THE EXTENT TO WHICH TECHNICAL VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS PREPARE ELECTRICAL AND ELECTRONICS ENGINEERING TECHNICIANS FOR THE LABOUR MARKET IN KENYA

BY

EMMANUEL RIONOMAKAL LOYAMURUK

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DECLARATION

Declaration by the student

This research proposal is my original work and has not been presented for a degree in any other university.

EMMANUEL RIONOMAKAL LOYAMURUK

……..…… **…….**

EDU/PGT/1008/12 **DATE**

Declaration by Supervisors

This research proposal has been submitted with my approval as the University supervisor.

……. ……

PROF. AHMED FEREJ **DATE**

SENIOR LECTURER

TECHNOLOGY EDUCATION DEPARTMENT

UNIVERSITY OF ELDORET

……. ……

DR. WOSYANJU CHRISTOPHER **DATE**

SENIOR LECTURER

TECHNOLOGY EDUCATION DEPARTMENT

UNIVERSITY OF ELDORET

DEDICATION

I dedicate this work to my father Merimagal for his love, patience and financial support in the payment of University fees. To my wife Alice and my brothers Nicholas , Daniel , Romanos and Dominic for their love and sacrifice they granted unto me during the period of my studies.

ABSTRACT

TVET institutions in Kenya are mandated to collaborate with other stakeholders in developing a comprehensive national skills curriculum (KESSP report, 2005-2010). Sufficient TVET collaboration with Industry would lead to provision of relevant competencies to trainees for Labour market preparedness. This research study investigated the extent to which TVET institutions prepare Electrical Engineering Technicians for the labour market in Kenya. The study used structured questionnaires to obtain quantitative data from TVET trainers and Industry supervisors within Nairobi Region. Survey research design was adopted for the study, simple random sampling technique was applied to select 80 respondents TVET Institutions and Industries. Data collected was analyzed using descriptive statistics in SPSS. Factor analysis was used to group the variables under study. It was established that research, development and innovation collaboration between TVET and industry, modern training equipment in TVET, TVET trainee and staff attachment programmes are vital for TVET trainee's labour market preparedness. The study recommends TVET institutions to restructure their training programmes in Electrical Engineering to achieve competence of the graduate. Training programmes should focus on fully trainee labour market preparedness and not the quality of grades attained by the graduate.

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LIST OF ABBREVIATIONS

CBET: Competency Based Education and Training.

EU: European Union.

GOK: Government of Kenya.

ILO: International Labor Organization.

KEPSA: Kenya Private Sector Alliance.

KICD: Kenya Institute of Curriculum Development.

KSSP: Kenya Education Sector Support Programme.

MAM: Machinery, Automobile and Mechanization.

MBT: Modular Based Training.

NACOSTI: National Commission for Science, Technology and Innovation

NYS: National Youth Service.

SPSS: Statistical Product for Service Solution.

TEC: Telecommunication, Electronics and Computers.

TVET: Technical Vocational Education and Training

UNIDO: United Nations Industrial Development Organization.

VET: Vocational Education and Training.

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CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

This study investigated the extent to which TVET institutions prepare electrical and electronics engineering technicians for the labour market in Kenya. This examination was undertaken from the perspective TVET trainers and industry engineering supervisors. The purpose of this chapter is to outline the rationale and questions that frame the study. The chapter encompasses eight sections, namely: Background of the study, Statement of the problem, Objectives of the study, Research questions, Significances of the study, Scope of the Study, Operational definitions of terms and conceptual framework.

1.2 BACKGROUND OF THE STUDY

Modern training curricula tend to provide some class room training preparations for trainees across the wide field of engineering, competencies that should be regularly updated alongside the technological development of the learners. Linkage with industries have not been achieved fully, a clear and direct link between availability of TVET and impact on economic growth has not been established fully particularly in developing countries (EU, 2008). Many students enter the labour market without the benefit of an industrial background and the general tendency has been failure for many students to access opportunities to experience the real world of work. Industry is an essential component of ensuring the generation of TVET graduates who are skilled and effective. Many employers are forced to subject newly employed personnel fresh from college to internship training. This is largely due to the

deficiency they display in terms of the relevant skills needed in the performance of specific tasks. Linkages between TVET institutions and employers is therefore important as it will empower trainees through the acquisition of practical skills, inculcation of positive professional attitudes and a better understanding of the working environment. This will enhance efficiency, provide cost saving on time and money and increase productivity.

The quality of graduates from TVET institutions is an important determinant of whether Kenya will attain vision 2030. The question one is likely to ask is whether there has been adequate and tangible collaboration in the form of problem solving, curriculum development, study visits, scholarships, apprenticeship training and incubation centers and industrial attachment programs between industry and TVET institutions.

The current TVET curriculum is inflexible and not responsive enough to the changing needs of the labour market due to various factors (GOK., 2013); 1) there is a mismatch between the skills learned in training institutions and skill demands from the industry. 2) Some of the instructors are inadequately trained and the mechanisms for quality assurance are weak due to lack of adequate support to inspection and supervision services. 3) Equipment and physical facilities used for training are inadequate, old and outdated, 4) Most of the training and reference materials and textbooks are sourced from overseas which makes them costly hence unavoidable. In addition, there is a general feeling that private sector is not adequately represented in the curriculum design and development process. These issues must be addressed in order to have quality TVET graduates joining the labour market and meet enterprises requirements.

The Kenya Education Sector Support Programme (KESSP) report (2005-2010) outlines the aims and purposes of TVET in Kenya is involvement of all relevant stakeholders in the development of a comprehensive national skills curriculum. It was recognized that there was need to link training to employment needs that industry offered. The private sector was to be brought on board in determining the content of training. Training would become more relevant for young people at the workplace (GOK., 2005). As a result of the mismatch existing between the skills taught in TVET institutions and those required by industry, there was need to review the existing TVET curriculum. However, despite continued review of the training curricula, emphasis has been on a school based rather industry driven curriculum. The Government was to source industrial attachment placements for trainees by working in collaboration with industry. However this has not recorded much success as many students still are unable to obtain placement. Another problem is reluctance by some industries to offer attachment since their focus is on production and view attachees as destructors of the production process.

The state of training facilities in TVET institutions remains wanting despite efforts by the government to equip TVET institutions with modern training equipment, most of the training facilities are still obsolete, non- functional and insufficient. Similarly a large number of tutors in TVET institutions lack modern technical skills that match those currently in industry. This is attributed to lack of a structured linkage with industry that is necessary for upgrading their skills and competencies regularly alongside technological developments. TVET institutions should have close linkages with the world of work to solicit support of industry in the enhancement of practical training through such activities as donations of equipment and tools, staff exchange

programs and placement of students (GOK,1999), as witnessed in dual vocational education and training systems (dual VET-systems) stand out due to the two learning venues company and vocational school, they are well acknowledged in Europe and established for example in Austria and Germany. Youth unemployment in countries with well working dual VET-systems is low. Nurturing of linkages between training providers and industry is essential for the provision of adequate and relevant skills development (Misko, 2001).

The Kenya vision 2030 social strategy recognizes establishment of TVET institutions in all constituencies in Kenya. In order to increase enrolment in these institutions, government will conduct a rebranding and an awareness programme for TVET. The TVET institutions will also be provided with engineering and science equipment, and laboratories. The programme will be based on strong public private and community partnerships. There will be a Central Admission Service for TVET government sponsored students established. The TVET Authority created through the TVET Act bill 2013 will streamline management and assessment of industrial attachment process, institutionalization of quality assurance, an accreditation system, monitoring, evaluation, reporting and inspection of TVET Institutions. Establish labour market information system and other survey instruments for data on actual employability of TVET graduates in partnership with industry (GOK., 2013). There have been some remarkable efforts to enhance collaboration between industry and TVET institutions in Electrical and Electronics Engineering programmes. In 2013 the Housing Finance Company of Kenya undertook a joint program with TVET institutions to produce a one million 'Army of artisans' in the construction industry by the year 2016. The mode of training to be used would be modeled on Competency Based Education and

Training (CBET) and this is yet to begin. Other joint collaborations include that of selected TVET institutions with Samsung Electronics (BUSINESS DAILY AUGUST 13TH, 2014). This is a one year hands-on sandwich course in-servicing and maintenance of Samsung products. The endeavor intends to produce 10,000 certified electronics technicians by the year 2015. The program started off well in 2012 but has been faced with financial issues and re-engineering of management at Samsung. Hence, there is need to investigate factors that have hindered continued collaboration between TVET institutions and industry.

1.3 STATEMENT OF THE PROBLEM

Over time, two different worlds have been built between TVET Institutions and Industry; each has activities going on in them. Under this circumstance, there exist relative differences in perspectives of TVET and industry. Education looks at the general development of students that will give them a wide range of opportunities and choices to prepare them after graduation while industries look for technicians and employees with specific skills who will fit directly into the system. Having this seemingly obvious discrepancy in their respective purposes, there is a need to create a platform where institutions and industry can meet face to face, share ideas and regularly interact so as TVET Institution can get real time technological advancement updates from industry , which in turn the TVET instructors cascades the same to trainees. Employers are looking to recruit graduates who fit into the organizational culture and utilize their abilities and skills to transform the companies by facilitating innovative teamwork (Harvey, Locke, & Morey, 2002). Forms of interaction can take place with the aim of understanding and jointly planning pre-employment and in-service training. A deeper analysis of the specific environments in the TVET

institutions and in industry indicates that institutions, on one hand, carry out their goals to facilitate learning, preserve a protected zone for students and nourish individual care to address the needs of the learners. Industry, on the other hand works within the framework of industrial practices and norms with production, efficiency and profitability as the basic premise of day-to-day operations. The characteristics of workplace as the supreme learning environment must be coordinated properly to ensure that there is a close correlation between the types of training that the workforce is being prepared for vis-à-vis the work environment, tasks and work systems. The TVET institutions' objectives must meet the expectations that industries regard in the context of finding the best in the pool to help them achieve industry goals. Consistent with these principles, the workplace as the supreme learning environment, establishes relevant links between the types of technical and vocational skills that must be learned and types of the various learning environments that can provide this. The classroom provides the environment for abstract learning, the scientific or technical laboratories provides learning by doing, production facilities at school are effective in providing learning in work environments, and finally the workplace is suited to learning in the real world. Thus, learning outcomes are largely dictated by learning environments that cultivate skills and competencies and the abilities of the learners to learn new skills.

This study investigated the extent TVET institutions prepare Electrical and Electronics Engineering technicians for the labour market. The study expounded on the various factors identified in literature such as the changing Electrical and Electronics Engineering programmes, dynamic labour market needs, trainer's competence on modern training equipment and new technology, trainers and trainee's attachment programmes among other factors.

1.4 OBJECTIVES

The main objective of this study was to determine the extent to which Technical Vocational and Education Training prepare electrical and electronics engineering technicians for the labour market.

1.4.1 Specific Objectives

This study was guided by the following specific objectives:

1. To determine the level of conformity between training equipment found in TVET institutions and those used in industry.
2. To establish whether there is collaboration in research, development and innovation between TVET institutions and industry in the field of Electrical and Electronics Engineering.
3. To establish whether there is adequate Industrial placement offered by Industry for Electrical and Electronics Engineering TVET Trainees.
4. To determine whether a staff industrial attachment programmes or policy exists between TVET Institutions and industry in Electrical and Electronics engineering for TVET Trainers.

1.5 RESEARCH QUESTIONS

To the above objectives the following research questions was formulated for the study.

1. What are the level of conformities of Electrical and Electronics Engineering Training equipment available in TVET institutions compared to those in industry?
2. Does innovation, research and development collaboration occur between TVET institutions and industry in the field of Electrical and Electronics Engineering?

3. Is the industrial placement period in the curriculum for TVET Trainees adequate?
4. Is there an industrial attachment policy for TVET Trainers in Electrical and Electronics Engineering?

1.6 SIGNIFICANCE OF THE STUDY

This study shaded light on factors contributing to the mismatch between preparing graduates of Electrical and Electronics Engineering programmes by TVET Institutions in Kenya and the demands by the labour market. The study aimed at investigating factors that contribute to mismatch between the training programmes in TVET and the enterprise expectations of TVET graduates. To achieve this, the study highlighted Electrical and Electronics Engineering equipment available in TVET institutions compared to those in industry, analysed attachment programmes for TVET trainees and trainers, highlighted on innovation, research and development collaboration between TVET institutions and industry in Electrical and Electronics Engineering programmes.

The findings of this study extend the existing knowledge on collaboration between TVET institutions and industry. The result of the study is of importance to stake holders in TVET education, policy makers and other players in Electrical and Electronic Engineering industry. Finally the results of this study provide a blue print to the government of Kenya in its effort to produce graduates who will contribute positively in economic development and realization of vision 2030. The study will address training needs in the TVET Electrical and Electronics Engineering programmes and enterprise expectation of TVET graduates.

1.7 SCOPE OF THE STUDY

The study "The Extent TVET Institutions prepare Electrical and Electronics Engineering Technicians for the labour Market in Kenya" was limited to TVET Institution's Electrical and Electronics department offering Artisan, Craft and Diploma level and also Electrical section in Industry in Nairobi County. The ability to generalize to the entire population of TVET in Nairobi County and its environs is not limited. The sample however is similar in nature to the preparation of Electrical and Electronics Engineering Technicians by TVET Institutions in various other TVET Institutions in Kenya and can be generalized. The study population comprised of Instructors from TVET Institutions and Industrial Supervisors.

1.8 LIMITATION OF THE STUDY

The student encountered a number of limitations which may impede answering the research questions and objectives. The main limitation in this study was attributed to the sample size (80) and generalization of the findings. The adequate assessment of factors contributing the extent to which Technical Vocational and Education Training prepare electrical and electronics engineering technicians for the labour market require a consideration of a large number of TVET trainer and industry engineering supervisors that cut across the Technical Vocational and Education Training Institutions and industries in Kenya. However, due to time and human resource constraints, it was not possible to cover a large number of Technical Vocational and Training Institutions and Industries in the Country. This meant that only a small sample is viable, tenable and possible. The findings of this study were therefore confined to the 80 respondents composed of Trainers from TVET institutions and industry engineering supervisors from industry in Nairobi region of Kenya. However,

despite the above mentioned challenges, various measures were taken by the researcher so that the study process remained objective, accurate, valid and reliable.

1.9 RESEARCH ASSUMPTIONS

The assumption of the study were that:-

- The answers given through the research instruments were true reflections of the respondent's answers and that utmost honesty guided answering of the questions.
- It was possible for the respondents to report their personal opinions accurately.
- The study population selected for the study operated within the same environmental conditions, hence giving related responses that was true and reliable concerning factors affecting the extent to which Technical Vocational and Education Training prepare electrical and electronics engineering technicians for the labour market.

1.10 OPERATIONAL DEFINITIONS OF TERMS

1.10.1 Technical Vocational Education and Training

Technical and Vocational Education and Training (TVET) is a comprehensive term referring to the educational process. It involves, in addition to general education, the study of technologies and related sciences and the acquisition of practice, skills and knowledge relating to an occupation in various sectors of economy and social life (UNESCO, 2000). In the present study, the concept of vocational education implies the preparation of an individual for an occupation or career.

1.10.2 Prepare

Means to make ready beforehand for a specific purpose, as for an event or occasion. The teacher prepared the students for the exams i.e. the Electrical and Electronics

Engineering Technician Common Core program is a springboard to a variety of exciting careers in electronics. Through theoretical and practical study, you will develop the skills needed to install, maintain and repair electronic circuits and equipment.

1.10.3 Electrical and electronics engineering technicians

Electrical and Electronics technicians are those who help to test, manufacture, install, and repair electrical and electronics equipment such as communication equipment, medical monitoring devices, navigational equipment, and computers. They may be employed in product evaluation and testing, using measuring and diagnostic devices to adjust, test, and repair equipment.

1.10.4 Labour Market

The term labour Market in this study means a market in which employers search for employees and employees search for jobs. The labour market is not a physical place as much as a concept demonstrating the competition and interplay between different labour forces. The labour market can grow or shrink depending on the labour demand and supply within the overall economy, specific industries, for specific education levels or specific job functions.

1.11 THEORETICAL FRAMEWORK

This study was guided by ecological system theory. The ecological system theory was advanced by Hands (2005) and states that a system made up of integrated parts that cannot be reduced to smaller entities. The structure and nature of each system are dependent on the interactions and interdependence of the system's parts. Every organism (plants, animals, microorganisms, etc.), and communities of organisms

(social systems like schools, families, towns) and ecosystem (the living and non-living environment) are examples of systems. Hands (2005) further identified ecological theory as relevant to understanding how networks of interconnections, such as those found in collaboration between TVET Institution and Industry, given their similarity to that of an ecological system (Hands, 2005).

According to Capra (1994) principles of ecosystems include the concept of "partnership where all living members of an ecosystem are engaged in a subtle interplay of competition and cooperation, involving countless forms of partnership." In a general sense educational institutions promote the intelligence and learning of individuals. However, in reality all learning is a result of interconnection and influence within partnerships (schools, industry, government agencies etc.), linkages, associations and communities (Capra, 1994; Dekay, 1996). Therefore, there is a strong argument regarding the structural and functional similarities and thus the application of ecological theory to TVET Institution and Industry collaborations.

1.12 THE CONCEPTUAL FRAMEWORK

This section provides interrelationship between variables in the context of the problem being investigated. The conceptual framework represents the relationship between the independent variables and the dependent variables. Labour market preparedness of TVET graduates independent variable. Factors which determine the extent to which TVET trainees are well prepared for the labour market were adopted to be the dependent variable. TVET institutions and industry are the moderating variables. The study aimed at revealing the extent to which TVET institutions prepare Electrical Engineering graduates for the labour market in Kenya.

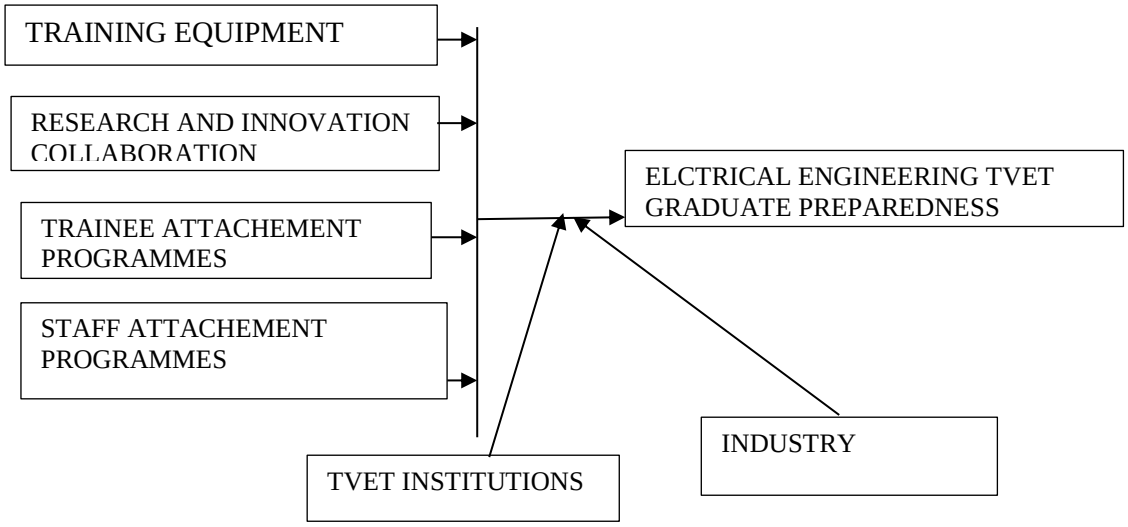

Figure 1.1 Conceptual framework (Source: Author, 2016)

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, a review of literature relating to the area of study is presented. An analysis of development of TVET in sub Saharan Africa is undertaken in particular, the Kenyan vision 2030 strategy for TVET with emphasis on Electrical and Electronic Engineering courses is described. Dynamics in Kenya labour market, linkage between TVET and industry in training Electrical engineering courses is discussed in context of training mismatch between labour market demands with TVET institutions. The chapter concludes by describing challenges facing TVET institutions in training Electrical Engineering programmes.

2.2 DEVELOPMENT OF TVET IN KENYA

According to Mabhanda (2017), Empirical findings of the study that there is need to develop strong partnership with industry to broaden the trainer's competencies and help keep abreast with new equipment coming as driven by the wave of technology and globalization. Furthermore, the TVET curriculum is undefined hence challenges of inadequate machinery are still dogging the TVET education. This scenario creates a gap on the part of trainer in synchronizing the use of old equipment with new equipment in the industry.

However, TVET institutions did not meet this expectations and attracted criticism due to their short comings (Atchoarena., 2002); 1) they were unable to train skilled workers to meet the requirements of enterprises and need for continuing education, 2)

Their training programmes were extremely costly compared to university education, 3) Graduates of these institutions joined the ranks of the unemployed, an indication that the training provided did not match the jobs available .In an effort to solve these problems, curriculum review of training pogrammes in TVET institutions have been done over time. Despite these reviews TVET institutions have not been able to adapt to the new structure of the labour market and skill requirements. This has led to low enrollment of trainees in TVET institutions. Education should help trainees improve themselves and get better jobs, the mismatch between labour market requirements and training programmes have made many parents believe that only a university education will offer their children the opportunity to acquire a good job. Similarly, for a decade many people view labour market jobs for TVET graduates as 'blue collar' involve manual labour, dangerous, dirty and difficult (Commonwealth, 2001).

In Kenyan, the Vision 2030 recognizes the need for relevant skills particularly in TVET institutions to accommodate the transformation of Kenya into a middle income economy. TVET programmes should be market driven and address the needs of the workplace as well as promote self-employment. The current skills development system in Kenya follows a curriculum-based, time-bound approach. Certification is based on completion of courses and passing exams rather than demonstration of competency. This has greatly contributed to releasing trainees to the labour market who have limited skills as demanded by the labour market. Training programmes have also given emphasis on a wide range of generic courses, which do not correspond to the diversity of actual economic activities (Ministry Of Higher Education, 2012).

According to (African Development Fund, 2015) expanding quality and relevant TVET programs will create opportunities for the youth who are 60% of the population. The skills gap requires urgent actions in equipping Youths with relevant middle level skills for the immediate labour market. TVET training programs should be tailored to the labour market needs in order to avoid the training mismatch. The TVET Policy (2012) outlines specific emphasis to enhance access to TVET by targeting an ambitious gross enrollment rate 30% by the year 2030 and ensuring relevance in the training provided.

The Kenyan government has put efforts to realize the targeted enrollment and quality training by 2030. Measures to achieve this include development of infrastructure and human resource capacity, ensuring good governance strengthening quality and assurance of training and providing incentives for industry linkage and participation in TVET. The Kenya Institute of Curriculum Development (KICD) TVET division is an important stakeholder in reviewing training programmes in TVET to attain relevant labour market needed by graduates. The division has a current establishment of 17 curriculum specialists serving over 100 sector specific subjects. They are competent in the areas of Agriculture, Clothing and Textiles, ICT and Computer Technology, Home Management, Entrepreneurship, Project Management, Finance, Accounting and Supplies Management, Business Management, Electrical and Electronics Engineering, Building and Civil Engineering, Mechanical Engineering, Secretarial Studies and Hotel and Tourism Management, Administration, Training, Strategic Management and Consultancy. The current curriculum specialists have strengths in efficient curriculum development process and organization. They have multi skills in integration of soft skills in the curriculum and have the capacity to

develop content for basic support subjects including Mathematics, Physics, Chemistry and Biology. In addition TVET has collaborated with other stakeholders in developing quality curriculum and curriculum support materials and facilitating training programs in curriculum development and examination. In Electrical and Electronic Engineering, the following programmes have been developed: 1) Telecommunication Engineering, 2) Instrumentation and Control Engineering, 3) Electrical Power Engineering, 4) Electronics, 5) Communication Systems, 6) Electrical Installation, 7) Radio and television Maintenance, 8) Avionics and Other related Course.

2.3 LABOUR MARKET DYNAMICS IN KENYA

The Kenyan labour market shows a declining number of jobs being created in the formal sector as compared to the informal sector (Kaane, 2014). The Kenya economy is not creating enough jobs; for instance 743,000 new jobs were created in 2013 against almost 2 million job seekers and another over one million new entrants into the labour force. There is mismatch between education and training and labour market requirements. A large number of people entering the labour market every year have no skills at all. Table 2.1 gives employment projections 2013-2017(‘000), it is clear informal sector both in the Agriculture, Service and Industry is projected to provide high rate of employment as opposed to the formal sector. TVET institutions are believed to be the transformation point in order to achieve these projections since their training programmes are aligned to skill acquisitions which is an important component for informal employment.

Tables 2.1: Kenyan Employment Projections

	2008-2012(MTPI)		2013	2014	2015	2016	2017	2013-2017(MTPII)	
	TOTAL	AVERAGE	PROJECTIONS					TOTAL	AVERAGE
TOTAL EMPLOYMENT	**2,557**	**511**	**723**	**821**	**1,000**	**1,194**	**1,432**	**5,170**	**1,034**
FORMAL	**334**	**67**	**108**	**164**	**250**	**418**	**573**	**1,513**	**303**
AGRICULTURE	**15**	**3**	**31**	**48**	**93**	**153**	**221**	**546**	**109**
INDUSTRY	**52**	**10**	**22**	**34**	**54**	**92**	**136**	**338**	**68**
SERVICES	**267**	**53**	**55**	**83**	**103**	**174**	**216**	**631**	**126**
INFORMAL	**2,223**	**445**	**615**	**657**	**750**	**776**	**859**	**3,657**	**73**
AGRICULTURE	**591**	**118**	**165**	**173**	**173**	**190**	**200**	**901**	**180**
INDUSTRY	**340**	**68**	**102**	**122**	**159**	**175**	**212**	**770**	**154**
SERVICES	**1291**	**258**	**348**	**360**	**396**	**411**	**448**	**1963**	**393**
RATIO OF FORMAL TO TOTAL EMPLOYMENT			**0.15**	**0.2**	**0.25**	**0.35**	**0.4**	**0.29**	
RATIO OF INFORMAL TO TOTAL EMPLOYMENT			**0.85**	**0.8**	**0.75**	**0.65**	**0.6**	**0.71**	

Source: Second Medium Term Plan 2013-2017(Ministry of Devolution and Planning, the National Treasury).

Labour market dynamics have been enhanced by Technological changes which keep on introducing new demands for TVET graduates time and again. In order to endure these dynamics, TVET institutions should often engage industries in their training for them to keep pace with the technological changes emerging. In Electrical and

Electronic Engineering for instance, renewable energy is a new field that has emerged that require a large pool of solar water heating system electricians. It is an area that will play an important role for rural electrification. However, TVET institutions are not readily prepared to train graduates who are able to manage such labour market dynamics. TVET Institutions is often less equipped, trainers are less qualified (Cattelaens & Fromme, 2014). There is need to align training programmes in TVET to the labour market demands.

Scholarly work on TVET programmes and labour market demands have identified many policy recommendations in the past decade. Support development of soft transferable skills such as communication, creativity ,team work and leadership etc. for manufacturing, complement formal education with (TVET), engage the private sector in designing TVET, encourage on-the-job training, make financing for TVET training efficient and equitable, nationwide certification for manufacturing skills (UNIDO, 2013) among other recommendations have been proposed. To attain these policy recommendations, restructuring education and training systems to align them with the demands of the new market economy, using labour market institutions to mitigate the negative effects of economic restructuring, and targeting training and lifelong learning on increasing the adaptability and mobility of the workforce is needed (ILO, 2010).

2.4 LINKAGES BETWEEN TVET INSTITUTION AND INDUSTRY IN ELECTRICAL ENGINEERING PROGRAMMES

In Kenya TVET institutions and industries are still far below the expectations in their collaborations as compared to the developed countries (Obwoge; Mwangi ;Nyongesa,

2013). According to Muthaa , Sang , Mbugua.,(2012), there exist minimal collaboration between training institutions and the industries or business organizations in skill training. Industries are never consulted on skill needs, TVET institutions rarely conducted market needs survey, though they are engaged in useful activity, it is possible to have the training which does not address the skill needs in industries and business organizations. There is need to have active links between TVET institutions and the labour market to ensure the relevance of their training programmes. Study conducted by Ferej, Kitainge, & Ooko, (2012) reported weak links existing between TVET and industry. However institution managers and policy makers speak about the situation often, this means TVET institutions are aware that their graduates are not ready for the labour market. Much is needed to be done to achieve the desired cooperation between TVET institutions and the labour market.

The teaching staff industrial attachment programme has been proposed by many scholars as means that would provide a link between TVET institutions and industrial partners (Kuria ;Mutahi ;Wairimu ;Okuro , 2013). The teaching staff industrial attachment if adopted and practiced could work toward offering consultancy services, supervise students during their industrial attachment, provide theoretical courses to the apprentices, conduct research and development to improve the industrial processes and develop goods and services that are globally competitive. However, the strategy has not been fully exploited in Electrical and Electronic Engineering programmes. Omondi (2008) observed that lecturer and supervisors in industry have negative attitude towards the performance of technicians, an indication that collaboration between the two parties is far being realized.

Equipping TVET institutions with relevant equipment and machinery would enable trainees gain experience in their operation and use. This will aid reduce the existing gap between the level of technology used by industry and those used by the education and training service providers to undertake training (KEPSA, 2013). The rapidly changing nature of employment and work requirements, the skills mismatch and technological gap between industry and education and training institutions necessitates retraining of the workforce, usually at employer cost, in order to gain increases in efficiency and productivity. Providing equipment and machinery with relevant technology to TVET will reduce this skills mismatch and enhance TVET graduates labour market relevance. The skills mismatch has left many TVET graduates unemployed (Dasmani, 2011). Besides, constant of industrial visits for better learning, applications towards theoretical components and increased contemporary knowledge currently practiced at the workplace to be brought into the classroom (Goi & Lau, 2010).

According to Amankwah &Swanzy(2011), there is necessity to involve stakeholders in building competencies among students for the labour market. Lecturers, training institutions, industry and the government need to collaborate to provide the needed competencies, in order to facilitate quest for industrialization. The dignity and popularity of TVET institutions depend on the type of graduates they produce. Collaborations between TVET institutions and industries in Electrical and Electronic Engineering training should occur at the various levels of the education sector with pre-employment skills development as the main objective of collaborations while research and innovation as a second main objective (Alias & Hassan, 2012). Ensuring successful working collaborations is important as they are essential in meeting the

diverse needs of the education and industry sectors. Successful collaborations can be achieved with the right environment and supportive organizational structure. TVET and industry should emphasize collaboration in the areas of Electrical and Electronics Engineering, telecommunication, electronics and computers (TEC), machinery, automobile and mechanization (MAM). Education and research are important determinants of the ability to create a knowledge-based economy.

GOK (2008), a pool of relevant and adequate skills must be available for absorption into the economy. Technologically successful countries such as Taiwan, Brazil, China, South Korea and Chile have been supported by an adequate pool of high technical skills. However, for technological deepening to occur within society, it is critical to translate these skills into technologically productive competencies within industry. Education and research system must be proactive in addressing the needs of industry to ensure effective synergy. The knowledge-intensive nature of science and technology requires highly qualified and skilled human resource. Over the years, the supply of such human resource has become acute, while employment of technically qualified personnel remains low by international standards. The rapidly growing economy has already started showing the skills constraints with shortages in critical cadres i.e. electricians. An added dimension to this is the emerging age-gap between the senior and junior scientists, engineers, technologists and researchers. Kenya's investment in high-level technical human resource is low. This arises from two factors; 1) education and training does not adequately meet the needs of industry, 2) Even though some firms offer on-the-job training; this is aimed mainly at providing

basic operational skills for specific jobs, rather than developing technological capabilities.

Focus on technological learning within industry is required for the exploitation of technologies to enhance market preparedness of TVET trainees.

2.5 CHALLENGES OF SKILL ACQUISITION IN FORMAL TVET

Anindo,Mugambi,&Matula(2016),established that there was inadequate provision of training equipment, institutions lacked modern equipment to match those used by the industries, workshops were not well equipped, it was also established that relevance of training equipment influences acquisition of employable skills, for instruction tutors mainly used lecture, demonstration, work-based learning and discussion teaching methods due to large classes and inadequate training equipment. Finally it was established that challenges faced by TVET were; 1) inadequate trained teaching staff, 2) rigid and exam-oriented curriculum, 3) inadequate modern training equipment, 4) limited industrial attachment for trainees, 5) limited support from the industries.

Umar & Ma'aji(2010), Posited that most of the TVET institutions in Nigeria have been forced to perform below expected standards due to non-availability, poor management or intentional neglect of the required facilities in the workshops for effective skills acquisition. Therefore, provision of adequate workshop tools, equipment and machines is a prerequisite for effective implementation of TVET programs through collaboration between TVET institution and Industry in any country for preparedness of TVET trainees for labour market.

Reddan & Harrison (2010), argued that TVET institutions need to restructure their programmes to be responsive to the needs of the labour market. To achieve this goal, TVET curricula must focus on outcomes in terms of the skills, knowledge and attitudes required by industry. TVET provision should be responsive to the demands of industry.

In Kenya, the current TVET curriculum is weak and rigid enough to meet the technological changes and diverse needs of different clients. Also the quality of TVET graduates has declined in recent years due to poor teaching methods, obsolete and inadequate training equipment and lack of meaningful work experience and supervision during attachment (Nyerere, 2009).

King & McGrath (2004) argued that with TVET being more diverse because of the changes in the labour market, it should be able to integrate the youth into the working world. It has been identified that the two major objectives of TVET is to train the workforce for self-employment and to raise the productivity of the informal sector (UNESCO, 2005). Lack of resources has led to cuts in the volume of training provided in public TVET institutions; these cuts are a hindrance to pursuing the critical objectives of providing training and raising production. Considering the expensive nature of TVET as a form of education, it is imperative that an expanded system with necessary and adequate facilities and equipment will lead to the effectiveness of the system.

Related studies carried out by Islam & Mia (2007), revealed that both formal and non-formal TVET lacked an effective linkage between training and the world of work. It further noted that because of its lack of coherent mode, practical skills training which

does not produce the requisite skills for the labour market. Additionally, the trainees also lacked training experience, initiative and motivation to discharge their duties effectively. There is need for TVET institutions and government to address these challenges in order to realize quality training of Electrical and Electronics Engineering graduates for full preparation self-employment in the labour market.

2.6 SUMMARY OF LITERATURE REVIEW

From the review of the literature one point comes clearly that the preparation of TVET trainees for the labour market is still an issue of concern to many governments, academicians and professional's .This is because the preparation of Electrical and Electronics Engineering Technicians is not substantial despite the ever new and emerging technologies especially the Electrical and Electronics Industry. This study sought to point out new dimensions of how TVET electrical and electronic engineering technicians can be prepared to exploit the ever new and emerging technologies in Electrical and Electronics Industry.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

In this chapter a description of the methodology, data collection methods and data analysis that were used in this study is presented. The research design is explained. Target population, sampling procedure and research instruments follow. This chapter concludes by presenting measures of consistency (i.e. Validity and reliability).

3.2 RESEARCH DESIGN.

The study applied constructionism as its epistemology. Constructivist epistemology holds that there is no objective truth waiting for us to discover. Truth and meanings come into existence in and out of engagement with the realities of our world. There is no meaning without a mind. Different people may construct meaning differently even in relation to the same phenomena (Crotty, 1998). According to (Creswell, 2003) the goal of research carried out in this spirit is to rely as much as possible on the participants' views of the situation being studied. In this study the researcher relied on the views of the participants' to establish the situation that exist as pertains to industrial attachment programme, research and development as well as innovations and training equipment that are being offered through collaboration between TVET institutions and industries. Survey research design was used. A survey is an attempt to collect data from current status of that population with respect to one or more variables (Mugenda,2003).

Survey research design was chosen because it's economical, rapid data collection and ability to understand populations from part of it. It also has the advantage of

identifying attributes of a large population from a small group of individuals (Fowler, 2002).

3.3 AREA OF STUDY

This study was conducted in Technical Vocational and Education Training Institutions and Industries within Nairobi region. The choice of TVET Institutions and Industries in these region was guided by their strategic location and their importance/significance in Kenya. TVET Institutions in these region have experienced enormous growth and expansion of TVET courses. Nairobi region is very industrialized and the first receptor in terms of introduction to current technologies in manufacturing processes, making it technological hub in Kenya. The study therefore enabled the researcher to get the true reflection of factors affecting the extent to which Technical Vocational and Education Training prepare electrical and electronics engineering technicians for the labour market.

3.4 TARGET POPULATION.

Target population is the entire set of units for which the study data are to be used to make inferences (Dempsey, 2003). The target population defines those units for which the findings of the study are meant to generalize the target population was industrial engineering supervisors from industry and Electrical and Electronic Engineering Trainers from TVET institutions within Nairobi County. According to Sharma (2017) using purposive sampling has the following merits; 1) they can provide researchers with the justification to make generalization's from the sample that is being studied, 2) also is useful in these instances because it provides a wide range of non-probability sampling techniques for the researcher

to draw on. The target population was 100 from ten industries and ten TVET institution,

3.5 SAMPLING AND SAMPLE SIZE DETERMINATION

A complex process is normally involved in determining the sample size for a survey. If a sample size is small, the results may not properly represent the entire population. If the sample size is large, the survey may not be able to be carried out due to cost and time restraints. Kothari (2004) Suggested that the sample size should be determined by a researcher keeping in view the following points: Nature of the universe: The universe may either be homogenous or heterogeneous in nature. A homogeneous universe, a small sample size can serve the purpose; Number of classes proposed: If many class-groups are to be formed, a large sample would be required; Nature of study: If the items are to be intensively and continuously studied, the sample should be small; Type of sampling: Sampling technique plays an important role in determining the size of the sample; Standard of accuracy and acceptable confidence level: If the standard of accuracy or the level of precision is to be kept high, we shall require relatively larger samples; and availability of finance: In practice, the size of the sample depends upon the amount of money available for the study purposes.

A good estimate of the sample size was calculated from the following formula:

$$n = \frac{q}{1 + \frac{(q-1)}{N}}$$

Where **n** is the desired sample size

N is the size of the target population

$$q = \frac{(z^2 P(1-P))}{d^2}$$

Z is the standard normal deviation at the required confidence level.

P is the proportion in the target population estimated to have the characteristics being measured. Here **P** = 0.5

d is the desired level of statistical significance. Here **d** = 0.05

"In management research the typical levels of confidence used are 95 percent (0.05: a **Z** value equal to 1.96) or 99 percent (0.01: Z=2.57)" (Taherdoost, 2017).

The target population size was about 100 and the researcher wanted 95% confidence and 5% sampling error. Therefore sample size is determined as follows;

$$q = \frac{((1.96)^2 (0.5)(1-0.5))}{(0.05)^2} \approx 384$$

$$n = \frac{384}{1 + \frac{(384-1)}{100}} \approx 80$$

The sample size of 80 was distributed such that 60 Electrical and Electronics Engineering TVET Trainers and 20 Electrical Industry engineering supervisors from TVET institution and industry respectively.

The study employed simple random sampling to select the respondents. The simple random sampling technique refers to selection of samples without bias from the accessible population. It's mainly used to select a random (representative) sample. In the study it was preferred because it was to ensure that each member of the target

population had an equal and independent chance of being included in the sample (Kothari , 1985).

3.5 DATA COLLECTION INSTRUMENTS

Data collection instrument is a device used to collect data in an objective and a systematic manner for the purpose of the research. This study used a structured questionnaire as the main data collection instrument.

According to Dempsey, (2003) questionnaires are preferred because they allow respondents to give much of their opinions pertaining to the researched problem.

A researcher-administered questionnaire was used to get response from TVET Trainers and industry engineering supervisors, because they are located differently and each will be visited individually. Items in the questionnaire were based on a five-point Likert scale because of following reasons; 1) Simple to construct , 2) Likely to produce a highly reliable scale ,3) Easy to read and complete for participants due to the fact statements in items were formulated in a positive form. The statements required the subjects to select any one of the options: strongly agree (SA), which were awarded five points; agree (A), four points; undecided (UD), three points; disagree (DA), two points; and strongly disagree (SDA), one point.

3.6 RELIABILITY OF DATA COLLECTING INSTRUMENT

Reliability refers to the degree to which the same instrument will give the same results for the same individuals at different times (Wadsworth, 2006). In various areas of study, the accurate dimension of hypothesized variables poses a test by itself. The issue of accuracy of dimension also comes up in applied research, whenever variables are difficult to examine. In most research, reliability and item analysis can be used to construct reliable measurement scales, to improve existing scales, and to assess the

reliability of scales already in use. Specifically, reliability aids in the design and evaluation of sum scales, that is, scales that are made up of multiple individual measurements. The measurement of scale reliability is based on the correlations between the individual items or measurements that make up the scale, relative to the variances of the items.

Cronbach's Alpha is the most common form of consistency reliability coefficient. By convention, a lenient cut-off of 0.6 is common in exploratory research; alpha should be at least 0.7 or higher to retain an item in an "adequate" scale; and many researchers require a cut-off of 0.8 for a "good scale." Regarding the above explanation, in this research the researcher used Cronbach's alpha to test the reliability of items at the pilot study. After calculating this, the researcher made some changes in order to make the questionnaire reliable and bring the Cronbach's alpha to minimum 0.7 (Lankshear & Knobel, 2004). Therefore, the calculated results for TVET trainer data reliability was 0.7851 while for Industry engineering supervisor's data was 0.8610 were considered reliable for this study.

3.7 VALIDITY OF THE DATA COLLECTING INSTRUMENTS

Validity is the degree to which evidence and theory support the interpretations of test scores entailed by proposed uses of tests (Wadsworth, 2006). The study used one tool for data collection. This tool included two sets of questionnaires, one questionnaire for supervisors in industries, and a second questionnaire for trainers in TVET institutions. A high reliability for the data collection instruments is necessary but not sufficient criterion for the adequacy of an instrument, it must be valid too. For a data collection instrument to be considered valid the content selected and included in the

instruments must be relevant to the need or gap establishment (Koul, 1992). The design of the questionnaire aimed to minimize the amount of bias as much as possible (Cohen, Manion, & Morrison, 2000). After the instruments were designed, the opinion of other postgraduate students within the University regarding the format and the content of the instruments was sought. Supervisors and other senior members of the faculty read through the data collecting instruments and suggested ways of improving them which were incorporated in the final design of the questionnaires

3.8 DATA ANALYSIS

The Statistical Package for Service Solution (SPSS) software package was used for data analysis. SPSS contains a set of statistical techniques that allow relationships between one or more independent variable either continuous or discrete and one or more dependent variables (Tabachnick & Fidell, 2001). It also helps in establishing path analysis with latent variables in the conceptual framework representing dependency relations within each of the variable in the framework. This helps in modeling a pictorial framework which represents the "goodness of fit" between the dependent, independent and moderating variables (Byrne, 2006). The data analysis aimed at establishing the statistical significance of the relationships between the various variables. The data collected was analyzed using descriptive statistics which include frequency, mean and standard deviation as well as inferential statistics like correlation and regression. Correlation (Spearman) and regression were used to test the model, Ordinary Least Squares (OLS) linear regression is one of the basic and most commonly used linear regression techniques (Vinzi Esposito ; Chin ; Henseler ; Wang, 2010). The OLS model was used together with factor analysis to reduce the factors of the study into small sets of variable for easier interpretation.

3.9 ETHICAL AND LOGISTICAL CONSIDERATION

Consideration of research ethics and logistical issues enhances the purpose of undertaking the enquiry (Makau & Akaranga, 2016). “These are issues that the researcher must be aware of before starting the research” (Mugenda & Mugenda, 1999), that will not only ensure a quality research but save the researcher time, energy and money. A research permit was obtained from the National Commission for Science, Technology and Innovation (NACOSTI) that approved the researcher to proceed to collect data in TVET institutions and industries within Nairobi region. A researcher must select the appropriate methodology to employ, relevant ways of collecting data, present the research findings and interpret them accordingly leading to presentation of information in a logical sequence (Makau & Akaranga, 2016). Sampling of Respondents was also done randomly and pre-testing of the questionnaire was done at NYS technical training institute and Hypertech Electrical services limited before the actual data collection was done in other TVET institutions and industries. The researcher assured the Respondents of their anonymity by asking them not to indicate their names in the questionnaire. The research also cited all the sources used in the development of the research literature to shun cases of research plagiarism and fraud. The data was then analyzed and reported in form of this thesis. The researcher, observed all the appropriate values in all the stages while conducting the research.

3.10 CHAPTER SUMMARY

This chapter addressed the research design ,area of study , target population, sampling and sample size determination , data collection instruments, reliability and validity of data collecting instruments , data analysis, ethical and logical

considerations. Simple random sampling method was employed to determine the sample size. The population sample consisted of electrical and electronics TVET trainers and industrial engineering supervisors within TVET institutions and industries in Nairobi region. The data collection instrument was the use of questionnaire. Validity and reliability of the instrument was conducted using internal consistency (Cronbach's alpha index). The accepted TVET data reliability index $\alpha = 0.7851$ and that of industry data reliability $\alpha = 0.8610$ was obtained from 17 items and 13 items of the questionnaire respectively. Data collected was then analyzed using descriptive and inferential statistics.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION

4.1 INTRODUCTION

In this chapter the data collected were analyzed based on the research objectives. The findings were analyzed and presented using frequency tables and graphs from descriptive statistics in SPSS.

4.2 RESPONSE RATE

This research study involved a sample size of 80, 60 Trainers in TVET institutions and 20 industry supervisors. Questionnaires were distributed to the respondents and 19 completed from industries were obtained representing a 95% response rate while 55 responses were obtained from trainers representing a 92% response rate. Cumulatively the study registered a 92.5% response rate which is sufficient for data analysis (Kothari, 2004).

4.3 RESPONDENTS' DEMOGRAPHICS

Data collected on individual respondents included gender, age, professional qualification and job experience. This section provides a discussion of the demographic characteristics of these profiles. The demographic profiles for the TVET instructors and industry supervisors are presented.

4.3.1 Demographic profile of TVET Instructors

4.3.1.1 Gender

Table 4.1 shows the gender statistics of TVET instructor's respondents, there were more male (83.6%) than female 14.4% who participated in the survey. The result indicates that there are more male than female instructors in TVET institutions.

Table 4.1: Gender of Respondents

Variable	Frequency	Percent (%)
Female	9	16.4
Male	46	83.6

4.3.1.2 Age of Respondents

The respondents' ages were grouped as 25-30 years, 31-35 years, 36-40 years, and 41-45 years, 46-49 years and above 50 years of age. The results indicate most of the respondents were of the age bracket 31-35 years representing 25.5% of the respondents while the least was the ages 46-49 years and above 50 years of age representing 9.1% of the study population in both cases. The findings of these results are indicated in table 4.2.

Table 4.2: Age of Respondents

Variable	Frequency	Percent (%)
25-30Years	12	21.8
31-35 Years	14	25.5
36-40 Years	13	23.6
41-45 Years	6	10.9
46-49 Years	5	9.1
Above 50 Years	5	9.1

4.3.1.3 Professional Qualification

The study established professional qualification of the respondents. Responses were received about levels of education; Diploma in Technical Education (Dip Tech Ed), Higher National Diploma Electrical Engineering (HND), Bachelor of education in Technology Education(Bed, Tech Edu), Bachelor of Technology(B Tech), Bachelor of Science(Bsc) and others. The study established Dip Tech Education accounted for 9%, HND Electrical Engineering 27%, B.ed Technology Education 33%, B. Technology 22%, Bachelor of Science 7% and others 1%. The findings are represented in Figure 4.1 below.

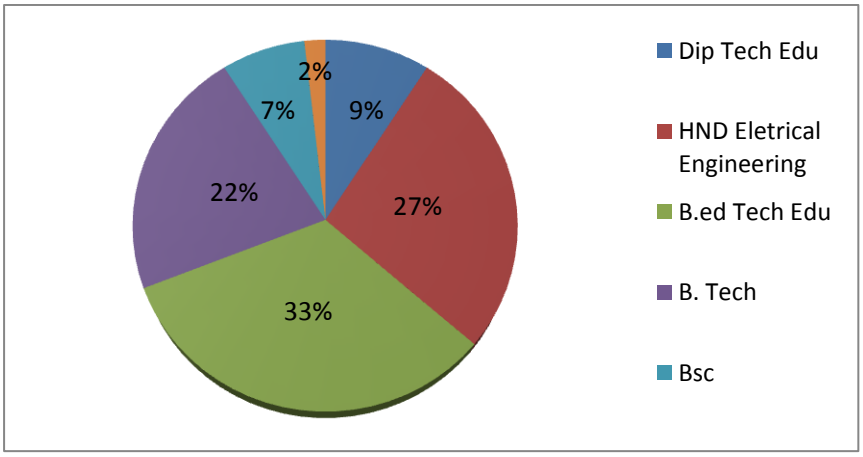

Figure 4.1: Respondent Professional Qualifications (Author, 2018).

4.3.1.3 Experience in current position

The research also identified the TVET instructor's experience in their current position. It was established 27.3% of the respondents have less than five years teaching experience while 70.9% have more than five years teaching experience. The results of these findings are illustrated in figure 4.2.

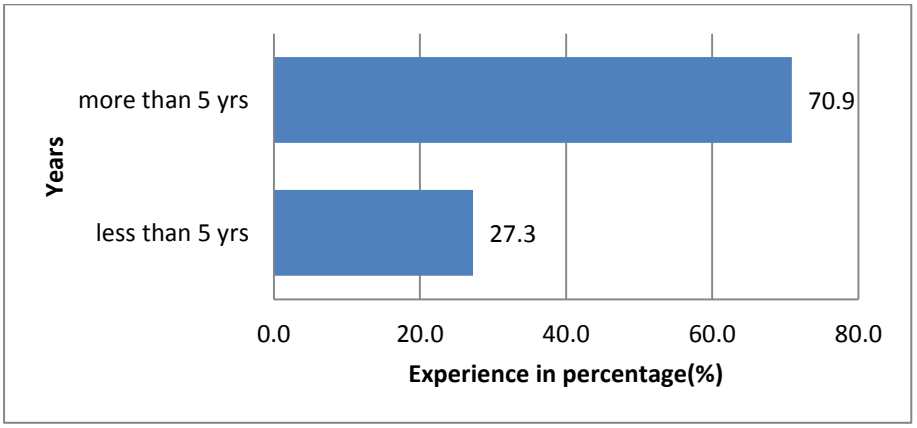

Figure 4.2: TVET instructors' job experience (Author, 2018)

4.3.2 Demographic profile for industry Supervisors

4.3.2.1 Gender

Table 4.3 shows the gender statistics for the industry supervisors, the findings indicates 84.2% of the respondents were male while 15.8% were female. There are more male than female supervisor in Electrical and Electronics section.

Table 4.3: Gender for Supervisor Respondents

Variable	Frequency	Percent (%)
Female	3	15.8
Male	16	84.2

4.3.2.2 Age of Respondents

The findings indicate most of the respondents were above 50 years of age representing 36.8% of the respondents, followed by the age group 31-35 years representing 26.3% of the respondents. The least respondent were for the age group 46-49 years which represented 5.3% of the respondents as indicated in table 4.4.

Table 4.4: Age for Industry Supervisors

Variable	Frequency	Percent (%)
25-30Years	3	15.8
31-35 Years	5	26.3
36-40 Years	1	5.3
41-45 Years	2	10.5
46-49 Years	1	5.3
Above 50 Years	7	36.8

4.3.2.3 Professional Qualification for Industry Supervisors

The study established most of the Industry supervisors were Diploma in Electrical Engineering holders accounting for 47.4% of the respondents. HND Electrical engineering accounted for 26.3% while the least was Artisan in Electrical Engineering accounting for 5.3% of the respondents. The results for the findings are indicated in table 4.5.

Table 4.5: professional Qualification for Industry Supervisors

Variable	Frequency	Percent (%)
Bsc Electrical Engineering	2	10.5
HND Electrical Engineering	5	26.3
Diploma Electrical Engineering	9	47.4
Artisan Electrical Engineering	1	5.3
others	2	10.5

4.3.2.4 Experience in current position

The study established most of the respondents have an experience of more than 10 years accounting for 52.6% while those with up to 5 years' experience accounted for 42.1% of the respondents. The results are indicated in figure 4.3.

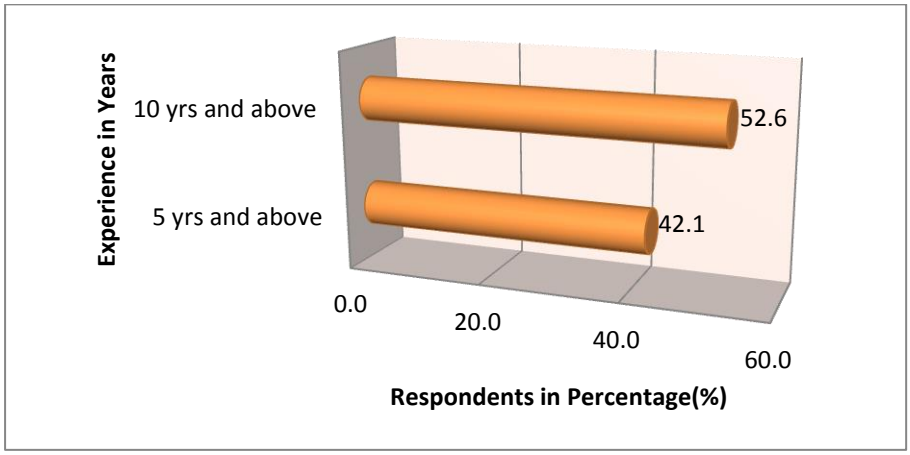

Figure 4.3: Industry Supervisor Experience (Author, 2018)

4.4 TRAINING EQUIPMENT AVAILABILITY IN TRAINING

The study sought to establish the available training equipment in TVET institutions Laboratory as well as establish whether industries donate institutions with equipment they use in order to bridge the gap between training and labour market requirement. Figure 4.4 present the results obtained from TVET instructors on the various factors on the training equipment in their laboratory. The results obtained indicate 50.9% of the respondents agreed there is adequate equipment in TVET institutions for training, 34.5% agreed the equipment matches those in industry, 58.2% agreed they have technical skills which allowed them to use the training equipment and 43.6% agreed the institutes have capital investment plan for purchasing modern training equipment. However 32.7% of the respondents were undecided whether industries donate equipment for training.

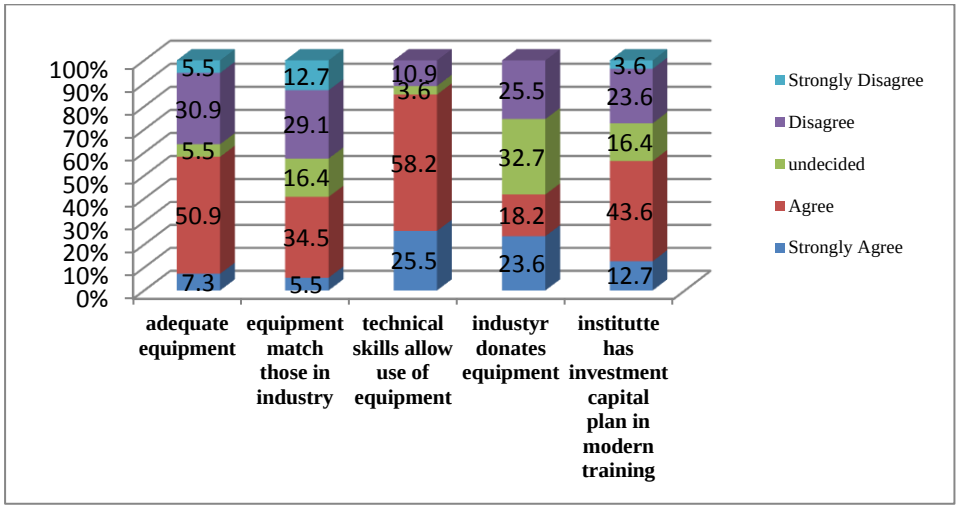

Figure 4.4: Training Equipment in TVET (Author, 2018)

Figure 4.5 represents the finding obtained on the industry support to TVET institutions on the quality of training equipment. 36.8% of the respondent indicated that the industries provide TVET institutions with Electrical and Electronic Equipment, similarly 36.8% indicated industries provide funds to TVET institutions to purchase modern equipment and 42.1% agreed that Industries provides servicing and maintenance of the training equipment. The results from this study therefore indicate there is collaboration between TVET institutions and industries in the provision, funding and servicing of the training equipment.

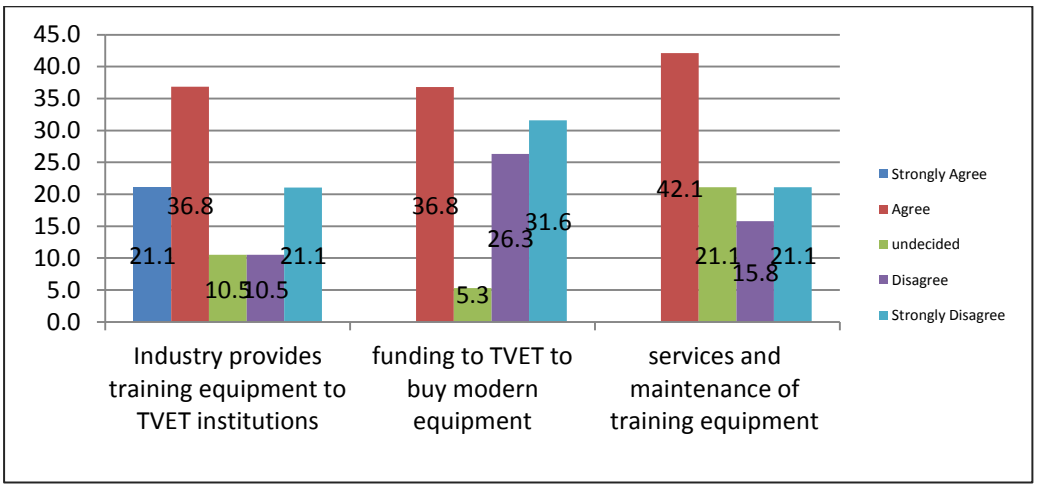

Figure 4 .5: Industries support on training equipment (Author, 2018)

4.5 Research Development and Innovations Collaborations

The study sought to establish whether there was collaboration between TVET institutions in research and development. The findings for these data are represented in figure 4.6 and 4.7 respectively. The response from the TVET trainers indicate industries are not involved in funding research development (26% disagree), there is no policy on collaboration in research (24% disagree), there is no collaboration between the Electrical and Electronic department and industry on training(20% disagree) but research and innovations takes place in the departments (25% agree). These results are represented in figure 4.6.

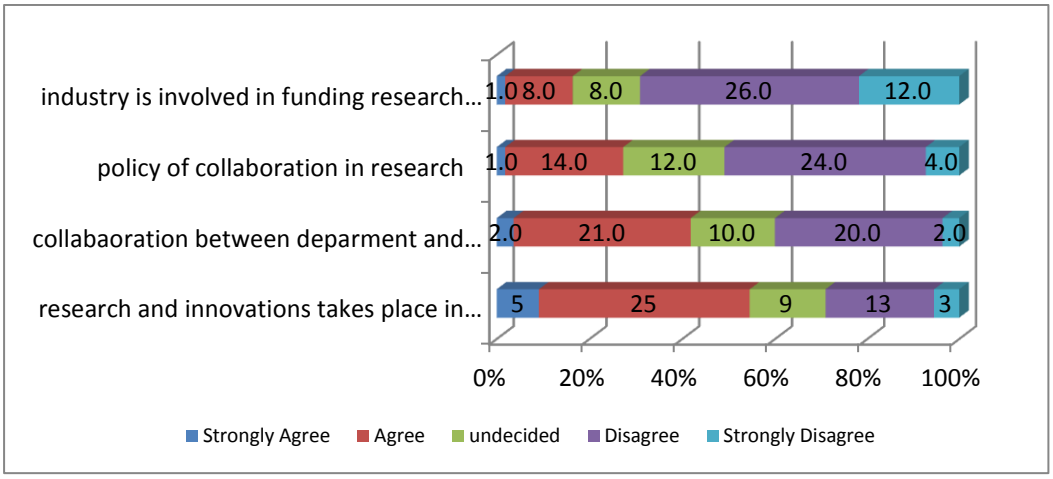

Figure 4.6: TVET Institutions Research Collaboration with Industry

(Author, 2018)

The data obtained from industry engineering supervisors indicates there is shared research and development between industry and TVET institutions (42.11% agree), the data also indicates there is an official policy between industries and TVET institutions (32% agree), however 32% disagree of the respondents indicated industries do not fund research and development in TVET institutions. The findings are illustrated in figure 4.7.

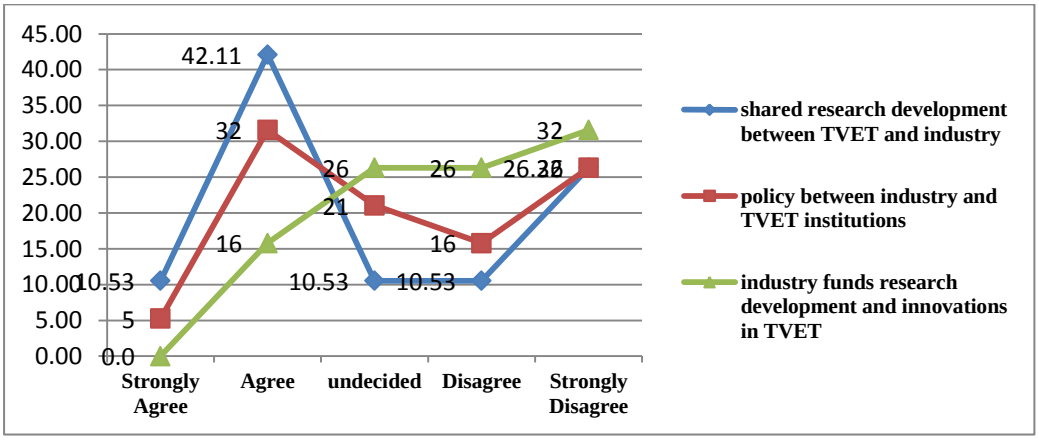

Figure 4.7: Industries collaboration on Research and Development

(Author, 2018)

4.6 TVET TRAINEES INDUSTRIAL TRAINING AND PLACEMENT

The study sought to establish if TVET trainees undergo sufficient attachment during their training programme. The attachment programme is a necessary tool that compliments the training hence impact on the quality of the trainee readiness for the labour market. Figure 4.8 represents the results obtained from TVET trainers on this component. 30.9% of the respondent disagreed that personnel from the industry visit TVET institutions to offer specialized training to Electrical and Electronic engineering trainees, similarly 30.9% indicated the period of three months attachment on completion of first year of study is sufficient for the TVET trainees to gain the required practical skills, 43.6% disagreed that industry offers adequate practical training to TVET trainees and 54.5% agreed all the trainees proceeding for Industrial attachment get placement.

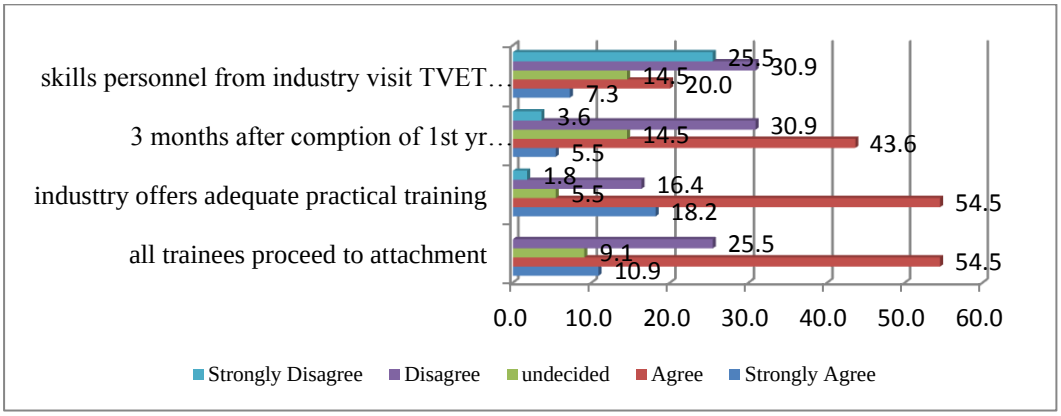

Figure 4.8: TVET Trainees Proceeding to Attachment (Author, 2018)

The result obtained from industry supervisors on trainee attachment indicate that industries offer attachment to TVET trainees (42.1% strongly agreed, 42.1% agreed only 10.5% were undecided), the industrial placement is adequate (36.85% strongly agreed, 26.3% agreed and 31.6% were undecided) and only 36.8% of the respondent agreed that the industries offers training to TVET trainees when in session in their TVET institutions. Figure 4.9 presents the results of these findings.

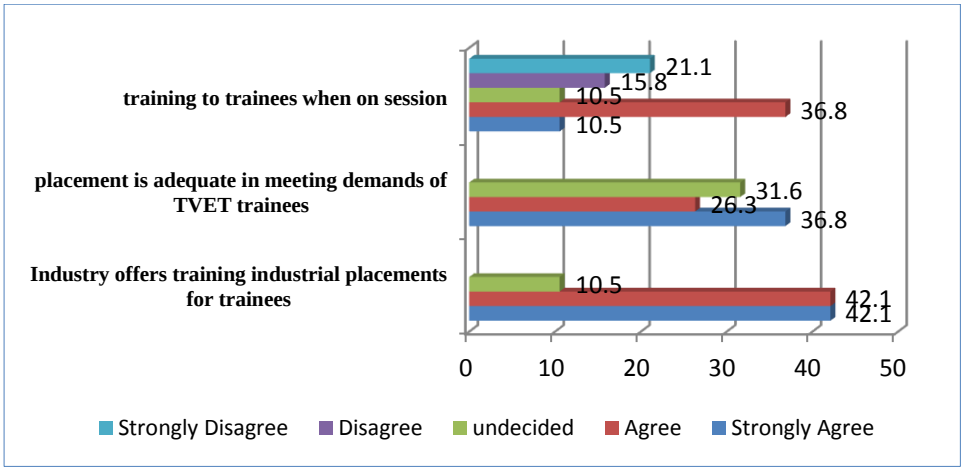

Figure 4.9: Trainee Industrial Placement (Author, 2018)

4.7 STAFF INDUSTRIAL ATTACHMENT PROGRAM

Figure 4.10 presents a summary of the response obtained from TVET trainers on staff industrial attachment. 40.7% of the respondents disagreed that there is a policy on

attachment between TVET institutions and Industry, 45.3% disagreed that instructors have acquired enough skills on modern practical skills from industrial attachment, 54.7% disagreed the industrial attachment program of one month is sufficient while 67.9% strongly agreed that attachment is a vital component in the delivery of the practical content of the syllabus by electrical and electronic engineering trainers. These findings indicate much collaboration need to be enhanced between TVET institutions and industries on staff attachment.

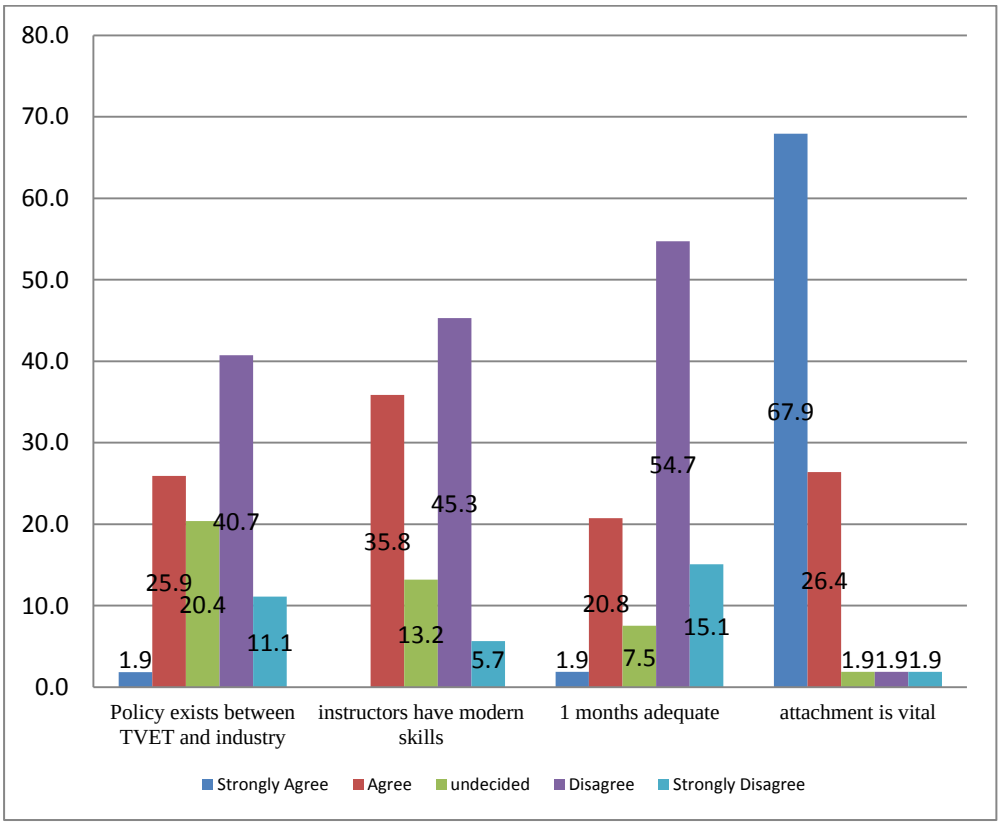

Figure 4.10: TVET Staff Industrial Attachment Responses (Author, 2018)

Industry supervisors indicated that instructors from TVET institutions are not offered industrial attachment (27.8% disagreed, 27.8% undecided), it is not clear if their exist a policy that support training of staff from TVET institutions (42.1% undecided), however they was agreement that the calendar of events for TVET favors the

placement for industrial attachment (52.6% agreed) and TVET institutions require attachment to improve the quality of training in practical subjects (57.9% agreed). Figure 4.11 gives a summary of the findings.

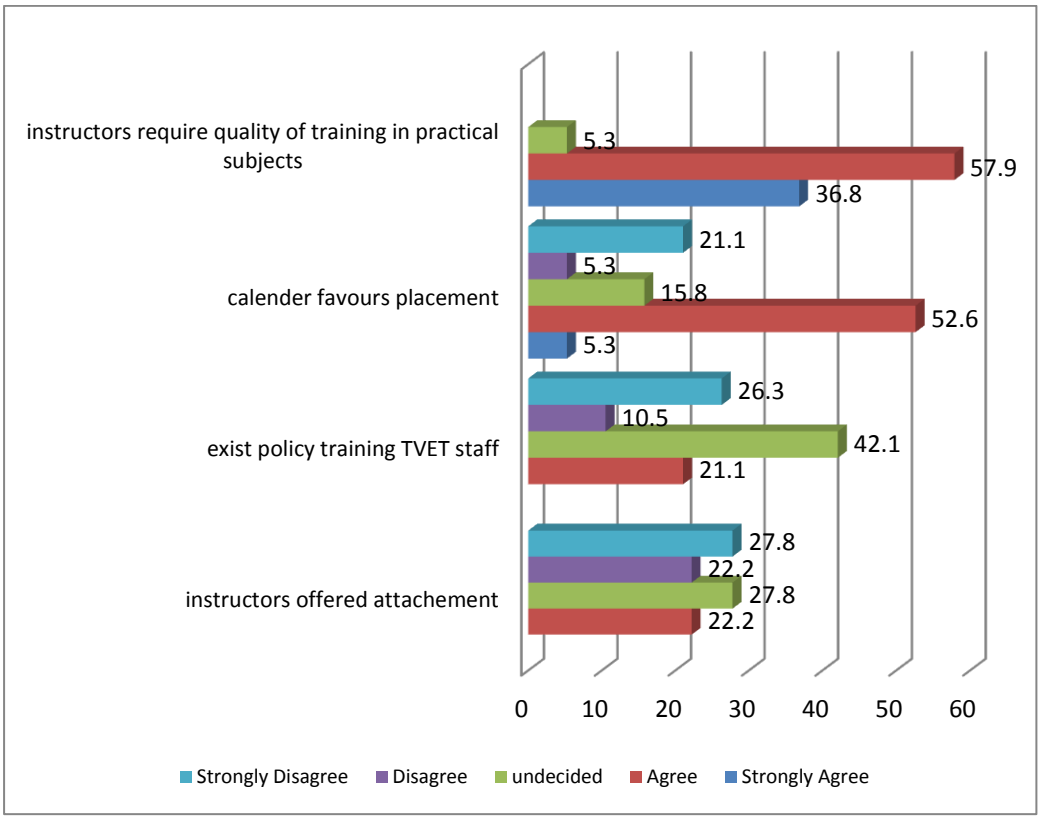

Figure 4.11: TVET Staff Industrial Attachment (Author, 2018)

4.8 FACTORS INFLUENCING TVET INSTITUTIONS PREPARE TRAINEES

The study established research development and innovations collaboration with industry (mean = 3.177) is a major component in determining the trainee labour market preparedness. Training equipment in the Laboratory (mean =2.815), TVET trainee placement in the industry (mean = 2.767) and staff industrial attachment program (mean=2.895) least influence the quality of the TVET trainee. Table 4.6 presents the mean of these factors.

Table 4.6: Factors influencing trainee labour Market Preparedness

	Mean	Std Deviation
research development and innovations collaboration	3.177	1.037
Training equipment in the Laboratory	2.815	1.081
TVET trainee placement in the industry	2.767	1.091
staff industrial attachment program	2.895	0.973

In order to rank the various factors that facilitate trainee preparedness for the labour market, the study utilized regression analysis. R is a measure of the correlation between the observed value and the predicted value of the criterion variable. R Square (R^2) is the square of this measure of correlation and indicates the proportion of the variance in the criterion variable which is accounted for by our model. In essence, this is a measure of how good a prediction of the criterion variable can be made by knowing the predictor variables. However, R square tends to somewhat over-estimate the success of the model when applied to the real world, so an adjusted R square value is calculated which takes into account the number of variables in the model and the number of observations (participants) our model is based on. This Adjusted R Square value gives the most useful measure of the success of our model. We have an R Square value of 0.603; we can say that our model has accounted for 60.3% of the variance in the criterion variable. The findings are shown in Table 4.7.

Table 4.7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.603[a]	0.363	0.024	1.096

4.8.1.1 Coefficients of the model to interpret relative ranking of the factors

The regression coefficient indicates that the biggest challenges in the preparing the TVET graduates for the labour Market is the training equipment in TVET institutions to matches those in the industry with Beta = 0.326, industry to support TVET institutions on training equipment with Beta = 0.305, industry to offers adequate practical training to TVET trainees with Beta = 0.214, adequate staff training on practical's with Beta = 0.249. The results are presented in table 4.8.

Table 4.8: Relative Ranking of Factors Coefficients

Factor	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.533	1.252		2.024	.052
Equipment in workshop are adequate	.088	.188	.094	.468	.643
Equipment match those in industry	.297	.215	.326	1.379	.178
Skills allow use of training equipment	-.088	.211	-.070	-.416	.680
Industry donates equipment	.298	.204	.305	1.457	.156
Research and innovations takes place	.004	.199	.004	.020	.984
Collaboration between department and industry on training	-.075	.265	-.070	-.282	.780
Policy of collaboration in research	-.071	.253	-.063	-.281	.781
Industry is involved in funding research development	.053	.275	.050	.192	.849
All trainees proceed to attachment	-.183	.197	-.168	-.930	.360
Industry offers adequate practical training	.227	.216	.214	1.049	.303
3 months after completion of first year sufficient Trainee acquire skills	-.247	.205	-.244	-1.205	.238
Skills personnel from industry visit TVET to offer specialized training	-.241	.237	-.283	-1.019	.316
Policy exists between TVET and industry on staff attachment	-.261	.211	-.248	-1.235	.226
Instructors have acquired modern skills from industry	.108	.283	.097	.380	.706
1 months adequate for staff training	.267	.213	.249	1.257	.219
Attachment vital in delivery of practical content	-.439	.238	-.329	-1.840	.076

Factor analysis was utilized to summarize the factors that influence the TVET trainee preparedness for the labour Market. Factor analysis attempts to identify underlying variables, or factors, that explain the pattern of correlations within a set of observed variables. Factor analysis is often used in data reduction to identify a small number of factors that explain most of the variances observed in a much larger number of manifest variables. Initial commonalities are estimates of the variance in each variable accounted for by all components or factors. Extraction commonalities are estimates of the variance in each variable accounted for by the factors (or components) in the factor solution. Small values indicate variables that do not fit well with the factor solution, and should possibly be dropped from the analysis. Each number represents the correlation between the item and the un-rotated factor. Table 4.9 presents commonality of factors and Table 4.10 extracted factors.

4.8.1.2 Commonality Extraction

Commonalities indicate the amount of variance in each variable that is accounted for. Initial commonalities are estimates of the variance in each variable accounted for by all components or factors. For principal components extraction, this is always equal to 1.0 for correlation analysis. The commonalities in this table are all high except for one variable which was dropped for further analysis. Initial commonalities are, for correlation analysis, the proportion of variance accounted for in each variable by the rest of the variables. Extraction commonalities are estimates of the variance in each variable accounted for by the factors in the factor solution. Small values indicate variables that do not fit well with the factor solution, and should possibly be dropped from the analysis (Chin, 1998). According to Table 4.9 the extraction commonalities for this solution are acceptable except for one variable.

Table 4.9: Commonality Extraction

Factor	Initial	Extraction
Equipment in workshop are adequate	1.000	.580
Equipment match those in industry	1.000	.813
Technical skills allow use of training equipment	1.000	.226
Industry donates equipment	1.000	.695
Institute has an investment capital plan in modern training	1.000	.492
Research and innovations takes place in department	1.000	.553
Collaboration between department and industry on training	1.000	.581
Policy of collaboration in research	1.000	.598
Industry is involved in funding research development	1.000	.752
All trainees proceed to attachment	1.000	.542
Industry offers adequate practical training	1.000	.500
3 months after completion of 1st yr sufficient Trainee acquire skills	1.000	.506
Skills personnel from industry visit TVET to offer specialized training	1.000	.702
Policy exists between TVET and industry on staff attachment	1.000	.607
Instructors have acquired modern skills from industry	1.000	.622
1 months adequate for staff training	1.000	.328
Attachment vital in delivery of practical content	1.000	.648

4.8.1.3 Component Extractions

The factor transformation matrix describes the specific rotation applied to the factor solution. This matrix is used to examine the factors and explain their classification. The factors that influence TVET trainee labour market preparedness are summarized

into four factors. Table 4.11, table 4.12, table 4.13 and table 4.14 present the factor grouping.

Table 4.10: Component Extractions

	Equipment 1	**Research 2**	**Trainee attachment 3**	**Staff attachment 4**
Equipment in workshop are adequate	.518	-.218	-.506	-.025
Equipment match those in industry	.639	-.137	.592	.382
Industry donates equipment	.256	.506	.327	-.564
Institute has an investment capital plan in modern training	.202	. 632	-.524	-.330
Research and innovations takes place in department	.625	.111	.309	-.211
Collaboration between department and industry on training	.729	.148	-.144	-.030
Policy of collaboration in research	.282	.313	.313	.269
Industry is involved in funding research development	.293	.614	.054	-.120
All trainees proceed to attachment	.314	-.254	.142	-.136
Industry offers adequate practical training	.369	-.419	.526	.097
3 months after completion of first year sufficient Trainee acquire skills	.439	-.538	.091	-.226
skilled personnel from industry visit TVET to offer specialized training	.337	-.280	.292	-.102
Policy exists between TVET and industry on staff attachment	.461	.254	.211	.403
Instructors have acquired modern skills from industry	.677	.168	-.308	.267
1 months adequate for staff training	.264	-.175	.093	.063
Attachment vital in delivery of practical content	-.373	.178	.632	.571

The items were grouped based on the magnitude of their factor loadings in all the corresponding factor components. There were 4 factor components implying that the variables could be reduced into 4. An item is considered to belong to a factor component if its factor loading corresponds to that particular component and is relatively higher than its factor loadings in the other factor components. From close examination the factors could be summarized as follows depending on the loading patterns.

Table 4.11: Factor category 1: Equipment

Factors	Factor Loading
Equipment in workshop are adequate	.518
Equipment match those in industry	.639
Research and innovations takes place in department	.625
Collaboration between department and industry on training	.729
Instructors have acquired modern skills from industry	.677

The factors that loaded in this section are the ones concerned with training equipment in TVET institutes. To enhance the quality of trainees from TVET institutes, strong training equipment support is required. The equipment should match those in the industry and instructors in TVET institutions should have modern skills from industry on the equipment.

Table 4.12: Factor category 2: Research

Factors	Factor Loading
Industry donates equipment	.506
Industry is involved in funding research development	.614
Institute has an investment capital plan in modern training	. 632

There is need to enhance research in TVET institution for quality trainee preparedness for the labour market. Industry involvement in research by providing equipment and funding will enhance trainee preparedness for the Labour market. Training institutions should set aside funds to enhance research.

Table 4.13: Factor category 3: Trainee attachment

Factors	Factor Loading
Equipment match those in industry	.592
Industry offers adequate practical training	.526
Attachment vital in delivery of practical content	.632

There must be adequate regulation framework which provides an enabling environment for trainee attachment programs. The successful implementation of attachment programs should be enhanced from the point of training in institutions to the implementation of the skills in the industry. The training equipment is a major component to the success for acquisition of required competencies by trainees during attachment period.

Table 4.14: Factor category 4: Staff attachment

Factors	Factor Loading
Attachment vital in delivery of practical content	.571

The TVET training programs should be complimented by lecturers acquiring practical skills on the modern equipment available in the industry. This will enable Lecturer prepare trainees adequately for the Labour market. Staff attachment program is required to enable lecturers and technicians acquire relevant skills which will translate to quality graduates ready for the Labour market.

4.8.2 Factors Influencing Industry prepare TVET trainees

The study established research development and innovations collaboration with industry (mean = 3.333), training equipment (mean = 3.140) are the major components in determining the trainee labour market preparedness. TVET trainee placement in the industry (mean = 2.315) and staff industrial attachment program (mean=2.876) least influence the quality of the TVET trainee. Table 4.15 presents the mean of these factors.

Table 4.15: Factors Influencing Trainee Labour Market Preparedness

	Mean	Std Deviation
Training Equipment	3.140	1.335
Research development and innovations Collaboration with TVET institutions	3.333	1.292
TVET trainee placement in the industry	2.315	1.140
Staff industrial attachment program	2.876	1.039

Regression analysis obtained an R Square value of 0.924; we can say that our model has accounted for 92.4% of the variance in the criterion variable. The findings are shown in Table 4.16.

Table 4.16: Model -Industry TVET Labour market Preparedness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.961[a]	0.924	0.743	0.747

4.8.2.1 Coefficients of the model to interpret relative ranking of the factors

The regression coefficient indicates that the biggest challenges in the preparing the TVET graduates for the labour Market is industry funds research innovations and development in TVET with Beta = 3.948, Industry provides training equipment to TVET institutions with Beta = 2.468, instructors from TVET offered attachment with Beta = 2.259, calendar of TVET favor placement to industrial attachment with Beta=1.429, placement is adequate in meeting demands of TVET trainees with Beta=1.176, instructors from TVET require quality of training inn practical subjects with Beta= 0.68.

Table 4.17: Model Coefficients - Relative Ranking of Factors

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	9.128	5.005		1.824	.128
Industry provides training equipment to TVET institutions	2.399	1.030	2.468	2.330	.067
Funding to TVET to buy modern equipment	-4.723	2.903	-4.132	-1.627	.165
Servicing and maintenance of training equipment to TVET	-1.251	1.036	-1.059	-1.207	.281
Policy between industry and TVET institutions	-2.111	1.253	-1.903	-1.685	.153
Industry funds research innovations and development in TVET	5.162	3.260	3.948	1.583	.174
Industry offers training industrial placements for trainees	-5.632	3.156	-2.621	-1.784	.134
Placement is adequate inn meeting demands of TVET trainees	1.314	.926	1.176	1.418	.215
Training to trainees when on session	-1.153	.547	-1.106	-2.107	.089
Instructors from TVET are offered attachment	2.899	1.624	2.259	1.785	.134
Policy on training of TVET staff	-3.447	1.889	-2.687	-1.825	.128
Calendar of TVET favors placement to industrial attachment	1.592	.779	1.429	2.045	.096
Instructors from TVET require quality of training inn practical subjects	1.690	1.089	.681	1.553	.181

Factor analysis was utilized to summarize the factors that influence the TVET trainee preparedness for the labour Market.

4.8.2.2 Commonality Extraction

Commonalities indicate the amount of variance in each variable that is accounted for. According to Table 4.18, the extraction commonalities for this solution are all acceptable.

Table 4.18: Component Extractions

	Initial	Extraction
Industry provides training equipment to TVET institutions	1.000	.936
Funding to TVET to buy modern equipment	1.000	.849
Servicing and maintenance of training equipment to TVET	1.000	.841
Shared research development between TVET and industry	1.000	.878
Policy between industry and TVET institutions	1.000	.944
Industry funds research development and development in TVET	1.000	.845
Industry offers training industrial placements for trainees	1.000	.835
Placement is adequate inn meeting demands of TVET trainees	1.000	.842
Training to trainees when on session	1.000	.847
Instructors from TVET are offered attachment	1.000	.855
Policy on training of TVET staff	1.000	.815
Calendar of TVET favors placement to industrial attachment	1.000	.855
Instructors from TVET require quality of training inn practical subjects	1.000	.901

4.8.2.3 Component Extractions

The factor transformation matrix describes the specific rotation applied to the factor solution. This matrix is used to examine the factors and explain their classification. The study identified four components.

Table 4.19: Component Extractions

Factors	Equipment 1	Research 2	Trainee attachment 3	Staff attachment 4
Industry provides training equipment to TVET institutions	.874	.046	.359	.203
Funding to TVET to buy modern equipment	.795	-.454	-.084	-.060
Servicing and maintenance of training equipment to TVET	.819	.124	-.340	.198
Shared research innovations and development between TVET and industry	.833	.019	.358	.234
Policy between industry and TVET institutions	.487	-.015	.567	.044
Industry funds research innovations and development in TVET	.322	-.339	-.011	-.231
Industry offers training industrial placements for trainees	-.647	.631	.682	.109
Placement is adequate inn meeting demands of TVET trainees	-.555	.197	-.010	.704
Training to trainees when on session	.153	.623	-.111	-.143
Instructors from TVET are offered attachment	.469	.265	-.423	.123
Policy on training of TVET staff	.344	.029	-.310	.077
Calendar of TVET favors placement to industrial attachment	.250	.343	-.015	.123
Instructors from TVET require quality of training inn practical subjects	.100	.839	.155	-.404

The factor loading on this attributes produced four, the factors can be summarized into the following loading patterns.

Table 4.20: Factor category 1: Equipment

Factors	Factor Loading
Industry provides training equipment to TVET institutions	.874
Funding to TVET to buy modern equipment	.795
Servicing and maintenance of training equipment to TVET	.819
Shared research innovations and development between TVET and industry	.833

The factors on equipment produced higher loadings. Industry support to TVET institutions is a major component in preparing TVET trainees for the Labour market. The training equipment from industry will enhance training and also support research to the training institutions. This will enhance trainee labour market preparedness.

Table 4.21: Factor category 2: Research

Factors	Factor Loading
Industry offers training industrial placements for trainees	.631
Training to trainees when on session	.623
Instructors from TVET require quality of training in practical subjects	.839

Industry involvement in TVET institutions by supporting research and innovations will encourage trainee preparedness for the labour market. The major areas that industry should support in providing attachment placement, training trainees while on session and training instructors on modern technology.

Table 4.22: Factor category 3: Trainee attachment

Factors	Factor Loading
Policy between industry and TVET institutions	.567
Industry offers training industrial placements for trainees	.682

Trainee attachment programs will enhance their preparedness for the Labour market. The main areas the industry should focus on to achieve this factor include formulating policy frameworks between industry and TVET institutions and training trainees while on session.

Table 4.23: Factor category 4: Staff attachment

Factors	Factor Loading
Placement is adequate inn meeting demands of TVET trainees	.704

Staff attachment programs should be emphasized to enhance the quality of trainees produced for the labour market. Attachment programs should be enhanced to provide trainees with the relevant skills required in the labour market.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECCOMENDATIONS

5.1 RESULTS AND DISCUSSIONS

The study sought to establish the extent to which technical vocational education and training (TVET) prepare electrical and electronic engineering technicians for the labour market. The factors presented in this study included training equipment, research development and innovation collaboration, TVET trainee industrial placement and TVET instructors industrial placement. Two set of questionnaires were distributed, one to TVET instructors and the other to industry supervisors. Respondents were asked to rate the factors under study using a likert scale of 1 – 5 where; 1 = strongly disagree, 2 = Disagree, 3 = Undecided, 4 = agree and 5 = strongly agree. The results for the findings were presented for both the industry supervisors and TVET trainers. Regression coefficient was used to rank the factors.

The study established that research development and innovations collaboration between TVET institutions and industry, modern Training equipment in TVET Laboratory, TVET trainee placement in the industry and TVET staff industrial attachment program are vital to enhance labour preparedness for TVET graduates. Similarly, for industries to enhance quality of TVET graduates, they should be involved in providing modern training equipment for TVET institutions, participate in research and innovation and establish productive placement programme for TVET trainees and staff.

5.2 CONCLUSION

This study was designed to determine the extent to which Technical Vocational and Education Training prepare electrical and electronics engineering technicians for the labour market. The study identified four factors, training equipment, research innovations and development collaboration, trainee attachment and staff attachment to investigate the research objective. Factor analysis was used to reduce the variable under study to the four independent factors both for the industry survey and the training institution survey. The regression model of these factors was found to be 60.3% for the TVET survey and 96.1% for the industry survey applicable in the area of study.

The first Specific objective was to establish the level of conformity between training equipment found in TVET institutes and those found in industry. The findings from this study indicate the equipment in TVET laboratories does not match those in the industry (34.5% agreed) similarly the industry does not provide training equipment to TVET institutions (36.8% agreed).

The second specific objective was to establish whether there is collaboration in research development and innovation between TVET institutions and industry. The data obtained from industry supervisors indicates there is shared research and development between industry and TVET institutions, while the response from the TVET trainers indicate industries are not involved in funding research innovation and development. This is a mixed finding on this item, factor analysis indicates that there is need to have clear policies to enhance and streamline research development and innovation between TVET institutions and the industry.

Specific objective number three was to establish whether there is adequate Industrial placement offered by Industry for Electrical and Electronics Engineering TVET Trainees. The findings indicate the industry offers adequate practical training to TVET trainees, similarly all the trainees proceeding for Industrial attachment get placement. However only 36.85% of the respondent agreed that the attachment period is adequate to TVET trainees when in session.

The last research objective was to determine whether a staff industrial attachment programmes or policy exists between TVET Institutions and industry in Electrical and Electronics engineering for TVET Trainers. The findings from TVET institutions indicate there is a policy on attachment between TVET institutions and Industry similarly the findings show that attachment is a vital component in the delivery of the practical content of the syllabus by electrical and electronic engineering trainers. However Industry supervisors indicated that instructors from TVET institutions are not offered industrial attachment and it is not clear if there exist a policy that support training of staff from TVET institutions. This implies that policies have been formulated at TVET institutions but not implemented.

From the findings of the study, the results demonstrate the four factors under investigation, training equipment, research development and innovation, TVET trainee placement and staff attachment program are vital in TVET trainee preparedness for the Labour market. Factor analysis indicate that the four variable under investigation on the training equipment are vital, two variable on the research innovations and development, one variable on trainee and staff attachment. It is clear that training equipment is vital in quality trainee preparedness there are advanced steps to achieve this component, much need to be done to enhance research

innovation and development, trainee attachment has been remarkably achieved though much need to be done to give sufficient period for trainee to master the skills, staff training programmes need to be emphasized to enhance the quality of the training staff.

5.3 RECOMMENDATIONS

The study has achieved what it was set to accomplish; investigated factors that influemce TVET trainees labour market preparedness. Four factors training equipment, reasearch and innovation collaboration, trainee attachment programes and staff attachment programees are presented. However, as was previously established, there is a huge gap between the activities undertakings in TVET institutitons and those in the industry. Therefore, there is need to harmonise the two sectors inorder to a chieve a fully prepared graduate for the labour market.

The Kenyan vision 2030 aims at training an army of artisans ready for the Labour market. It is argued that this graduates will tranform the economy of Kenya, the focus is to produce TVET graduates who have required skills for self employement.

The training programme should be restructured to focus on the competency of the graduate and not the quality grades attained by the graduate. The emphasis of the training programe has been for many years the mean score attained by the trainees in theoritical examinations while industry focus has been on the skills in the form of practical competence a graduate trainee can display. Review of the training programme with focus on the competancy will be the starting point to attain fully trainee preparedness for the labour market.

Based on the conclusion that modern training equipment, research development and innovation are important factors in preparing trainee for the Labour market, TVET institutions should be adequately funded in order provide the quality training desired to this objective. However, TVET institutions have heavily relied on the government and other well-wishers to buy training equipment and other facilities required in the training. This translates into admitting many students in programs with few facilities to raise funds for running the institutions. There is a need to ensure appropriate mechanisms are formulated and implemented to support funding to TVET institutions in order to achieve fully trainee labour market preparedness.

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APPENDICES

APPENDIX I: INFORMED CONSENT LETTER

I am a postgraduate student of school of Education, Department of Technology Education, University of Eldoret conducting research on "extent TVET institutions prepare electrical and electronics Engineering Technicians for the labour market in Kenya". I kindly request you to answer the questions below. All responses will be handled confidentially and will be used only for this. This questionnaire therefore is to help me collect information from you for purely academic purpose.

You are therefore kindly requested to participate and respond as best as you can to items in the questionnaire. The information provided will be treated with utmost confidentiality and will be used only for the purpose of this study.

Let me take this opportunity to thank you in advance for taking part in this study.

Yours sincerely,

RIONOMAKAL L. EMMANUEL

APPENDIX II: QUESTIONNAIRE FOR ELECTRICAL ENGINEERING TVET INSTRUCTOR

This is an academic study being undertaken in partial fulfillment of the requirement for master degree thesis, to determine the extent of formal collaboration between TVET Institutions and Industry in Electrical and Electronics Engineering field. The purpose of this questionnaire is to seek your views on various aspects of Formal Collaboration between TVET Institutions and Industry. The information gathered will generate some suggestions and recommendations towards the improvement of TVET Institutions and Industry. You are requested to fill in the questionnaire as accurately as possible. All responses will be handled confidently, both during and after the study. Thank you!

Rionomakal L. Emmanuel
Master of Education in Technology Education
Student.
University of Eldoret, Kenya.

QUESTIONAIRE FOR ELECTRICAL AND ELECTRONICS ENGINEERING TVET TRAINERS

SECTION A: PERSONAL INFORMATION

1. Gender (i) male ( )
   (ii) Female ( )
2. Age 25-30 ( )
   31-35 ( )
   36-40 ( )
   41-45 ( )
   46-49 ( )
   OVER 50 ( )
3. Professional Qualification
   (i) S1 ( )
   (ii) Dip Tech. Ed. ( )
   (iii) HND in Electrical Eng. ( )
   (iv) Bed. Tech. Ed. ( )
   (V) B. Tech. ( )
   (vi) BSC. ( )
   (vii) Others (please specify) ( )
4. Experience in current position
   (i) 0- 5years ( )
   (ii) 5 & above years ( )

SECTION B : PROFESSIONAL INFORMATION

Please indicate with an x the extent of your agreement with the statement given in the appropriate space.

SA: Strongly agree
A: Agree
U: Undecided
D: Disagree
SD: Strongly disagree

(I) Training Equipment in Electrical and Electronics Engineering Laboratory

	STATEMENT	SA	A	U	D	SD
5.	The training equipment in the workshops are adequate.					
6	The training equipment match those found in industry					
7	Your technical skills allow you to use the training equipment effectively.					
8	Industry donates equipment for training purposes					
9	The Institute has an investment capital plan in modern training equipment e .g CRO , training modules, Microprocessor training kits, signal generators, Megger etc.					

(II) Research development and innovations collaboration with Industry.

	STATEMENT	SA	A	U	D	SD
10	Research development and innovations activities takes place in Electrical and Electronics Engineering department					
11	This is collaboration between the Electrical and Electronics Engineering department and industry in the areas of research development and innovations.					
12	There is a policy of collaboration in the areas of research, development and innovations between Electrical and Electronics department and Industry.					
13	Industry is involved in funding research development and innovations activities in Electrical and Electronics Engineering Department.					

(III) TVET Trainee Industrial Training and placement by Industry.

	STATEMENT	SA	A	U	D	SD
14	All trainees proceeding for Industrial attachment get placement					
15	Industry offer adequate practical training to training to the TVET trainees					
16	The period of attachment is sufficient for the TVET trainees to again the required practical skills					
17	Skilled personnel from Industry visit Electrical and Electronics Engineering trainees to offer specialized training.					

(IV) Staff Industrial attachment program.

	STATEMENT	**SA**	**A**	**U**	**D**	**SD**
18	There is a policy that exists between your TVET Institution and Industry for Staff Industrial attachment					
19	Lecturers have acquired the necessary modern practical skills from the industrial attachment.					
20	The Industrial attachment program is adequate in terms of duration					
21	Industrial attachment is a vital component in the delivery of the practical content of the syllabus by Electrical and Electronics Engineering Trainers.					

END

Thank you for your co-operation.

APPENDIX III: QUESTIONNAIRE FOR INDUSTRIAL ENGINEERING SUPERVISOR

This is an academic study being undertaken in partial fulfillment of the requirement for master degree thesis, to determine the extent of formal collaboration between TVET Institutions and Industry in Electrical and Electronics Engineering field. The purpose of this questionnaire is to seek your views on various aspects of Formal Collaboration between TVET Institutions and Industry. The information gathered will generate some suggestions and recommendations towards the improvement of TVET Institutions and Industry. You are requested to fill in the questionnaire as accurately as possible. All responses will be handled confidently, both during and after the study. Thank you!

Rionomakal L. Emmanuel
Master of Education in Technology Education
(Electrical and Electronics Engineering Option)
Student.
University of Eldoret, Kenya.

QUESTIONAIRE FOR INDUSTRIAL SUPERVISORS IN THE ELECTRICAL AND ELECTRONICS ENGINEERING SECTION

SECTION A: PERSONAL INFORMATION

1. Gender (i) male ( )
   (ii) Female ( )
2. Age 25-30 ( )
   31-35 ( )
   36-40 ( )
   41-45 ( )
   46-49 ( )
   OVER 50 ( )
3. Professional Qualification
   (i) S1 ( )
   (ii) Dip Tech. Ed. ( )

(iii) HND in Electrical Eng. ( )

(iv) Bed. Tech. Ed. ( )

(V) B. Tech. ( )

(vi) BSC. ( )

(vii) Others (please specify) ( )

4. Experience in current position

(i) 0-5 years ( )

(ii) 5 & above ( )

SECTION B: PROFESSIONAL INFORMATION

Please indicate with an x the extent of your agreement with the statement given in the appropriate space.

SA: Strongly agree

A: Agree

U: Undecided

D: Disagree

SD: Strongly disagree

(I)Training Equipment in Electrical and Electronics Engineering Laboratory.

	STATEMENT	**SA**	**A**	**U**	**D**	**SD**
5	Our Industry provides Electrical and Electronics Engineering training equipment TVET Institutions.					
6	Our Industry provides funding for TVET Institution to purchase modern Electrical and Electronics Engineering training equipment.					
7	Our Industry provides servicing and maintenance of the training in TVET Institutions					

(II) Research development and innovation collaboration with TVET Institution.

	STATEMENT	**SA**	**A**	**U**	**D**	**SD**
8.	There is shared research development					

	and innovation between our Industry and TVET Institutions in Electrical and Electronics Engineering field.					
9.	There is an official policy document between our Industry and TVET Institutions on research development and innovations activities.					
10.	Our Industry funds research development and innovations activities in TVET Institution					

(III) TVET Trainee Industrial Training and placement by Industry.

	STATEMENT	**SA**	**A**	**U**	**D**	**SD**
11.	Our Industry offers training Industrial placement for Electrical and Electronics Engineering trainees.					
12.	The Industrial Placement offered is adequate in meeting the demands of TVET trainees.					
13.	Our Industry offers training to TVET trainees when in session in their TVET Institutions.					

(IV) Staff Industrial attachment program

	STATEMENT	**SA**	**A**	**U**	**D**	**SD**
14.	Lecturers from TVET Institutions are offered Industrial attachment by our Industry					
15.	A policy document exists that supports training of Electrical and Electronics Engineering staff from TVET Institutions					

16.	The calendar for the events for TVET favours the placement for Industrial attachment					
17.	The trainers from TVET Institutions require attachment to improve the quality of training in practical subjects					

END

Thank you for your co-operation.

APPENDIX IV: STATISTICS

I.TVET Data Reliability Analysis

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)
Reliability Coefficients
N of Cases = 47.0 N of Items = 17
Alpha = .7851

II.Industry Data Reliability Analysis

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)
Reliability Coefficients
N of Cases = 18.0 N of Items = 13
Alpha = .8610

III.TVET Data Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
equipment in w orkshop are adequate	55	1	5	2.76	1.138
equipment match those in industry	54	1	5	3.09	1.186
technical skills allow use of trainig equipment	54	1	4	2.00	.869
industyr donates equipment	55	2	5	3.60	1.116
institutte has an investment capital plan in modern training	55	1	5	2.62	1.097
research and innovations takes place in department	55	1	5	2.71	1.100
collabaoration betw een deparment and industry on training	55	1	5	2.98	1.027
policy of collaboration in research	55	1	5	3.29	.994
industyr is involved in funding research development	55	1	5	3.73	1.027
all trainees proceed to attachment	55	1	4	2.49	.998
industtry offers adequate practical training	53	1	5	2.26	1.022
3 months after comption of 1st yr sufficient Trainee aquire skills	54	1	5	2.83	1.060
skills personnel from industry visit TVET to offer specializ ed training	54	1	5	3.48	1.285
Policy exists betw een TVET and industry on staff attachment	54	1	5	3.33	1.046
instructors have aquired modern skills from indurty	53	2	5	3.21	1.007
1 months adequate for staff training	53	1	5	3.60	1.044
attachment vital in delivery of practical content	53	1	5	1.43	.797
Valid N (listw ise)	47				

IV.TVET Data Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Industry provides training equipment to TVET institutions	19	1	5	2.74	1.485
funding to TVET to buy modern equipment	19	2	5	3.53	1.307
services and maintenance of training equipment to TVET	19	2	5	3.16	1.214
shared research development betw een TVET and industry	19	1	5	3.00	1.453
policy betw een industry and TVET institutions	19	1	5	3.26	1.327
industry funds research development and development in TVET	19	2	5	3.74	1.098
Industry offers training industrial placements for trainees	18	1	3	1.67	.686
placement is adequate inn meetong demands of TVET trainees	18	1	4	2.28	1.320
training to trainees w henn on session	18	1	5	3.00	1.414
instructors from TVET are offered attachement	18	2	5	3.56	1.149
policy on training of TVET staff	19	2	5	3.42	1.121
calender of TVET favours placement to industrila attachment	19	1	5	2.84	1.302
instructors from TVET require quality of training inn practical subjects	19	1	3	1.68	.582
Valid N (listw ise)	18				

APPENDIX V: GEOGRAPHICAL MAP OF AREA OF STUDY

Figure 5.1 NAIROBI MAP

APPENDIX VI: RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
MR. EMMANUEL RIONOMAKAL LOYAMURUK
of UNIVERSITY OF ELDORET, 30039-100 nairobi,has been permitted to conduct research in *Nairobi County*

Permit No : NACOSTI/P/15/7691/6037
Date Of Issue : 13th August,2015
Fee Recieved :Ksh 1,000

on the topic: *THE EXTENT TO WHICH TECHNICAL VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS PREPARE ELECTRICAL AND ELECTRONICS ENGINEERING TECHNICIANS FOR THE JOB MARKET IN KENYA*

for the period ending:
30th November,2015

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

NACOSTI

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 6149

CONDITIONS: see back page