

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya

By

Eunice Chepkorir, Dr. Shem Mwalw'a and Mrs. Florence Ateka
The Catholic University of Eastern Africa, Nairobi, Kenya

Email: euniechep@yahoo.com

Abstract

The study aimed at-exploring on promotion of educational research for productivity & innovation among selected public and private universities in Nairobi County, Kenya. The study was guided by the following research question: How does industry –university collaboration influence research output in the universities. The study was anchored on the Triple Helix Theory. The study adopted cross-section descriptive research design. The target population was 306 university researchers comprising of lecturers, PhD Students and any other staff in the universities involved in research. A sample size representing 30% of the target population was used for this investigation. The study used questionnaires to collect data. Cronbach Alpha technique was used to determine reliability of Likert scale items in the university researchers' questionnaire. Quantitative data was analyzed using Statistical Package for Social Science version 23 to generate frequencies and percentages that summarized data. The findings revealed industry –university collaboration greatly influence research output in the universities. The study concluded that universities in Kenya have not taken commercialization of research results seriously. Additionally, there is low venture in profitable and marketable products such as trademarks, industrial design and utility models. The study recommended that: universities should balance teaching workload to ensure that university researchers have balanced hours for both teaching and research; universities should continuously sensitize university researchers on university-industrial sector linkages; Funding organizations of research projects should come up with simple and suitable research project financial reporting procedures; the government and other research funding organizations should increase funds for both research and commercialization; the government and funding organizations should avail adequate and timely communication on disbursement of funds.

Key words: Kenya, Educational Research Productivity, Public and Private Universities, Nairobi County

Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya

By

Eunice Chepkorir, Dr. Shem Mwalw'a and Mrs. Florence Ateka

Background to the Study

In order to boost their country's competitiveness, raise money for further Research & Development and maximize the returns on public investments and research usage, several governments have pushed universities to produce outputs from their research endeavors (OECD 2008). Additionally, in the 2012 KEI Rankings which included 146 nations from around the world, China, Korea and Malaysia are at the top of the list of knowledge-based economies (World Bank, 2012). On the other side, a lot of African nations came in the bottom of the list (Kefela, 2010).

According to their rate of publication and performance in securing research grants, researchers in Australia are frequently awarded. The government of Australia has established programs to strengthen ties with universities, and a number of organizations have established commercialization entities to let their academics make money from their findings and hasten knowledge transfer to industries (Collier & Gray, 2010). The government of Australia is also aware of the important role that support systems and training in commercialization play in helping researchers successfully market their own findings.

The United States has a sophisticated entrepreneurship finance system, with early-stage venture capitalists and business people who are more technologically oriented. Engagement between academia and industry was a significant force behind university entrepreneurship, helped in part by a network approach to such collaboration (Guenther & Wagner, 2008). University academics now have the right to patent any invention they create while working on government-funded research according to the Bayh-Dole Act.

Government programs that promote partnerships between colleges and industry enable the majority of Japanese universities to interact with it. Through these connections, Japanese institutions can produce outputs from their research findings and engage in commercialization (Tantiyaswasdikul, 2013). Through technological licensing and formal R&D collaborations with industry, the nation has made great strides toward commercializing intellectual property since the late 1980s. Because of the proliferation of spin-off businesses and the increasing accessibility of commercial venture capitalists, many universities have been able to commercialize the results of their research. The promotion of university research commercialization has been linked to various factors, including finding appropriate industry collaborators and partners, negotiating license agreements, establishing start-up companies, raising funds from investors, and partnering with industry.

To develop a knowledge-based economy, the government South Africa recognizes that IP exploitation must be carried out by publicly funded research groups through commercialization. According to an Association of African Universities case study, South Africa boasts the continent's longest-standing university-industry links despite the fact that South African

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

universities hold only a few patents. This is due to the fact that industry owns the majority of patents resulting from industry-commissioned research, as well as the numerous barriers and dangers associated with patent acquisition (AAU, 2012).

The National Office for Technology Acquisition and Promotion (NOTAP), which oversees an Intellectual Property Rights (IPR) technology transfer in Nigeria has created Intellectual Property and Technology Transfer Offices has established offices for the transfer of intellectual property and technology in tertiary institutions throughout the nation to help inventors with IPR preparation and filing (Ogunwusi & Ibrahim, 2014). A legislative and administrative framework, along with incentives for university academics to share their ideas and breakthroughs through financial and non-financial channels, have been found to be beneficial in promoting the commercialization of research outputs.

Less than 60% of academic staff members at Ilorin University in Nigeria share their research findings and commercialization takes a backseat with only about 28% of university lecturers creating research products that can be used for societal development and less than 10% of university lecturers commercializing their research outcomes (Oduwaye, Onasanya & Shehu, 2010). Despite the fact that many institutions are experiencing a research boom, the report demonstrates that the rate of commercialization of research discoveries is still quite low (OECD, 2014).

In Kenya, National Commission for Science, Technology & Innovation (NACOSTI) is in charge of providing guidance, organizing science and technology activities, promoting them, and enforcing rules (ST&I Act, 2013). On behalf of the Kenyan government, NACOSTI has been managing the Research Endowment Fund since it was founded by the Ministry of Higher Education, Science, and Technology. The Fund's mission is to assist Kenyans in funding research and innovation projects throughout the country. In order to attain an innovation-driven economy for Kenya's development, learning institutions are anticipated to translate their research discoveries into products and services, generate new ideas, and embrace innovation by fostering research, science, and technology in higher education institutions (NACOSTI, 2014). In accordance with the University Act of 2012, Kenyan institutions must also advance knowledge through instruction, scholarly investigation, and scientific advancement in addition to making their findings available to the general public.

Governments and organizations that finance research around the world are increasingly interested in how successfully research advances societal progress because research money is typically provided by taxpayers. They have concentrated their efforts on conducting evaluations and assessing the outcomes because they finance research programs (Mutz, Bornmann & Daniel, 2013). Globally, public universities are critical centers for scientific research that results in better lives through technological progress. They have achieved enormous innovation through sustained scientific research to help address myriad challenges throughout history. It has been on a declining trajectory in the past.

Kenya's public universities are not immune to research inefficiency. Hence it is necessary to investigate why scientific research is not prioritized in public universities and what can be required to enhance it. Besides teaching, research has become a core function of universities around the world. Yet, like in many African countries, Kenyan universities still lag behind in

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

terms of research productivity, due to factors many researchers refer to as constraints (Oringo 2016).

Statement of the Problem

As per the UNDP study from 2012, academic research is still a significant source of knowledge and innovation on a global, regional, and national scale. However, over the past ten years, the majority of industrialized nations have been compelled to deal with the concomitant challenges of sustaining adequate investment in high-level research activities while simultaneously extending access to post-secondary education and training. This is proving to be a tricky balancing act that depends on cutting-edge regulations and a wider divide.

Most university research proposals are not moved forward to the next stage and are instead left to gather dust in shelves when they could have been used to improve several economies with significant government financing. Few universities are engaged in the commercial exploitation of discoveries developed as a result of their research activities, according to a report on the topic that was created in 2013 in Canada by the OECD Directorate for Science, Technology, and Industry. For instance, only approximately 10 percent of institutions in Europe, which has the highest proportion of universities worldwide, are responsible for 85 percent of the total revenue from inventions (OECD, 2013).

Studies on the research outputs in Kenyan universities have been done on a range of subjects, including strategies for increasing the commercialization of university research in Kenya (Ondimu, 2012); the factors that affect research productivity in Kenyan public universities, with a case study of Moi University (Kendagor, Kosgei, Tuitoek & Chelangat, 2012) and the reasons for the low rate of research publication in the nation (Migosi, 2012). On the other hand, the present study gathered viewpoints from academic researchers who were either publicly or privately supported in order to identify research outputs and to show their expertise in commercializing their research results.

There have been concerns amongst stakeholders on the capacity of universities in Africa in general and Kenya in Africa to attract research funding and to translate research outputs into enterprises. A lot of studies have been carried out on this (Mowery and Sapat, 2007, Rotheamel, Agung and Jiang, 2007, Migosi, 2012). However no study has been carried out targeting the four universities. This study is therefore meant to fill that gap.

Research Question

The following question guided this study:

How does industry –university collaboration influence research output in the universities in Kenya?

Significance of the Study

The findings of this study may be useful in demonstrating the economic worth of academic research and the reasons why the government and other important stakeholders should continue to fund R&D expenditures in accordance with Vision 2030 (GoK, 2013). Estimates of the societal impact of funding from either NACOSTI's Research Endowment Fund or other organizations are anticipated to use the study's findings as a starting point. The results of the

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

study are also hoped to inspire researchers in Kenyan universities, both public and private, to produce research outputs and apply them to benefit society.

Scope and Delimitation

Catholic University of Eastern Africa, the University of Nairobi, Strathmore University and Kenyatta University were the primary focus of the study, which primarily examined university-industrial linkages and research initiatives in those universities and how those initiatives lead to outputs that are commercialized and used for the benefit of the university.

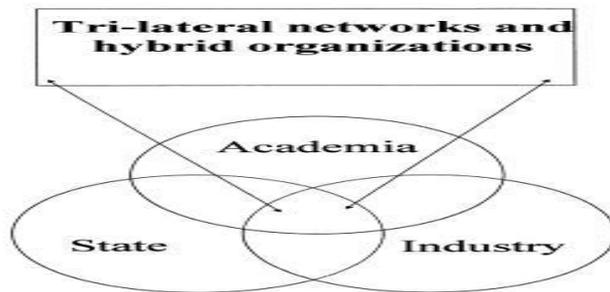
Theoretical Framework

The Triple Helix Theory underpins this research study. Etzkowitz and Leydesdorff (1995) proposed the Triple Helix model to explain the dynamic interactions between academia, industry, and government in fostering entrepreneurship, innovation, and economic growth in a knowledge-based economy (Etzkowitz and Leydesdorff 2000). The theory emphasizes the interdependence of universities, industries, and governments in the formation of knowledge citizens. The Triple Helix theory has also been regarded as both a model and a concept (Etzkowitz, 2003).

According to the Triple Helix hypothesis (Rieu, 2011), there should be more interaction among the government, industry and universities. This interaction, in the case of universities and industries, changes university culture and values and encourages more entrepreneurial tendencies. The government is crucial in creating the right institutions and laws to achieve the commercial production of research discoveries as well as funding R&D in universities, according to the Triple Helix Theory. Additionally, it is the main source of funding for the commercialization of products produced from supported university research projects and technology transfer (Gorasson & Brundenius, 2011).

Particularly in the emergence of knowledge-based civilizations, the Triple Helix theory's emphasis on the university's role in innovation is enhanced. This role includes both research and teaching for inclusive growth. Three interconnected dynamics: evolutionary mechanisms, institutional changes and the university's new position control the interaction between the three spheres (Etzkowitz & Leydesdorff, 2000). The concept proposes that universities should take a more active part in innovation and economic development as well as the collaborative efforts they must make with business and government in order to support the generation, transmission, and application of knowledge for socioeconomic development.

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.



Source: Triple Helix model, adopted from (Etzkowitz & Leydesdorff, 2000)

According to the Triple Helix concept, an entrepreneurial university is one that is adamantly committed to creating and applying knowledge (Etzkowitz, 2003).

The Strengths of the Theory

Research has established that local triple helix initiatives in key cities/regions contribute to bridging the gap between science and industry, foster an increased number of proposed and implemented Research, Development and Innovation projects and enable a stronger ecosystem for innovative start-ups. That also contributes to the effectiveness of the national system of innovation, as well to the implementation of the innovation policy. However, the strength of these effects is likely to vary and depend upon specific conditions in a given environment.

Triple Helix theory inserts the dualities of government-industry, university-industry, industry-government relationships within triadic university-industry-government interactions, opening relationships to innovation and new levels of cooperation and competition. Thus, new innovation platforms are expeditiously created to promote knowledge-based development. It is believed that strengthening universities and other knowledge producing and disseminating organizations should help in realizing the objective of a knowledge based development. Instead of playing peripheral roles in development, they should be regarded as the core actors of development.

The triple Helix development strategy differs from traditional development models in propounding the university as a leading development actor, removing the blockages to circulation and enhancing interaction and cooperation among development actors and agencies. As equal interacting spheres develop, the pace of innovation is quickened. The classic functional differentiation of institutions is superseded by hybridization of functions moving toward a common global triple helix innovation and development environment in which both developed and developing countries have much to learn from each other as knowledge opportunities multiply.

Weaknesses of the Theory

To be successful, Research, Development and Innovation initiatives need a critical mass of resources and existing linkages. However, there are also risks and limitations involved. Too strong reliance on external financing may lead to sub optimal choice of projects, and synergies

Citation: Chepkorir, E; Mwalw’a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

with market-driven innovation are sometimes difficult to achieve and sustain over time. Furthermore, the development of the start-up population is not necessarily linked to Research, Development and Innovation, as their development patterns tend to differ and have shorter time horizons.

Finally, the success of local triple helix partnerships can also lead to disproportionate utilization of structural investment funds by metropolitan regions and thereby can increase regional disparities within a country.

Application of the Theory to the Study

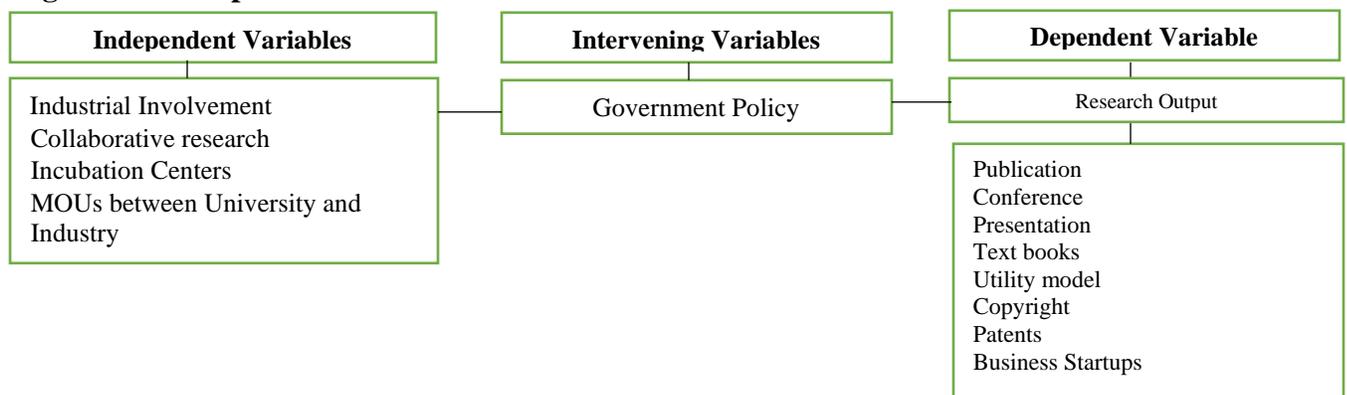
The Triple Helix is effective in understanding the dynamics of innovation at the international, regional and national levels because it provides a well-elaborated framework for understanding central inquiries in innovation processes, namely the key actors; the mechanisms of interactions between the actors; and the enabling conditions of the interactions.

Regarding the key actors, the Triple Helix model focuses on university, industry, and government. Nevertheless, it does not exclude other actors, such as intermediaries, legal firms and non-governmental agencies, but consider them secondary players (Cai & Etzkowitz, 2020). This study incorporates aspects of university, government and industry without excluding other actors on focusing on promotion of education research and productivity and innovation in Nairobi County. Therefore Triple Helix theory is applicable in this study.

Conceptual Framework

The objectives are aligned with the conceptual framework, which also aids in understanding how interconnected concepts and variables relate to one another (Kombo & Tromp, 2009).

Figure 1: Conceptual Framework



Source: Field Research 2022

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

The output of research is heavily reliant on government funding. This is dependent on the policy implemented by any government to promote research in higher education institutions. Some financial support may come from both donors and development partners. If financial support is sufficient, the likelihood of a positive outcome is high. It also depends on past experience, such as the university's previous success in the field of research. The output will also be affected by the motivational factors introduced by institution in order to boost the morale of those involved in the research activities. They must be adequately compensated and the security of their work must be ensured. There is a requirement for them to collaborate with other institutions doing similar work. The resources needed for the research must be made available to the researchers at the appropriate time.

Review of Related Literature Review of Related Theories

University Research Outputs

Education at the university level is essential for progress. This is partly because of the research done in these institutions, which has the potential to lead to inventions and technological advancements that will advance the economy (Bloom, Canning & Chan, 2006). A critical step in the research process is dissemination. Research findings can only be applied if they are widely disseminated. A university has a responsibility to distribute every information that is beneficial to the society including discoveries from their research (Awuor, 2013). By enhancing academics to develop research outputs, effective dissemination of research findings allows them to contribute to political choices that may have an impact on the target population's behavior.

University research is meant to add to the current body of knowledge by publishing new findings. Papers published in peer-reviewed journals or academic textbooks are examples of publications. Books or book chapters, peer-reviewed journals, monographs and preprints are examples of formal publications. Academic repositories, blogs, and webpages are examples of digital publications. Authors have the sole right to reproduce copyrighted content, whether it is published or not, thanks to copyrights. Contrarily, a trademark can be anything that differentiates a good or service, including a logo, a word, a slogan, or a design. Patents can help innovators keep a competitive edge by granting them for a specific amount of time, forbidding others from making, using, or selling their innovations.

Previous Research Output

The first studies that examined research output (Cole & Cole, 1967; Lotka, 1926) discovered differences in professors' intellectual production. According to the accumulative advantage, productive scientists are likely to be even more productive in the future, while low-performing scientists' productivity will decrease (Kwiek, 2016). According to Fox (1983), the accumulative advantage is frequently presented by different resources that researchers accumulate from their previous publications. Some studies claim that previous research output has a positive effect on productivity levels. The desire to conduct more research and publish more is fueled by success in publishing (Gaus et al., 2020; Kwiev, 2016). Furthermore, Salinas-Ávila, Abreu-Ledón and Tamayo-Arias (2020) discovered that a professor's motivation to conduct research, stay current in their field of study, and develop research skills influences their research productivity.

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

Review of Empirical Studies

Research Outputs and Industrial Involvement

The ability to capture information gained via research and apply it to drive economic development is made possible by collaboration between universities and industry. Benefits of this partnership include money for R&D, career prospects for university graduates, cooperative research, knowledge and resources for teaching and learning, and—most importantly—the ability to solve a range of societal concerns by utilizing research findings. With regards to innovation and economic development, university-industry collaboration is a major concern but finding suitable motivation mechanisms, forming institutions and determining consequences for research policy remains a problem (D'Este & Patel, 2007). The cooperation between universities and industries allow the universities to realize their third objective, which is entrepreneurship (Leisyte, 2011). Entrepreneurial universities have a history of pursuing and initiating industrial partnerships. Co-publication is a measure of university-industry partnership.

University-industry cooperation might enrich commercializing research outcomes from institutions of higher education (Ondimu, 2012; WIPO, 2007). Recently, it has been proposed that universities' collaborations with business, government and civil society provide them a more enduring mission that is essential for them to continue to exist in the modern period (Trencher, Yarime, McCormick, Doll, & Kraines, 2013).

Encouraging research partnerships among the government, universities, and industry is essential for creating a knowledge-based economy and advancing a nation's global standing. This kind of cooperation is referred known as "triple-helix" (Narayan & Hooper, 2010). Recently, the venture capitalists and private sector have been added. Incentives that enable researchers in industrialized nations to profit from their innovations, such as the chance to keep up to 50% of the money made when their research findings are commercialized, are some of the ways that researchers have promoted university-industry links (World Intellectual Property Organization, 2007).

Universities form strategic partnerships with the industry sector based on an awareness of their respective strengths and areas of expertise in order for the connection to be mutually beneficial. In industrialized nations, numerous universities have established businesses that employ thousands of people and make money through their connections to industry. As indicated by certain Chinese businesses that devote up to 40 percent of their profits to academic research and development, the industrial sector in these nations is also highly active and the majority of corporations are eager to adopt and promote university research results (World Intellectual Property Organization, 2007).

Summary of Literature Review and the Identification of the Research Gap

According to most writers, industry-university cooperation is essential for producing research outputs and commercializing university research findings. The literature analysis excludes the research studies that NACOSTI and other organizations have funded at private and public universities in Nairobi County. Concerns have been expressed by stakeholders about the capacity of African universities in general, and Kenya in particular, to attract research funding and translate research outputs into businesses. Many studies have been conducted on this subject (Mowery and Sapat, 2007, Rotheamel, Agung and Jiang, 2007, Migosi, 2012). However, no

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

study focusing on the four universities has been conducted. As a result, the purpose of this research is to fill that gap.

Research Methodology

Research Design

According to Kothari (2014), a research design is the organization of methods for collecting and analyzing data in a way that aims to combine relevance to study purpose. In this study, the researcher used cross sectional survey design to collect data at one point in time (Creswell, 2014). Specific data collection techniques, including observation, case studies, and questionnaires, can be used to conduct descriptive surveys. Since quantitative data is gathered, it gives information and a comprehensive understanding of a research issue. Because the data gathered is reliable and simple to examine and serves as the foundation for decision-making.

Target Population

All individuals and organizations that comprise study universes are referred to as the population (Kothari & Garg, 2014). The complete group of individuals, occasions, or problems that the researcher desires to examine is referred to as the "target population," and serves as a base from which the sample size or scope of the study will be determined (Mugenda and Mugenda, 2003). The target population for this study was university researchers who are lecturers, PhD Students and any other staff in the universities involved in research. A total of 306 university researchers from Kenyatta University, University of Nairobi, Strathmore University and Catholic University of Eastern Africa who are active researchers and have received funds from various organizations made up the target group for this study.

Sample and Sampling Procedures

An analytical subset of a broader population is called a sample. Any conclusions drawn from the sample should hold true for the entire population (Orodho, 2012). A specific method for choosing a sample from a given population is known as a sample design. Sampling was used to reduce costs, gather data more quickly, increase the reliability of the results, and make basic information about the population more available.

The sample for this study was made up of university researchers. Cluster random sampling was used in this investigation. Cluster sampling subdivides a population into smaller groups known as clusters. Each university selected acted as a cluster. A sample was then drawn at random from these clusters. There are differences among university researchers in terms of gender, rank and academic specialties. University researchers were chosen using stratified sampling technique.

Sampling of Universities

Sampling is the process by which a researcher collects people, places, and things to study (Kombo & Tromp, 2013). Nairobi County is home to four public universities and ten private institutions. Universities were chosen for participation in the study using a stratified sampling technique. Private and public universities formed the strata. The researcher used a stratified

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

sampling technique to select 50% of public universities and 20% of public universities schools from each stratum, totaling four universities that participated in the study.

Sampling of University Researchers

The researcher got number of representation from each university by using the stratified sampling where each university was used as a stratum. From each stratum, the researcher picked between 10% to 30% of the university researchers which according to Mugenda and Mugenda (2013) were representative enough for each category to participate in the study. Strathmore University, Catholic University of Eastern Africa, Kenyatta University and the University of Nairobi were chosen from among the Nairobi County's universities. The universities were chosen at random based on their accessibility, location and availability of data on university researchers.

The chosen universities are an ideal sample size for this study since they include a diverse range of faculties as well as a large student population. A sampling frame is a database of potential respondents from which people can be recruited to take part in a study. The sampling frame for this study is university lecturers from chosen universities. According to Mugenda & Mugenda (2013), for descriptive study instruments, a sample size of 10% to 50% is considered acceptable to assure consistency across all variables under consideration.

Table 1: Sample Matrix

| University | Total | Percentage | Sample size |
|---------------------|--------------|-------------------|--------------------|
| Kenyatta University | 40 | 30% | 12 |
| UoN | 63 | 30% | 19 |
| Strathmore | 140 | 30% | 42 |
| CUEA | 63 | 30% | 19 |
| Total | 306 | | 92 |

Source: NACOSTI, Strathmore University website and CUEA website

Description of Research Instruments

Data collection, according to Creswell (2014), is the process of obtaining information from the subjects of a research. Since this study relied on primary data, questionnaires were employed to gather information. Mugenda and Mugenda (2013) posits that questionnaire provide detailed answers to complex problems. Furthermore they are preferred method because of the ease and minimal cost in their construction and administration. There are two categories of questions that may be applied in a questionnaire i.e. closed-ended and open-ended questions (Fellows and Liu, 2015). The questionnaires for this study had both closed and open ended questions.

Questionnaires for University Researchers

Questionnaires were the primary data collection instrument in this project. The questionnaires were divided into two based on the variables provided in the research project. Open-ended and closed-ended questions were asked on industrial involvement and how it affects research outputs at Nairobi County's private and public universities

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

Validity of Research Instruments

The data's validity describes how well it covers the exact area of research (Ghauri and Gronhaug, 2005). The main measure of how well-founded and likely accurate a notion, conclusion, or measurement is called validity (Field, 2005). If a research tool measures what it is intended to measure and accurately captures the respondents' perspectives, it is regarded as valid. The validity of the content was a concern for the researcher. The research supervisors were consulted to ascertain the research instrument's content validity.

Pilot testing of the Research Instruments

A pilot study is an initial test done prior to the main study to verify that the questionnaires are functioning appropriately. Pilot testing of research instruments reveals flaws and makes recommendations for improvement. It ensures the content validity of a questionnaire by providing the opportunity to improve questions and the instrument's format (Creswell, 2014). The questionnaires were administered to 15 university researchers from universities that were not included in this study. Following the completion of the questionnaires, the researcher solicited feedback from researchers who had completed the questionnaires so as to evaluate the questionnaires in terms of clarity of question items, their appropriateness, and relevance, as recommended by Neuman (2014).

Reliability of Research Instrument

Reliability, which is characterized as the stability or consistency of scores across time, gauges how error-free and consistently accurate a measurement is (Mugenda and Mugenda, 2008). The Cronbach Alpha approach was employed, which only requires one test to assess instrument internal consistency. For survey research and other questionnaires containing more than two choices, such as the Likert scale, the Cronbach Alpha approach is the most appropriate internal reliability test (Kothari & Garg, 2014). The questionnaire for university researchers was subject to Cronbach's alpha test and 0.714 was arrived at. This is considered acceptable according to McMillan and Schumacher (2001) who stated that a good rule of thumb for satisfactory reliability is at least 0.70, regardless of the sort of research done.

Data Collection Procedures

According to Creswell (2014) data collection procedures refer to the protocol that must be followed to make sure that data collection tools are applied efficiently and correctly. The researcher obtained a clearance letter from the Department of Postgraduate Studies in Education at the Catholic University of Eastern Africa. Thereafter, the researcher applied and obtained a research license from NACOSTI for her to be able to conduct research. The researcher used questionnaires in this study to gather information from the respondents. The questionnaire was printed and administered through give and pick method. Additionally, an online survey tool was developed where university researchers who were far filled the questionnaires.

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

Data Analysis Techniques

Data Analysis describes how the information gathered during the data collection method was interpreted to derive meaning. Both quantitative and qualitative data were collected for this project from the questionnaire's close-ended and open-ended questions, respectively. The quantitative information from the closed-ended questions was coded using SPSS software version 23 and descriptive statistics were utilized to examine it. The outcomes of the data analysis were presented using frequency tables and charts.

Ethical Considerations

NACOSTI granted a research permit after CUEA approved for the researcher to proceed for data collection. Prospective respondents were contacted to request their consent to take part in the research study and they were given the assurance that all information would be kept private and used solely for those objectives. The conclusions and suggestions of the study were not affected by any data manipulation.

Data Analysis, Presentation, Interpretation And Discussion

Questionnaire Response Rate

The researcher sent questionnaires to the participants of the study in the selected universities. They were requested to fill the questionnaire online with the required information. Their response rate is presented in figure 1 below.

Figure 2: Questionnaire Response Rate

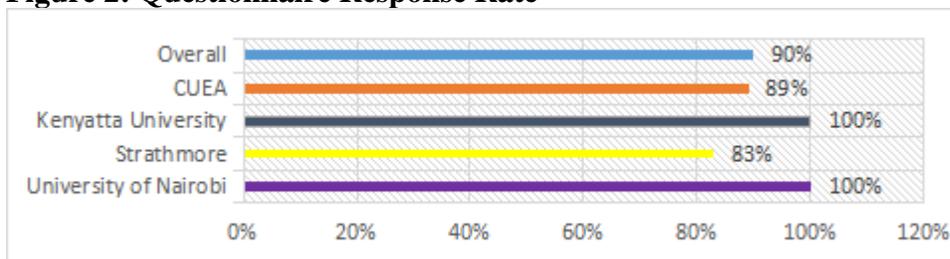


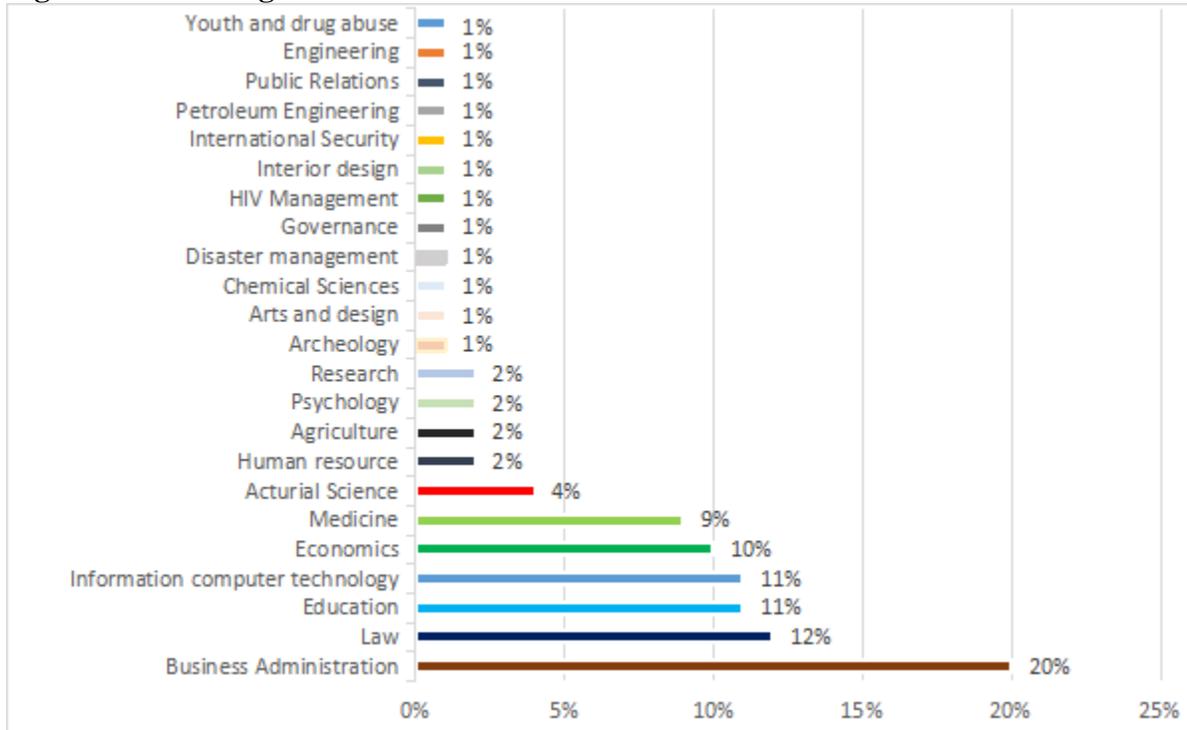
Figure 2 above shows that the average questionnaire response rate was 90%. This was above 70%, which Mugenda and Mugenda (2008) consider to be adequate for analysis.

Demographic Information of the Respondents

This concentrated on gender, age, highest academic qualification, university, role and area of research of the respondents. Majority of the respondents were female (65.1 percent) and 34.5 percent were male. 22.9 percent of the respondents were in the age bracket 40-44 while 1.2 percent were in 25-29 age bracket. Majority of the respondents recorded that they had masters and PhD at 50.6 percent and 37.3 percent respectively. 38.6 percent of the respondents belong to Strathmore, 25.3 percent to University of Nairobi, 20.5 percent to CUEA and 15.7 percent to KU. With regards to their roles, 28.9 percent of the respondents were lecturers, 37.3 percent were students, 27.7 percent were both lecturers and students and 6 percent of the respondents had other roles such as administrative staff, quality assurance officer, community coordinator, innovation center office secretary and head of examinations.

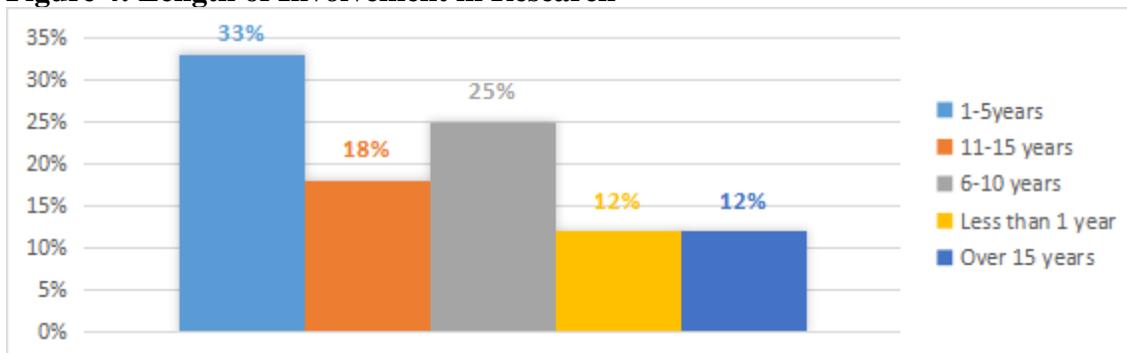
Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

Figure 3: Percentage of Researchers in Areas of Research



From figure 3 above the leading areas of research are business administration, law, education and Information, Communication and Technology at 20%, 12%, 11% and 11% respectively.

Figure 4: Length of Involvement in Research



From figure 4 above, majority of the respondents have been involved in research for a duration of 1-5 years (33 percent) followed by 6-10 years (25 percent). The least respondents involved in research are those with durations of less than 1 year and over 15 years at 12 percent each. The findings concur with Pablo, Beatrice and Danny (2021) findings that time invested on research have a direct impact on research output.

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

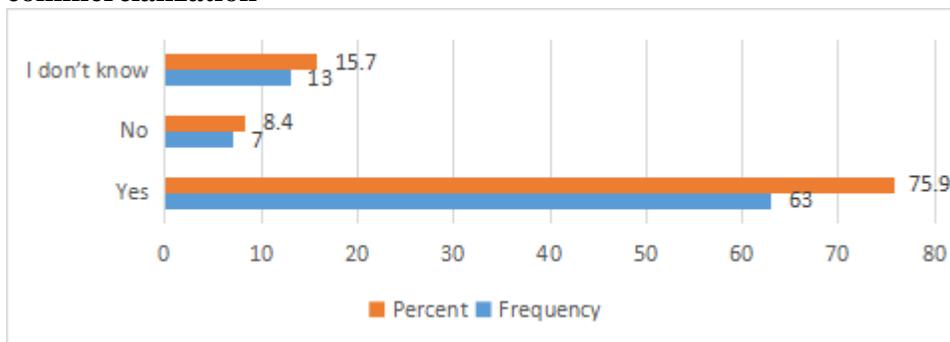
Findings according to the Research Question

How does industry –university collaboration influence research output in the universities?

Industrial Involvement In Research Output In The Universities

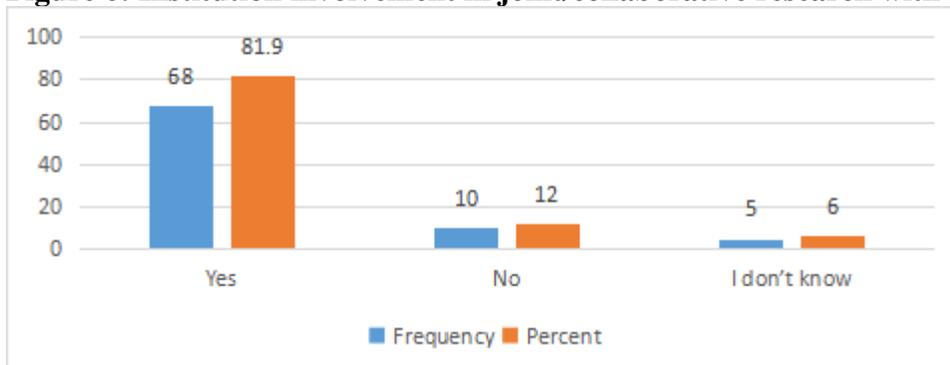
This research question sought to determine the involvement of industry in the research output in universities. The lecturers who participated in the study were asked whether they collaborated with industry in their research activities or not. Table 2 and figures 6 to 13 address these concerns.

Figure 5: University and industrial sector linkage to support research outputs and commercialization



From figure 5 above, majority of the respondents (75.9 percent) recorded that there was a formal link between university and industrial sector to support research outputs and commercialization whereas while 7 percent did not. Surprisingly, 15.7 percent of the respondents did not know whether such a linkage exists. The findings are supported by Assefa Abraham (2016) who recommended suggestions for development of a collaborative culture, improvement of the innovation system and facilitation of a greater university-industry collaboration.

Figure 6: Institution involvement in joint/collaborative research with the industrial sector



From figure 6 above, majority of the respondents (81.9 percent) recorded that their institutions had a joint research with the industrial sector, 12 percent did not and 6 percent did not know whether such collaboration exists. The findings are supported by Assefa Abraham (2016)

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

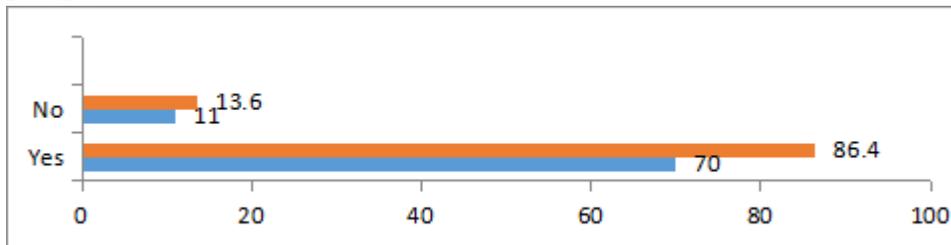
who recommended suggestions for development of a collaborative culture, improvement of the innovation system and facilitation of a greater university-industry collaboration.

Figure 7: Presence of a Technology Transfer Office at the university



From figure 7 above, majority of the respondents (78 percent) reported existence of a technology transfer office at their universities while 9.8 percent did not. Remarkably, 12.2 percent did not know whether such an office exists.

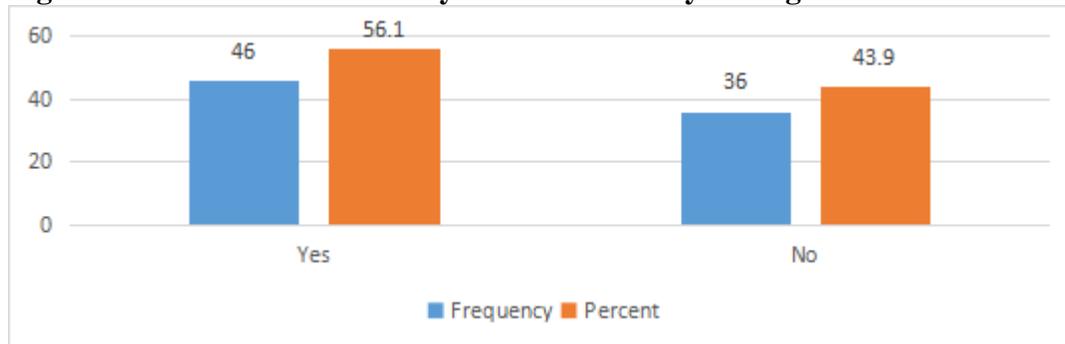
Figure 8: Existence of a Technology Transfer Office and commercialization of research results



From figure 8 above, most of the respondents (86.4 percent) recorded that presence of a transfer office boosts commercialization of research results while 13.6 percent did not. They recorded that a transfer office: acts as an open door to commercialize research; arranges the purchase and delivery of new computer hardware for research teams; enables people to get funds from different organizations; enhances efficiency in communication; provides linkages; acts as a platform for guiding researcher in commercialization of their research findings; enables researchers to have a smooth transition from the lab to the business world; maintains quality of research product; helps to achieve standardized process which facilitates cost effective production; promotes invention and innovation of new products; updates on trends of technological development and improvement; assist in the pairing up of researchers with appropriate partners for their project; emphasize the importance of intellectual property protection; facilitate research-based results through helping researchers in licensing, patenting or management of spin-off creations; accelerates the commercialization process by providing services in several aspects that assist the researcher in the process and accelerates access to opportunities and resources. The findings are similar to those of Dagmara (2014) who found two approaches to commercialization, namely transactions-focused practice and relations-focused practice which co-exist and co-evolve in some TTOs while in other TTOs they are predominantly transactions-focused.

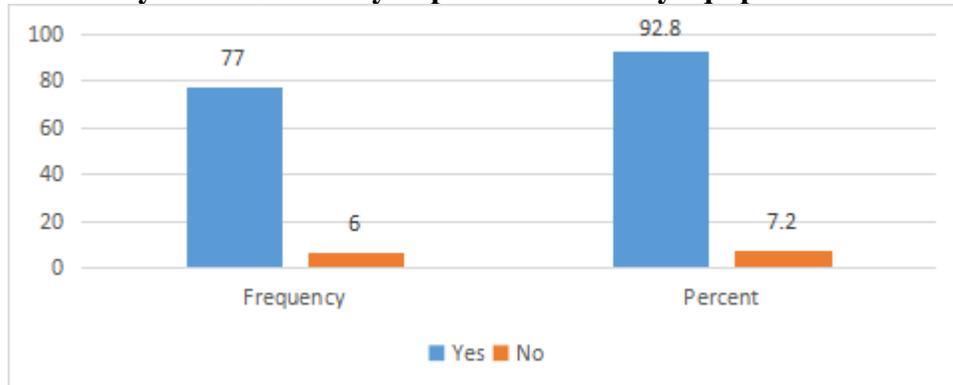
Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

Figure 9: Collaboration with anyone from industry during research



From figure 9 above, 56.1 percent of the respondents recorded that they collaborated with anyone from the industry while 43.9 percent did not. The collaboration help them in: accessing respondents and other data; combining expertise; finishing the research in time; having a more practical experience in analysis and interpretation; advancing research knowledge and creative skills; commercializing project and knowledge transfer and intellectual insight. The findings were supported by Guan, Jian & Yam, Richard & Mok and Chiu, (2005) who revealed that university research cannot produce innovation without practical knowledge which is provided by company during collaboration. Additionally, the company cannot produce scientifically based innovation without the interactive learning.

Figure 10: Ability of the University to provide necessary equipment for research



From figure 10 above, a greater percentage of the respondents (73.5 percent) recorded that the universities were able to provide them with necessary equipment for research while 26.5 percent did not. Those who were not able to be facilitated obtained necessary equipment by: acquiring a loan from the bank and grants to purchase the needed equipment; seeking from family and friends; doing their own initiatives; hiring equipment for the period of research; collaborating with donors; sourcing through the internet; making purchases and collaborating with other institutions.

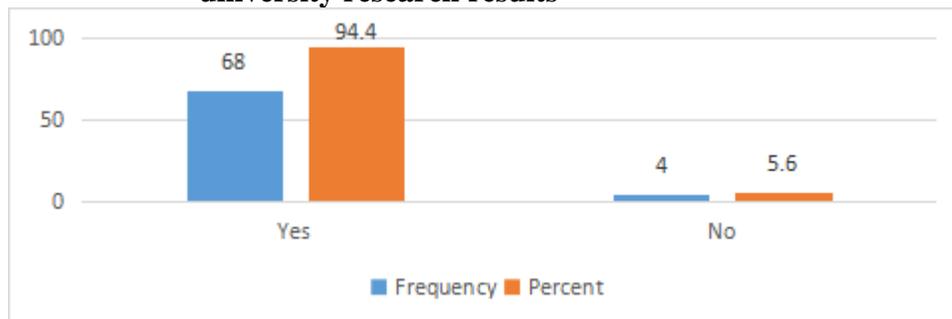
Citation: Chepkorir, E; Mwalw’a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

Table 2: Impact of university-industry collaboration on research outputs

| Statement | Frequency | Percent |
|--------------|-----------|--------------|
| Yes | 78 | 94.0 |
| No | 5 | 6.0 |
| Total | 83 | 100.0 |

From table 2 above, most of the respondents (94 percent) believed that collaboration between university and industry effects on research outputs while 6 percent did not. The respondents explained that collaboration effects on research outputs through: empowerment with the necessary equipment and resources for the research; rise of new inventions; creation of synergy; faster market penetration; funding and linkages; giving insights into the area of study; interaction with experienced research persons; higher retention of research results; provision of mentorship program; commercialization of research results and application of real life scenario, There can be financial and interests differences between the collaborators, With the collaboration, university students are able to apply real life scenarios into research. The findings were supported by the ones of Banal-Estanol, Albert & Inés, Estañol & Pérez-Castrillo, David (2011) who found that the quality of the project (number and impact of the publications) increases with the quality of the researcher and firm, and with the affinity in the partners’ preferences. Additionally, the collaboration with firms increases the quality of the project only when the firms’ characteristics make them valuable partners.

Figure 11: Impact of university-industry collaboration on the commercialization of university research results

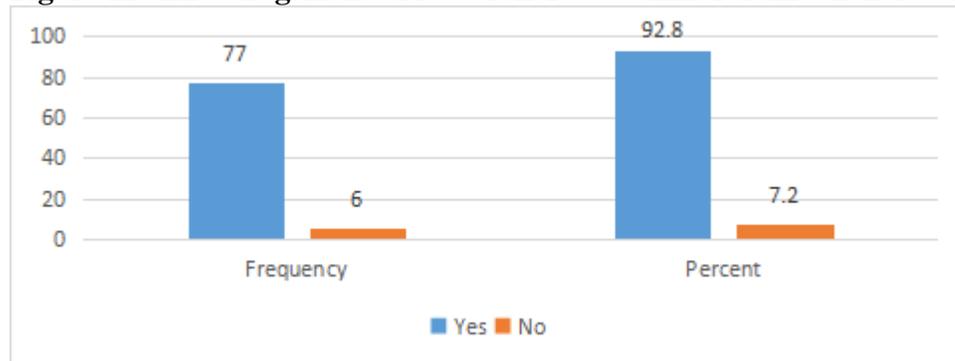


From figure 11 above, a large percentage of the respondents (94.4 percent) believed the partnership between university and industry effects on commercialization of university research results while 5.6 percent did not. They explained this was possible through: offering relevance and legitimacy that the research output has; filling research gaps; acceleration of vertical technology transfer, knowledge, resources and guidance; enabling wide spread linkages; avoidance of duplication of research and operational delay on the research project; provision of better potential for societal impact; enhancement of innovation on project ideas which gain more profits and recognition; amplification of research visibility; funding; reduction of operational inefficiency; validation of research results and easier translation of research products. The findings agreed with Banal-Estanol, Albert and Jofre-Bonet, Mireia & Meissner, Cornelia (2008) who found that researchers with industrial links publish significantly more than their peers

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

although academic productivity is higher for low levels of industry involvement as compared to high levels.

Figure 12: Encouragement of researchers to commercialize their research findings



Majority of the respondents (92.8 percent) thought that the move by universities to encourage them publish or acquire IP stimulated them to commercialize their research findings while 7.2 percent did not as shown in figure 12 above. The results were supported by the recommendations of Ayisi (2016) that building capacity in entrepreneurship among staff and students and committing more resources to Research and Development (R&D) activities hold potential to increased commercialization of university research outputs in Kenya.

Conclusions

The research question sought to determine the involvement of industry in the research output in universities. Majority of the respondents recorded that there was a formal link between university and industrial sector to support research outputs and commercialization. Surprisingly, a considerable percent of the respondents did not know whether such a linkage exists. Majority of the respondents recorded that their institutions had a joint research with the industrial sector and a small percent did know whether such collaboration exists. Majority of the respondents reported existence of a technology transfer office at their universities. Remarkably, a considerable percent did not know whether such an office exists. Most of the respondents recorded that presence of a transfer office boosts commercialization of research results. The respondents recorded that a transfer office: acts as an open door to commercialize research; arranges the purchase and delivery of new computer hardware for research teams; enables people to get funds from different organizations; enhances efficiency in communication; provides linkages; acts as a platform for guiding researcher in commercialization of their research findings; enables researchers to have a smooth transition from the lab to the business world; maintains quality of research product; helps to achieve standardized process which facilitates cost effective production; promotes invention and innovation of new products; updates on trends of technological development and improvement; assist in the pairing up of researchers with appropriate partners for their project; emphasize the importance of intellectual property protection; facilitate research-based results through helping researchers in licensing, patenting or management of spin-off creations; accelerates the commercialization process by providing

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

services in several aspects that assist the researcher in the process and accelerates access to opportunities and resources. There was a close gap between respondents who recorded that they collaborated with anyone from the industry and those who did not. The collaboration helped them in: accessing respondents and other data; combining expertise; finishing the research in time; having a more practical experience in analysis and interpretation; advancing research knowledge and creative skills; commercializing project and knowledge transfer and intellectual insight. A greater percentage of the respondents recorded that the universities were able to provide them with necessary equipment for research. Those who were not able to be facilitated obtained necessary equipment by: acquiring a loan from the bank and grants to purchase the needed equipment; seeking from family and friends; doing their own initiatives; hiring equipment for the period of research; collaborating with donors; sourcing through the internet; making purchases and collaborating with other institutions.

Most of the respondents believed that collaboration between university and industry effects on research outputs. They explained that collaboration effects on research outputs through: empowerment with the necessary equipment and resources for the research; rise of new inventions; creation of synergy; faster market penetration; funding and linkages; giving insights into the area of study; interaction with experienced research persons; higher retention of research results; provision of mentorship program; commercialization of research results and application of real life scenario, There can be financial and interests differences between the collaborators. With the collaboration, university students are able to apply real life scenarios into research. A large percentage of the respondents believed that partnership between university and industry effects on commercialization of university research results. They explained this was possible through: offering relevance and legitimacy that the research output has; filling research gaps; acceleration of vertical technology transfer, knowledge, resources and guidance; enabling wide spread linkages; avoidance of duplication of research and operational delay on the research project; provision of better potential for societal impact; enhancement of innovation on project ideas which gain more profits and recognition; amplification of research visibility; funding; reduction of operational inefficiency; validation of research results and easier translation of research products. Majority of the respondents thought that the move by universities to encourage them publish or acquire IP stimulated them to commercialize their research findings.

The researcher concluded that Universities in Kenya have not taken university-industrial sector linkages and commercialization of research results seriously. Additionally, there is low venture in profitable and marketable products such as trademarks, industrial design and utility models. Therefore universities have a lot to do to ensure that they promote education research for productivity and innovation through continuous sensitization on university-industrial sector linkages and commercialization of research outputs into marketable and profitable research products.

Recommendations

The researcher recommended that:

- a) Universities should balance teaching workload to ensure that university researchers have balanced hours for both teaching and research.

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

- b) Universities should continuously sensitize university researchers on university-industrial sector linkages
- c) Funding organizations of research projects should come up with simple and suitable research project financial reporting procedures.
- d) The government and funding organizations should avail adequate and timely communication on disbursement of funds.

Recommendation for Further Studies

The study investigated promotion of educational research for productivity & innovation among selected public and private universities in Nairobi County, Kenya. There is need to investigate the impact of industry –university collaboration on the Kenya’s economy. This will give a full understanding of the participation and contribution of the university researchers on matters economic growth and development.

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

References

- AAU, (2012). *Strengthening Industry and University linkage in Africa*. A Study of Institutional Capacities and Gaps.
- Assefa, Abraham. (2016). University-Industry Linkage Practices, Determinants and Challenges *Theoretical and Empirical Article Review: Lessons for Effective and Successful Collaboration*.
- Ayisi, J. (2016). Initiatives to Promote Commercialization of Research Outputs by Kenyan Universities. *Elixir international journal*. 100 43517. 43517.
- Banal-Estanol, Albert & Inés, Estañol & Pérez-Castrillo, David. (2011). Research Output From University-Industry Collaborative Projects. *Barcelona GSE Working Paper Series Working Paper*. n°. 10.1177/0891242412472535.
- Banal-Estanol, Albert & Jofre-Bonet, Mireia & Meissner, Cornelia. (2008). The Impact of Industry Collaboration on Academic Research Output: A Dynamic Panel Data Analysis.
- Bank, W. (2012). *Knowledge Economy Index 2012 Rankings*. Retrieved from World Bank: <http://siteresources.worldbank.org/INTUNIKAM/Resources/2012.pdf>
- Bloom, D., Canning, D., & Chan, K. (2006). *Higher Education and Economic Development in Africa*. Harvard University.
- Collier, A., & Gray, B. (2010). *The commercialization of University innovations-A Qualitative analysis of the New Zealand situation*. Centre for Entrepreneurship, School of Business, University of Otago.
- Creswell, J.W (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 4th Edition. Los Angeles: Sage Publications, Inc.
- D'Este, P., & Patel, P. (2007). University –Industry linkages in the UK: What are the factors? *Research Policy* 36, 1295-1313. doi: 10.1016/j.respol.2007.05.002 Delhi: New age International Publisher.
- agmara M. Weckowska, (2014). Learning in university technology transfer offices: transactions-focused and relations-focused approaches to commercialization of academic research, *Technovation, Volumes 41–42, 2015, Pages 62-74, ISSN 0166-4972*, <https://doi.org/10.1016/j.technovation.2014.11.003>. Delhi: New age International Publisher.
- Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of Innovation from National systems and "Mode 2" to a Triple Helix of University-Industry-Government Relations. *Research Policy* 29, 109-123.
- Ghauri, P.N., & Gronhaug, K. (2005). *Research Methods in Business Studies: A practical Guide*. London: Pearson Education.
- GOK. (2012). *University Act*. Nairobi: Government Printers
- GOK. (2013). *Science, Technology and Innovation Act*. Government Printers
- GoK. (2013). *Second Medium Term Plan (2013-2017)*. Nairobi: Government of Kenya.
- Gorasson, B., & Brundenius, C. (2011). Universities in Transition. The Changing Role and Challenges for Academic Institutions. *Springer*.
- Guan, Jian & Yam, Richard & Mok, Chiu. (2005). Collaboration between industry and research institutes/universities on industrial innovation in Beijing, China. *Technology Analysis &*

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

- Strategic Management – *TECHNOL ANAL STRATEG MANAGE*. 17. 339-353. 10.1080/09537320500211466.
- Guenther, J., & Wagner, K. (2008). Getting out of the ivory tower- new perspectives on the entrepreneurial University. *European Journal of International Management*.
- Kefela, G. T. (2010). Knowledge-based Economy and Society has become a vital commodity to countries. *International Journal of Education Research and Technology*, 1(2), 68-75. Retrieved from <http://www.soeagra.com>
- Kendagor, S. T., Kosgei, R., Tuitoek, D., & Chelangat, S. (2012). Factors Affecting Research Productivity in Public Universities of Kenya. *Journal of Emerging Trends in Economics and Management Science*, 3(5), 475-484. Retrieved from www.jetems.scholarlinkresearch.org
- Kombo, D. K., & Tromp, D. L. (2009). *Proposal and Thesis writing; an introduction*. Nairobi: Kothari C.R and Garg G (2014) *Research Methodology Method and Techniques 3rd ed* New New
- Leisyte, L. (2011, July). University Commercialisation Policies and their Implementation in the Netherlands and the United States. *Science and Public Policy*, 38(6), 437-448. Retrieved from <http://www.ingentaconnect.com/content/beechn/spp>
- Link, A. N., & Siegel, D. S. (2007). *Innovation, Entrepreneurship and Technological Change*. Oxford University Press.
- Migosi, J., Muola, J., & Maithya, R. (2012, March 25). Perceptions of Academic Staff on Research and Publishing in Kenyan Universities. *International Journal of Education Administration and Policy Studies*, 4. Retrieved February 2014, from <http://www.academicjournals.org/IJEAPS>
- Mowery, D. C., & Sampat, B. N. (2007). Universities in National Innovation systems. *The Oxford Handbook of Innovation*.
- Mugenda, A & Mugenda, O. (2003). *Research methods, quantitative and qualitative*. Nairobi: Kenya Arts Press.
- Mugenda, A., & Mugenda, O., (2013). *Research methods: Quantitative and Qualitative Approaches*. Nairobi. ACTS Press.
- Mutz, R., et al (2013). Types of Research Output Profiles: A Multilevel Latent Class Analysis of the Austrian Science Fund's Final Project Report Data. *Research Evaluation*, 22, 118-133. doi: 10.1093/reseval/rvs038
- NACOSTI. (2013). *Annual Report*. NACOSTI.
- NACOSTI. (2014). *Strategic Plan*.
- Nairobi County, *CIDP 2013-2017*.
- Narayan, A., & Hooper, K. (2010). The Role of Government towards Encouraging the Development of Academic Research Commercialization in New Zealand: A Historical Overview of Policy Directions.
- Neuman, W. (2014) *Social Research Methods: Qualitative and Quantitative Approaches*. Pearson, Essex

Citation: Chepkorir, E; Mwalw'a, S & Ateka, F. (2022). Promotion Of Educational Research For Productivity And Innovation Among Selected Public And Private Universities In Nairobi County, Kenya. *Journal of Popular Education in Africa*. 6(9), 5 – 28.

- Oduwaye, R. O., Owolabi, H. O., Onasanga, S. A., & Shehu, R. A. (2010, June). Research dissemination, Utilization and Commercialization by Lecturers of a Nigerian University: Case study of University of Ilorin. *Journal of Educational Review*, 3(2).
- OECD (2008), Tertiary Education for the Knowledge Society, OECD Publishing, Paris.
- OECD (2014). OECD Estimates of R&D Expenditure growth in 2012. Retrieved from http://www.oecd.org/sti/inno/Note_MSTI2013_2.pdf
- Ogunwusi, A. A., & D, I. H. (2014). Promoting Industrialization through Commercialization of Innovation in Nigeria. *Industrial Engineering Letters*, 4(7).
- Ondimu, S. (2012). *Possible Approaches to Commercialisable University Research in Kenya*. Nairobi:
- Oringo, James. (2016). Constraints on Research Productivity In Kenyan Universities: Case Study Of University Of Nairobi, Kenya. *International Journal of Recent Advances in Multidisciplinary Research*. Vol. 03. Pp.1785-1794.
- Orodho, A. (2012), *Elements of Educational and Social Research Methods: 2nd edition* Kenezja Publisher, Maseno, Kenya
- Rieu, A.M., (2011). The Triple Helix Concept; Towards the Formation of a New Social System.
- Rothaermel, F. T., et al (2007). University Entrepreneurship; Taxonomy of the Literature. *University and Corporate Change*, 69-79.
- Tantiyaswasdikul, K. (2013). Technology Transfer for Commercialization in Japanese University: A review of the Literature. *Japanese Studies Journal*.
- UNESCO. (2010). *The Current Status of Science Around the World*. UNESCO Publishing.
- Wilson, P. M., et al (2010). Disseminating research findings: what should researchers do? A systematic scoping review of conceptual frameworks. *Implementation Science*, 5(91). Retrieved from <http://www.implementationscience.com/contents/5/1/91>
- WIPO. (2007). Technology transfer, Intellectual Property and Effective University-Industry Partnerships. The Experience of China, India, Japan, Philippines, Republic of Korea, Singapore and Thailand.