REVAMPING TELECOMMUNICATION ENGINEERING CURRICULUM IN KENYA - SURVEY

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Abstract

Education system in Kenya is a field highly recognized by institutions in Kenya and even beyond. The grading of Kenyan education system is leveled from CPE/KCPE, KSE/KCSE, Diploma, HND, Undergraduate/ bachelors, Masters and PHD being the highest in Kenya. This survey is based on enrolment and employment patterns of telecommunication engineers. It also focuses on graduates with diploma, HND and Undergraduate levels from high learning institutions like ten tertiary institutions and universities. The employment pattern is taken over fifty industrial sectors between year 2000 and 2020. In ancient times, engineering skills were used to design and develop working tools for people. The definition of engineering is a field of discipline and art relating to growth, attainment, and submission. The uniform sample size will give a linear data that is analyzed using descriptive statistics, linear regression analysis and one-way ANOVA to find the viability in including ICT in telecommunication engineering courses. The main variables will be telecommunication with ICT as independent variable and employment and or enrolment as dependent variables. The expectation from this new design of the course would be more students' enrolment and relevancy to dynamic technological market and perfect telecommunication engineers, well equipped with hardware and software of communication equipment in the modern market. In totality an improved telecommunication engineers' enrolment index and a wide range of employment opportunities, ranging from hardware designers and repairs to communication equipment programmers in the market.

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I INTRODUCTION

Engineering is a concept that existed since human history. In ancient times, engineering skills were used to design and develop working tools for people. It is, therefore, possible to define human nature with their tool-making, design, and engineering knowledge. The definition of engineering field is a discipline and art relating to growth, attainment, and submission [1]. Engineering is a word derived from the principle word engine. The engine is a Latin word meaning resourcefulness or ingenuity in Latin "Ingenium". In the 1790s fixed semaphore emerged in Europe and by 1830s, the first technical telecommunication appeared. The word telecommunication can be backdated to the twentieth-century and is a mixture of Greek and Latin pedigree [2]. It means passing on data and information from one point to another. The art of transmitting and consequently receiving information and data in the form of an electromagnetic wave is telecommunication.

Telecommunication started with the use of smoke and drums in Africa, America, and Asia as a signal sending messages like war, distress, disaster, etc. In the era of education, studies in engineering emerged with different engineering areas and one of the areas emerged prominently is telecommunication engineering as course within the vast engineering. The selection of trainees in engineering based on the previous performance and individual interest has been the trend in enrolment to this discipline. The categories of people have not been considered in selection of trainees. Some categories are not capable to go through the engineering training process due to their generations [3].

The generations of people are categorized as X, Y, Z as per the research done by researchers in 2017. The researchers' categorized people of generation X as those born between 1964 and 1980. [4].This cohort was characterized by their technical knowledge ability, multicultural, and world minded there was a good grasp of engineering knowledge in this cohort. Cohort Y was born between 1980 and 1990. This group was confident, optimistic, competent, and funny [5].

This cohort is born during the technical era. This group had a good technological capability and could be molded in any engineering field including telecommunication engineering. They are highly inquisitive, troubled, unprejudiced, and talkative also said that the groups Z called the iGeneration group born the 1990s are the digital era group nicknamed also as the dot com era. They have characteristics of multitasking, being pliant, and interactive. In engineering studies a lot of patience is paramount and this group is a bit impatient and requires quick results. This cohort lack capacity to focus on issues, analysis of sophisticated issues and not having strategic objectives thereby presenting issues in upright organizations This Cohort prefers psychomotor skills and visual learning leaving the affective and personal differences. It is as if they don't trust learning to be individual and bear sophisticated characteristics. They engage more in cognitive learning skills and psychomotor skills. Engineering discipline requires these two skills but the group has another complicated one. They learn well if their interest is considered before in full or partially Science and technology trends forced engineering to realize a periodic change to meet the current market demand. In this field of engineering, one must be ready to embrace this dynamism in engineering and technology. For a change of attitude(learning) to these current groups of learners to be realized the resource persons need to understand power, fragility, and liking of the student.

The need to train engineers in telecommunication requires resource persons to be organized so that their trainees can be fast decision-makers who acquire the vast knowledge from their resource persons and through ICT equipment. In totality an improved telecommunication engineers' enrolment index and a wide range of employment opportunities, ranging from hardware designers and repairs to communication equipment programmers.

II MOTIVATION OF THE STUDY

Learning is a change of attitude and is a process while education is gaining knowledge through some defined activities. The principal reason for doing a specific discipline is to improve livelihood, gain or acquire knowledge and bring a change to society among others. Most learning activities are to help the learner to gain competency after completion of the acquired knowledge and get rewarded in one way or the other. Very few learners go through this engineering process for prestige. If a common platform is opened for interested applicants to apply for the course of their interest and only what one is qualified to enroll for, it is evident from the enrolment pattern in the twenty learning institution that the pattern is low. In Kenya, a platform called KUCCPS (Kenya universities and colleges central placement system), is an authorized system mandated to place students to desired universities and colleges with the prescribed mandatory requirements. A survey from KUCCPS website has shown that the numbers of the applicants for other courses are more than telecommunication engineering (*). Visiting industries that use telecommunication equipment like media stations has also shown that the number of staff in a different discipline is far more than telecommunication engineering discipline staff employed yet the media station needs communication equipment to achieve the desired goal.

III ENROLMENT & EMPLOYMENT DROP

For a period backdating to the 1980s, there has been

remarkable development and innovation in engineering, Technology, and Space disciplines. The breakthroughs of these fields are culminated by their dynamism [6]. Engineering education challenges vary from the cost of the relevant tools to availability of engineering professionals. Some academic institutions have made tremendous strive to equip their engineering laboratories with the right training tools and integration of academic curricula with modern technology. This has even gone far to change some specific curriculum to match the dynamic technology. For example, Mechanical engineering merged with electronics to form mechatronics, microprocessor electronics, and mechanical to form micro electro mechanical (MEMS). A trend to merge telecommunication with other engineering disciplines has not made recognized steps. A suggestion to include ICT to merge with any other large unit like telecommunication has not proved good by the examination bodies.

The trend towards telecommunication integrating with a unit in ICT not the whole ICT will be easy. Communication components need a greater part of ICT- the software. This is an indication of the requirement to integrate ICT with telecommunication. To conclude, the research proposal will design a curriculum to incorporate telecommunication engineering curriculum with programing. A Government training institution in Kenya (KIMC) admitted 25 to 40 students for telecommunication engineering between 2000 and 2009 and started declining to less than ten students by 2017 despite those admitted passes internal and external examinations. The industrial employment index for telecommunication engineers was 80% by 2009 in Kenya. Currently, the same industrial employment index falls below 10% for telecommunication engineer graduates. After a training period, the aspiring telecommunication engineers seek industrial attachment in relevant industries in vain. The trainers visit the industry where a trainee is attached and found that the telecommunication engineer trainer is attached to ICT department. More than half of the trainees fail to get the attachment and the other half get attached to places not relevant to the field of study

3.1 Abandoned engineering match

Several traditional engineering training courses have been integrated with other courses to meet the current market demand. Telecommunication equipment is widely used by all sectors either as a tool, component, or its technological aspect. There is a great need to integrate telecommunication engineering with some courses to improve its weight in the job market. This integration has not been done formally. Industrialization is moving with technology and telecommunication engineering is one of the major components in industrialization, there is a necessity for it to move to the same speed. Some training units in telecommunication don't add weight and there is a need to remove them or consider revamping the whole curriculum for telecommunication engineers. When we consider the rate at which technology is moving, it is more evident that telecommunication engineering has been lagging due to its traditional units being taught. A change is always inevitable.

3.2 Significant of the study

Telecommunication engineering is a field within a wider discipline of engineering, studied for three years diplomas and four years for undergraduates. The majority of engineering disciplines have so far merged to meet market demand and dynamic change of technology. An example is motor vehicle engineering; the modern vehicles are embedded with a lot of electrical, electronics, and Computer Technology (particularly software). The communication industry is not off the hook for this change. Telephony has changed from analog to digital with a lot of configurations and programming. Wireless technology requires both hardware and software knowledge. Looking at cohorts, the Z cohort has unique characteristics, and studying telecommunication engineering from a non-contemporary approach will not serve this cohort Z interest.

3.3 Content of the course

The public views engineers as a restricted group with skills in science related field. Engineers are perceived to be technology driven with strong background of mathematics, technology and scientific units. Some of the studies involving critical and creative thinking become a paramount course for engineers' profession today. The California engineering and Agricultural Board released a report on this in 2008 (CEAB, 2008). There are world issues that engineers are perfectly aware of but policy ties engineers' not to address them and Sustainable Development Goals (SDG) specifies these goals . Generally, on lack of professionalism, this might have been due to growing trend in technological drive. Telecommunication engineering should be one of the driving professional trades in the sector of communication. In technological advancement, focusing communication and its co-sector transportation, ICT is taking center stage in their growth. The uniqueness of engineers put them in a fast solving and system designers of communication equipment [7]. In Gender based enrolment in engineering field as a whole and telecommunication engineering, much has been noted.

In a conference, participants found that there is a drop in female enrolment in engineering courses. The conference further identified instruments used to measure personal motivation factors towards engineering. In some universities students take single engineering degree and others take combined degrees i.e. engineering and non-engineering program. The main purpose of choosing different programs is to be relevant in the job market[8].

A student enrolled for a program leading to award of Bachelors in telecommunication engineering and bachelors of commerce Wales University dropped engineering after completing. After successfully graduating with the two degrees, the alumni student ended up securing employment with the department of commerce and industry. The

knowledge of engineering falls to a ditch. The US workforce has been approximated to two third of the technical, managerial and administrative work use computers or modern technology [10].Most modern technology equipment implements both hardware and software. Private institutions, government and individual offices throughout the world need an electronic facility. In most cases the facilities are used by novice users or non technical staff. Examples are computers and printers used in offices for data storage, data analysis, communication, financial accounting, order placement; record keeping, program scheduling, production and editing of both video and audio yet the users might not be engineers.

Traditionally, telecommunication engineers were engaged in design and servicing workshops for malfunctioning equipment or design new equipment. This has now been overtaken by technology. The field of telecommunication engineering (TE) should be one of the driving forces in communication and its equipment but most equipment in this field of TE needs a lot of software. Design specifications need to start planning and ends in implementation while servicing starts from problem identification and motive (for routine maintenance) and ends in testing for serviceability [9]. The Communication equipment has hardware and software and the last part in maintenance is software managed putting off traditional TE professional. An expanding scope of learning and experience in manufacturing field has been forced by computer industry to change their work structure, work motivation, and communication link. Then what are the benefits of this technological transformation? Adopting new scientific technology has advantages: easy identification of problems, fast problem solutions, decision marking, controlling, staffing, communication, work programming and organizing organization's projection. There must be reasons why ICT and telecommunication engineering merger.

Information system is a group of connected components and or units that do storage, process data and disseminate information. It can also share stored data or information with other terminals used by executive, mangers and functional levels in an organization. These systems have hardware and software and needs both experts during design, implementation and maintenance. One advantage of training TEs in ICT is reducing cost and number of employees in an organization. Mobility report on students done by an international body shows that, great mobility experienced in social sciences and humanities than pure sciences [11]. The report reveals that enrolment growth in tertiary institutions was forecasted to be 1.4% between 2011 and 2020. One decade between 2001 and 2010, the growth was 6% per year telecommunication engineers alone. There is a great decline in this enrolment and this also trickles to employment sector. In 2016, World Bank report recommendation to Kenya was that Kenya government should give weight in mathematics and science at primary and secondary schools [12] .

IV. Data analysis

Data analysis is calculating certain measures together intending to identify the relationship and pattern that exists between training sets or data clusters. In the survey approach, analysis of data includes approximating un-determinant parameter values of a population and testing the hypothesis with the view to determine inferences[13]. In contemporary times, and with the invention of computer technology, correlation analysis for the collected data is more appropriate for the study. Correlation analysis will involve:

i.   Processing of data: - collected data from the survey will be scrutinized and errors removed to improve accuracy.

ii. Coding:- weighing the questions answered and clustering them

iii. Homogeneity: - reducing the questions into related groups for reliability and determination of relationship.

The correlation analysis is chosen from the fact that the study involves three main variables:

i.   Telecommunication engineering with subunit from ICT

ii. Enrolment index from higher learning institutions

iii. Employment index from industries and organizations

The study is a social science where the principal interested in understanding and controlling the relationship between variables to determine what causes the variations. The use of correlation analysis becomes more viable than other close ones like the multivariate analysis. The choice of this correlation analysis is culminated by the fact that the independent variable is telecommunication engineering with software and two dependent variable employment and enrolment indexes.

V CONCLUSION

Going into future, there is a great need to integrate telecommunication engineering with some courses to improve its weight in the job market. This integration has not been done formally. Industrialization is moving with technology ,and hence telecommunication engineering is one of the major components in industrialization, there is a necessity for it to move to the same speed.

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