On the Applied Research Concept Towards Becoming a Winning University

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Abstract

The study focused on the research performance of the world class Universities with emphasis on the performances of African Universities as compared to the western Universities. One of the best University according to (World University Ranking) was selected from each continent and six (6) continents were considered. The study also evaluated the performances of each University in terms of total student's subscription, student per staff, and percentage of international student's subscription. The result showed that Oxford University was rated number one with an output research of 99.5% followed by California University of Technology having a research output of 97.3%. The result also showed that University of Cape Town had research output of 36.2%. This is quite poor compared to Oxford University. However, reasons for this output were discussed and the way forward were suggested on the need to becoming a winning University.

Keywords Applied Research, Winning, University, Concept

1. Introduction

1.1 Exploring Research Importance

The technological advancement of the top world countries relies heavily on research. This can as well be traced to the quality standard invested in their education system. It is therefore important to say that investment in research for academics and students is needful to develop competencies in their various chosen field. Applied research approach deals with solving immediate problems of societies or an industry, and this largely depend on research tools and equipment availability.

Great solutions have been achieved from the work of many researchers. For instance, Vouri et al., 2015 emphasized on the importance of formal research training for postgraduate students before they embark on their residency in pharmaceutical studies. Top pharmaceutical positions requires research expectations and this can only be achieved formally. Lack of adequate research skill would make certain advanced positions unattainable in the field of pharmaceutical studies. Therefore, pharmaceutical students must continue to develop research skills during their clinical in order to develop a better curriculum program Anderson & Saseen, 2017.

According to Hanson & Weinstock, 2016, the relationship between human response and microorganisms involved adequate research that would provide a multivariate data. This data set would make certain preventive solutions to the causative agents of diseases possible. Therefore, research in diseases and health prevention can only be possible where adequate and accessible equipment are available. More so, to improve our undergraduate and postgraduate research skills, certain factors are important such as; faculty interaction using demonstrative and applied research equipment, engineering or research field of interest and also use of appropriate library skills. This will not only broaden the learning capacity of students, but the ability to develop and engage in research and publications, thereby contributing to the University's research concept Soria., 2013.

However, it is not enough to develop a vision, a vision that will be sustainable will have to focus on adequate research in the directions where the vision is focused. That is to say that result oriented research requires the empowerment and participation of the major stakeholders (students and academics) of the Universities Dlouhá & Pospíšilová, 2018.

Obviously, research potentials have proven to be a safe and reliable factor in the automobile industry. Sophisticated and highly developed automated vehicles poses some potential hazards and this can only be resolved when adequate policies are developed by the transport industries on the use of this automated vehicles. The standards for testing the reliability as well as certification rely on research and this is very key if potential hazards must be prevented or controlled. Li et al., 2018.

The application of research in the agricultural sector had actually made a tremendous improvement in the areas of fishery management. By acquiring data on the biological method of fishery management, effective economic analysis can be achieved Barclay, et al. 2017. More so better maintenance of ecosystem could be achieved by critical study of the biological traits of different species of animals Turner et al, 2017. The aim of this study is to critically review the importance and contributions of research towards becoming a winning or top University.

2 Engineering Research and its Sustainability

Investment into students and academia field of research creates a better future for improved learning, quality teaching methodology as well as providing a better and easier means of solving societal problems Dimov et al, 2015. Research findings improve designs and implementation, strengthen the opportunities and enable great values to be developed from the moral experience True et al, 2017. In fact, the use of Latin-square technique which is a random method of designing and analysing experiments had proven very effective in drawing out the conclusions of experimental result against the conventional and systematic method Richardson, 2018.

It is worth noting that several factors led to deficiencies in the university education especially in the areas of research which had led to low academic productivity, hence research sustainability in Universities becomes a dilemma (Krogstie et al, 2015. Therefore, the possibilities of raising professionals in the field of engineering with capabilities, proficiency and areas of specialization becomes a herculean task Felgueiras, et al, 2017. To achieve sustainable engineering research, there is need to adopt good structuring and planning method, this will translate into competencies of the students and the academics during didactic practice Rampasso et al, 2018.

More so, studies have shown that sustainable engineering can only be possible with interest in entrepreneurship development. Therefore, entrepreneurial education requires research tools and equipment Barba-Sánchez & Atienza-Sahuquillo, 2017. According to Phang & Yusof, 2013, Universities like Harvard and Massachusetts had sustainable engineering research because of the great investment into education, therefore collaborative research does not involve assumptions but quality research tools and equipment, thereby bringing sustainability.

It is possible to say that the role of engineering technology cannot be overemphasized as it stands out to provide solution to the problem of mankind. On this note, according to Popoola et al, 2018, the sustainability of research developing countries especially in the African contest can be possible through empirical study of the outcome based approach on the performance of the students rather than depending on the measure of the income based technique in terms of syllabus formulation and teaching method. This depends heavily on research which is only possible in Universities Monteiro et al, 2018. However, quality is only evident in education impact in terms of theory, while research output is low due to mismanagement of resources especially in public Universities Guironnet & Peypoch, 2017.

Further to this, development of applied research based engineering curricula which will focus on the paradigm shift in modern manufacturing will be of great importance in engineering research sustainability Salaha & Darmoulb, 2018. For example, application of TRIK technology in robots; a developed robotic controlled program had demonstrated great control and efficiency in robotic systems Luchin et al, 2017. This has affirmed that innovation and human resource development are functions of research and this can be more evident in the difference between the winning Universities and the African universities Oluwatobi et al., 2015.

Hence, the challenges of mankind can be reduced by developing sustainable research in higher institutions of learning Severengiz et al 2018; Alhammad & Moreno, 2018.

Basically research in African Universities have received low attention due to the absence of teaching and research aids. Africa at large is faced with several problems such as energy supply, power and transportation. It is therefore important to review this problem looking from the dimension of research in African Universities and compare their performance with the world winning Universities, in order to suggest ways for improvement.

The aim of this study is to critically review the performances of the current winning Universities in each continent of the world in terms of their research contributions, also to harness the brain or tools for their success and work towards becoming one of the best.

3 Method of Data Collection

Raw data was obtained from each continent from current world University ranking by The Times Higher Education. The data collected and analyzed are:

- Continents: Europe, North America, South America, Australia, Asia and Africa.
- Universities: Oxford University, California institute of technology, University of São Paulo, University of Melbourne, National University of Singapore, University of Cape Town.
- Ranking position
- Research output
- No. of students
- Student ratio Female: Male
- No. of students per staff
- % of international students

Some world class research laboratories in some selected universities were critically examined especially Oxford University to show the reason for being a major contributor in terms of research. Also, the raw data were mined from 2018 world University Ranking body by The Times Higher Education.

4 Results and Discussion

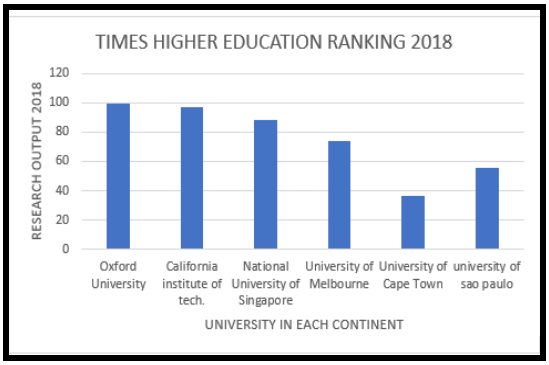


Figure 1. Times higher education Ranking2018

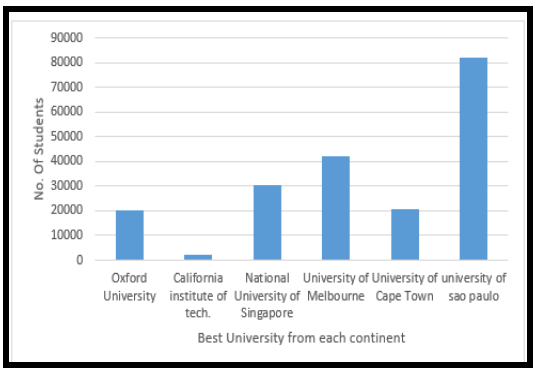
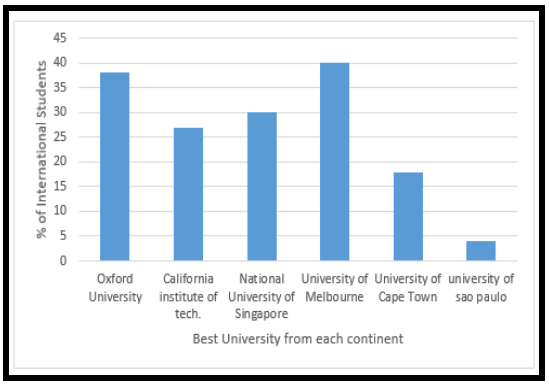


Figure 2. Times higher education Ranking 2018



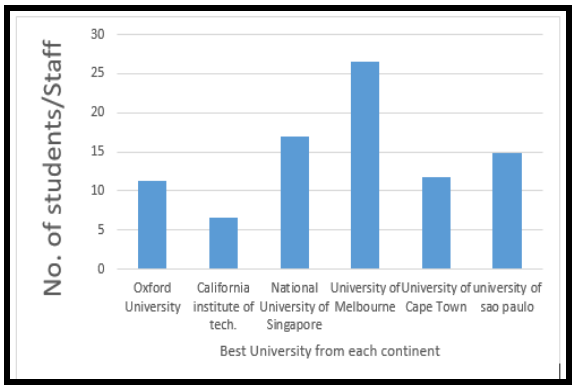


Figure 3. Times higher education Ranking 2018

Figure 4. Times higher education Ranking 2018

Figure 1, presents a plot of research contributions in percentage against the best university from six (6) different continent. It is obvious that Oxford University took the lead in terms of research contributions with an overall research output of 99.5% making the University the best in the world. Though, this is the result in terms of research. But they became overall best because their contribution to research had paved way for development in terms of meeting the needs of mankind. The University engaged in continuous innovative research in different discipline and this has improved their understanding and the operation of modern engineering. Also, California Institute of technology performed well with a research output of 97.3% which made the University number 3 in the world. Also National University of Singapore had a research output of 88.2, followed by University of Melbourne with an output of 74.2 and University of Sao Paulo having 55.5%. The University of Cape Town came last in this group of analysis with a research output of 36.2%. This is far below average though they are number 1 in Africa, yet African Universities are far behind in terms of research and that is the reason for our poor development in all facet of life compared to the top world countries. Figure 2, presents the plot of variation in the number of students with the best Universities according to the world University Ranking 2018. University of Sao Paulo had the highest number of students' subscription into the University programme with a value of about 82,258 students. This could be due to the fact that it is the best University in South America according to the ranking. University of Melbourne and National University also tried having a total student of 42,116 and 30,602 respectively. California institute of technology had the least subscription maybe owing to the fact that it is a research based University and affordability is also a problem considering its location. Further to this, figure 3 showed the variation of percentage of international students with each University from each continent. University of Melbourne located in Australia had the highest number of international students' subscription with a value of 40%. Oxford University also had a value of 38% followed by National university of Singapore and California Institute of Technology with 30 and 27 % respectively. The high rate of subscription could be traced to the fact that the Universities had all research tools and equipment in place making it easy for international students to choose them especially if it is a scholarship option. Off course University of Sao Paulo and University of Cape Town had the lowest international subscription with a value of 4 and 18% respectively. This can be attributed to lower standard of education they provide compared to the Universities in the other continent. More so, figure 4 is a plot showing the variation in student per staff with the respective University in each continent. University of Melbourne had the highest value of about 26.6 followed by National University of Singapore with 17 and University of Sao Paulo with 14.8 students per staff. The student/staff distribution is a way of improving the quality of teaching as well as a measure of research quality. It showed that the less student a staff have the more the quality of knowledge the student would achieve, thereby improving on the standard of education. University of Cape Town and Oxford had 11.7 and 11.2 respectively, while California institute of technology had a value of 6.2. Apparently, the student to staff distribution depend on the number of available students as well as the staff strength. However, is worthy of note to say that it also contributes to research because the more number of students you have the more the research problems to solve. It is worth noting that the winning universities according to Times Higher Education Ranking 2018, have adequate laboratories and researchers especially in the mechanical and materials engineering department in Oxford University. This quality research equipment would definitely improve on the teaching methodology and research output of the academics. But what we have in most of the African University is teaching aids not research aids, thereby making it impossible to solve the problem of Africa.

Conclusion

The performance of Universities in research have been carried out by selecting one of the best University in each continent of the world. Six (6) continents and six (6) Universities were selected and their research performance, number of students subscribing into each University, percentage subscription by international students as well as number of students per staff were studied critically. The result of the study showed that Oxford University from the continent of Europe is the best with research contribution of about 99.5% followed by California University of technology having 97.3%. Oxford University is number one in the world (Times Higher Education Ranking 2018), while California University of Technology was rated overall 3rd in the ranking. These Universities emerged the best because of their enormous research which serves as an investment in their academics and students. The winning

Universities are committed to sponsoring and retaining good researchers to enable them transform lives through research. They provide world class teaching and research thereby producing graduates of pure distinctions and high international standard. On the contrary, the best University in Africa continent is the University of Cape Town in South Africa with a research output of 36.2% making the university number 171 in the ranking. This is quite incomparable to the winning Universities. Our institutions are backward owing to the result of our teaching, research, publications and citations. That is why you see most of our academics travelling to this Universities to do Post-Doctoral research work because the research aids are not available for them to use.

Research attracts more researchers. It is a gear that can drive our University output and in turn increase our impact in meeting the need of mankind and Africa at large. Therefore, the African Universities must understand that competing to be a world class University meant a global task and it is quite intense. Academics, graduates and post graduates will benefit a lot from improved method of teaching and research aids that are available. Therefore, since the University system is a platform for drawing talent, the stakeholders must look into adequate provision of research aids instead of teaching aids. This will eventually help us in raising new generation of researchers that can and will solve African problem.

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