____, (No)_____,
b) Improvement of learning resources and facilities (Yes)__, (No)___,
c) Enhancing collaboration with industry-------- (Yes)____, (No)____,
d) Teaching staff development and training -------(Yes)___, (No)____,
e) Increasing practical session time---------- (Yes)____, (No) ____

Appendix IV:

Questionnaire for Employers of UEAB's Automotive Technlogy Graduates.

Instructions- Do not write your name on any of the questionnaire papers.

SECTION A: **Background information**

1. What automotive services do you company offer?

   Assembly of motor vehicles ---------- ( )

   Automotive service and repair ---------- ( )

   Automotive sales ---------- ( )

   Automotive spare sales ---------- ( )

   Other ---------- ( )

2. How many workers does the company employ? 10 and below ( ), 11 -50 ( ),

   50 and above ( ), others (please specify) ----------

SECTION C: PERFORMANCE RATINGS OF UEAB AUTOMOTIVE TECHNOLOGY GRADUATES WORKING IN YOUR COMPANY

Key:

(1) No relevant skills at all

(2) Have basic skills

(3) Have sufficient skills

(4) Have good skills

(5) Have excellent skills and can solve all the system problems without assistance.

Tick against the value that matches your description of UEAB automotive graduates' performance in solving various automotive system problems.

1. Vehicle electrical and electronic systems----------(1)__(2)__(3)__(4)__(5)___
2. Vehicle transmission system----------(1)__(2)__(3)__(4)__(5)___
3. Automotive engine tune up----------(1)__(2)__(3)__(4)__(5)___
4. Automotive engine rebuilding----------(1)__(2)__(3)__(4)__(5)___
5. Major panel repair----------(1)__(2)__(3)__(4)__(5)__
6. Body repairs, spray painting, and major panel repairs-(1)__(2)__(3)__(4)__(5)__
7. Customer care and communication skills----------(1)__(2)__(3)__(4)__(5)___

8. DO YOU ASSOCIATE THE FOLLOWING ATTRIBUTES WITH THE UEAB's AUTOMOTIVE TECHNOLOGY GRADUATES? , (Use separate paper if necessary

   Key (1) Yes, (2) No

   i) Creativity ----------(1) (2)

   ii) Works with other technicians as a team(appreciates teamwork)----(1) (2)

   iii) Work with minimum or with no supervision----------(1) (2)

   iv) Ready to share and learn from what they know----------(1) (2)

   v) Have adequate problem diagnosis and solving skills----------(1) (2)

   vi) Time conscious----------(1) (2)

   vii) Are good in communication skills----------(1) (2)

viii) Treats other workers, seniors and juniors with courtesy ----------(1) (2)

ix) Are able to work in challenging environment----------(1) (2)

x) Are satisfied with their work and strive for maximum productivity-(1) (2)

xi) Adapts readily to the new work environment and are flexible-------(1) (2)

xii) Are dependable----------(1) (2)

xiii) Ready to learn new technology and adapt new skills----------(1) (2)

xiv) Are orderly, maintains cleanliness and appropriate attire ----------(1) (2)

9. Do you think UEAB can be of good help in providing training to other staff in your company? (Yes)_____, (No)_____, if yes, which of the following methods can help in providing training to stall already working in your company. Tick against the method which can be used as per your opinion.
   ( ) Providing specialized programs in various automotive systems
   ( ) Provision of industry tailored programs
   ( ) Conducting industry based training
   ( ) others (please specify)_____

10. Which of the following attributes and traits are expected of gradate technicians entering the automotive job market? Tick what you think is a requirement.

i)	Creativity ---------- ( )	vi). Efficiency and productivity ( )	
ii)	Honesty---------- ( )	vii). Dignifies manual labor---- ( )	
iii)	Team work---------- ( )		
iv)	Responsibility------ ( )	viii). Sound Judgment --------- ( )	
v)	Proper use of time- ( )		

11. How much system knowledge is needed in the following automotive systems in Industry? Key: 1- not always needed, 2 – always needed

Body and body management system ---------- (1)__(2)__

Automotive electrical and electronic systems ---- (1)__(2)__

Suspension system and alignment ---------- (1)__(2)__

Transmission system ---------- (1)__(2)__

Engine management systems- - ---------- (1)__(2)__

Use of OBD- Onboard Diagnosis ---------- (1)__(2)__

Braking systems ---------- (1)__(2)__

GDI and EFi fuel systems ---------- (1)__(2)__

Appendix V:

Universities Authorized to Operate in Kenya as of June 2013

Public Universities

1. University of Nairobi (UoN) – established 1970
2. Moi University (MU) - established 1984
3. Kenyatta University (KU) - established 1985
4. Egerton University (EU) - established 1987
5. Jomo Kenyatta University of Agriculture and Technology (JKUAT) - 1994
6. Maseno University (MSU) - established 2001
7. Masinde Muliro University of Science and Technology (MMUST) - 2007
8. Dedan Kimathi University of Technology (DKUT) - 2012
9. Chuka University (CU) – 2013
10. Technical University of Kenya (TUK) - 2013
11. Technical University of Mombasa (TUM) - 2013
12. Pwani University (PU) - 2013
13. Kisii University (EU) - 2013
14. University of Eldoret - 2013
15. Maasai Mara University - 2013
16. Jaramogi Oginga Odinga University of Science and Technology - 2013
17. Laikipia University - 2013
18. South Eastern Kenya University – 2013
19. Meru University of Science and Technology – 2013
20. Multimedia University of Kenya - 2013
21. University of Kabianga - 2013
22. Karatina University – 2013

Constituent Colleges for Public Universities

1. Murang'a University College (JKUAT) - 2011
2. Machakos University College (UoN) - 2011
3. The Co-operative University College of Kenya (JKUAT) - 2011
4. Embu University College (UoN) - 2011
5. Kirinyaga University College (KU) - 2011
6. Rongo University College (MU) - 2011
7. Kibabii Universtity College (MMUST) - 2011
8. Garissa University College (EU) - 2011
9. Taita Taveta University College (JKUAT) – 2011

Chartered Private Universities

1. University of Eastern Africa, Baraton - 1991
2. Catholic University of Eastern Africa (CUEA) - 1992
3. Scott Theological College - 1992
4. Daystar University - 1994
5. United States International University - 1999
6. Africa Nazarene University - 2002
7. Kenya Methodist University - 2006
8. St. Paul's University - 2007
9. Pan Africa Christian University - 2008
10. Strathmore University - 2008
11. Kabarak University - 2008
12. Mount Kenya University - 2011
13. Africa International University - 2011
14. Kenya Highlands Evangelical University - 2011
15. Great Lakes University of Kisumu (GLUK) - 2012
16. KCA University, 2013
17. Adventist University of Africa, 2013

Private University Constituent Colleges

1. Hekima University College (CUEA)
2. Tangaza University College (CUEA)
3. Marist International University College (CUEA)
4. Regina Pacis University College (CUEA)
5. Uzima University College (CUEA)

Private Universities with Letter of Interim Authority (LIA)

1. Kiriri Women's University of Science and Technology -2002
2. Aga Khan University - 2002
3. Gretsa University - 2006
4. UMMA University - 2013
5. Presbyterian University of East Africa - 2008
6. Adventist University - 2009
7. Inoorero University - 2009
8. The East African University - 2010
9. GENCO University - 2010
10. Management University of Africa - 2011
11. Riara University - 2012
12. Pioneer International University – 2012

Registered Private Universities

1. Nairobi International School of Theology
2. East Africa School of Theology

Appencix VI: Automotive Technology Courses Taught in UEAB

a) Core courses

AUTO 114 Power Technology 2CR

COMP 130 Software Applications in Technology 2CR

ELCT 111, Fundamentals of Electronics 3CR

MECT 131 Technical Drawing 3CR

MTLS 242 Welding Technology 2CR

TCED 141 Engineering Materials 2CR

TCED 220 Safety Education 3CR

TCED 260 Industrial Safety 3CR

TCED 235 Philosophy of Technical Education 2CR

TCED 281Practicum in Technology 2CR

TCED 325Technology Entrepreneurship 2CR

TCED 350Industrial Economy 2CR

TCED 381Practicum in Technology 2CR

TCED 400Attachment in Industry 2CR

TCED 441 Senior- Project 2CR

TCED 442 Senior- Project 2CR

TCED 462 Thermodynamics 2CR

WOOD 181Bench Woodworking 2CR

b) Concentration Courses

AUBO 111 Fundamentals of Auto Body Repair 2CR

AUBO 112 Auto Body Refinishing 3CR

AUBO 211 Major Panel Repair 2CR

AUBO 311 Major Collision Repair 2CR

AUBO 312 Auto Body Refinishing 2CR

AUTO 211 Automotive Engines I 3CR

AUTO 212 Automotive Engines II 3CR

AUTO 221Automotive Electricity 2CR

AUTO 231 Automotive Air-conditioning 2CR

AUTO 311 Automotive Diesel Engines 3CR

AUTO 321 Drive Trains and Suspension 3CR

AUTO 411 Engine Performance I 3CR

AUTO 412 Engine Performance II 3CR

MTLS 342 Workshop Practice 2CR

TCED 200Introduction to Fluid Mechanics 2CR

TCED 250Machine and Tool Maintenance 3CR

TCED 335Fleet Management 2CR

TCED 454 Shop Planning and Organization 1CR

c) Cognates

ACCT 110 Bookkeeping and Accounting 2CR

CHEM 121 General Chemistry I 3CR

MATH 191Engineering Mathematics I, 3CR

MATH 192Engineering Mathematics-II, 3CR

MATH 193Engineering Mathematics III, 3CR

MATH 292Engineering Mathematics IV, 3CR

MGMT 230Fundamentals of Management, 3CR

MGMT 330Human Resource Management, 3CR

MGMT 355Management and Organization 3CR

PHYS 151 General Physics I, 3CR

STAT 201 Statistics I 3CR

Appendix VII:

Research Proposal Approval by Department of Technology Education, University of Eldoret.

Tel: Eldoret (053) 32090/63111
Fax No. (053) 63257 or 63206
Telex No. MOIVARSITY 35047

P.O. Box 1125,
Eldoret,
KENYA.

SCHOOL OF EDUCATION
TECHNOLOGY EDUCATION DEPT

4TH FEB. 2011

The Permanent Secretary,
Ministry of Higher Education,
National Council for Science & Technology,
P.O. Box 30623-00100,
NAIROBI.

Dear Sir/Madam,

RE: KITUR EVANS KIPCHIRCHIR – EDU/PGT/31/09

This is to confirm that the above named Post Graduate Student has completed course work of his Master of Philosophy in Technology Education (Automotive Technology)

He is currently preparing for a field research work on his thesis Title ***"The Relevance of Automotive Technology Graduates from the University of Eastern Africa, Baraton to the Automotive Industry in Kenya"***. The proposal has been approved by the Institution.

Any assistance accorded him to facilitate successful conduct of the research and the publication will be highly appreciated.

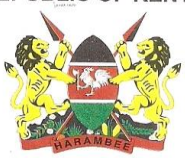
Yours faithfully,

DEPARTMENT OF TECHNOLOGY EDUCATION
MOI UNIVERSITY
P. O. BOX 1125
ELDORET, KENYA

DR. P. OKEMWA
HEAD, TECHNOLOGY EDUCATION DEPT.

Appendix VIII: Research Authorization by NCST

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams:"SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123.
Fax: 254-020-2213215, 318245, 318249
When replying please quote

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: **NCST/RRI/12/1/SS-011/198/4**

Date: **24th February 2011**

Evans Kipchirchir Kitur
Moi University
P. O. Box 1125
ELDORET

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"The relevance of automotive technology graduates from the university of Eastern Africa, Baraton to the automotive industry in Kenya"*** I am pleased to inform you that you have been authorized to undertake research **in Nairobi Province and Uasin Gishu District** for a period ending ***31st May 2011.***

You are advised to report to **the Provincial Commissioner and the Provincial Director of Education, Nairobi Province, the Chief Executive Officers in the selected Automotive Companies, the District Commissioner and the District Education Officer, Uasin Gishu District** before embarking on the research project.

On completion of the research, you are expected to submit **one hard copy and one soft copy** of the research report/thesis to our office.

P. N. NYAKUNDI
FOR: SECRETARY/CEO

Copy to:
The Provincial Commissioner
Nairobi Province

The Provincial Director of Education
Nairobi Province

The District Commissioner
Uasin Gishu District

The District Education Officer
Uasin Gishu District

The Chief Executive Officers
Selected Automotive Companies

Appendix IX: Research Permit

PAGE 2

THIS IS TO CERTIFY THAT:

Prof./Dr./Mr./Mrs./Miss.....EVANS KIPCHIRCHIR KITUR

of (Address) MOI UNIVERSITY P.O. BOX 1125, ELDORET

has been permitted to conduct research in .....Location, UASIN GISHU & NAIROBI .....Districts RIFT VALLEY & NAIROBI .....Provinces,

on the topic the relevance of automotive technology graduates from the University of Eastern Africa, Baraton to the Automotive Industry in Kenya.

for a period ending 31ST MAY ,20 11

PAGE 3

Research Permit No. NCST/RRI/12/1/SS-0

Date of issue 25/02/2011

Fee recei : SHS 1,000

Applicant's Signature

Secretary National Council for Science and Technolog