International Journal of Sciences: Basic and Applied Research (IJSBAR)

ISSN 2307-4531
(Print & Online)

http://gssrr.org/index.php?journal=JournalOfBasicAndApplied

Africa the Precariously Positioned Continent in Knowledge Society

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Abstract

The study examines what Africa's role and position were and are in the generation, dissemination and use of knowledge in the world. Some of the factors which contribute to the status are explored. The methodology used has been rigorous review of articles in credible peer reviewed journals, conference papers, books, chapters, theses and dissertations, research projects and the internet. The data gathered thus has been synthesized, correlated and conclusions drawn. The study established that Africa is currently precariously positioned in knowledge society despite a glamorous past. When favourably rated, the continent contributes only 2% of global research. Its expenditure in this important area constitutes only 1.3 % of that of the whole world. It is therefore not surprising that of the patents globally registered, Africa's share is a mere 0.1%. Additionally, in comparison to the UK, USA and the other developed western economies who boast of 4,000 researchers per one million of their population, Africa has 198 researchers for a similar number of people. The research findings add to the stock of knowledge, and will among other benefits, help policy makers, funders and implementers appreciate the enormity of the task before them. It is also a contribution, albeit a token, to improving Africa's position in knowledge society.

Keyword: Africa; doctorates; knowledge society; publications; research supervision**.**

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1. Introduction

1.0 Knowledge society is one where knowledge becomes the product of combining the cultures of information, experience and ability to govern, in order to rationalise resources, mobilise and use the available means to reach a renaissance and enjoy the gains of human development [1]. One of the great wonders of the world have been and continue to be the pyramids of Egypt. In the particular case of The Great Pyramid at Giza, known as 'Akhet Khufu', it has amazing height of over 451 feet at the base. About 2.5 million stone blocks weighing 2.5 tons were used to construct it. The pyramid is the largest constructed mass of stone ever built by human beings. It must have been an extreme example of utmost ingenuity of human creation at that time, and it still is. There must have been intense application of mathematics, science technology, art and craft in other endeavours [2]. The Egyptians are recorded to have achieved many other feats. The preservation of their dead leaders as mummies, the scenic mosaic of the otherwise intricate irrigation systems and the use of papyrus to produce paper, which later became a key factor in recording events and other matters of importance to society, could not be isolated cases of otherwise idle minds. The ancient Egyptians are also credited with and greatly applauded for their writing system called 'hieroglyphs'. This was a form picture-writing to represent different objects, action, sound and ideas, which they used widely in life [3]. Oldest universities of modern time are reported to be Qarrawyyin in Fez Morocco and Al Azhar in Egypt, which were established in 859 AD and 975 AD, respectively.

1.1 Research Objective

The study intended to establish the historical as well as the current positioning of Africa in knowledge society, explore the factors for the status quo and generate solutions for improving it.

1.2 More evidence of prominence in knowledge society from Africa

Further down in Bunyoro kingdom in what later came to be known as Uganda, caesarian operations were being carried out in the thirteenth century. In the Congo Basin, malaria was being effectively treated using herbal medicine knowledge. The relics in West Africa, of Timbuktu and Sokoto Caliphate as well as those of the Asante Kingdom with the famous Golden Stool are evidence of a knowledgeable people. The war formations of the Ngoni and the impressively organised southern Africa and interlacustrine kingdoms of the Victoria Basins leave no one in doubt that these were societies managed based of indigenous accumulated knowledge. Indeed every region in Africa has records of meritorious accounts of knowledge generation, dissemination and utilisation. It has been observed that higher education in Africa is as old as the pyramids of Egypt, obelisks of Ethiopia and the kingdom of Timbuktu [4].

2. Method

Deliberate efforts have been painstakingly but patiently made to study and interrogate a commendable volume of literature. The methodology used has been rigorous review of articles in credible peer reviewed journals, conference papers, books, chapters of books, theses and dissertations, research projects and the internet. The data gathered thus has been carefully synthesized, arranged and correlated, after which conclusions were drawn.

3. Literature Review

In this section the literature reviewed has either been the original recorded literature or that referred to by the original or both. In some cases even that referred to has led to other sources, which have enriched the literature available. Given limitations of space and time, great care has been taken to choose which sources appear.

3.1 Philosophers of long ago studied and lived in Africa

Modern Egyptologists read, among other texts, *The Dialogue between Man and his Ba. . The Lamentations of Khakheperraseneb, the Memphis Theology and The Great Hymn to the Aten, The Teachings of the Vizier Ptahhotep, and The Tale of the Eloquent Peasant,* to whet their appetite for knowledge. This way, they explore the Theory of Knowledge and the Value Theory, as propounded in ancient Egypt and later popularised in the proximate land and watershed of the curious Greeks and Asia Minor, for example. These works are ancient. For example, The Teachings of the Vizier Ptahhotep were authored during the Fifth Dynasty, 2388–2356 BCE, during the reign of King Isesi. The *Tale of the Eloquent Peasant* was authored during the 12th Dynasty, ca. 1900 BCE.

Some of the great Greek philosophers who are believed to have lived, studied and benefited from Africa include Pythagoras, the mathematician of the Pythagorean Theorem fame. Socrates lived between 470/469–399 B.C.E. Others are Plato (428/427–348/347 B.C.E.), and Aristotle (384–322 B.C.E.). The list is long. In Africa, they were exposed to scholarship in philosophy, science and the arts. They studied sciences ranging from physics, mathematics, alchemy, biology, astrology, zoology and astronomy. As it is noted form above, and long before western civilisation, Africans possessed valid social, political and development philosophies geared towards transforming society [5]

3.2 Africa's declining position conforms to empirical evidence

There is abundant evidence of the rise, sometimes accelerated, of civilisations, and then followed by decline. Among other great civilisations of the past are the Ancient Greek (2700 BC-479 BC), Ancient Egyptian (3150 BC-50 BC) Aztec (1345 AD-1521 AD), Chinese (1600 BC-1046 BC), Incan (1438 AD-1532 AD), Indus Valley (3300 BC-1900BC), Maya (2600 BC-900 BC) and Mesopotamia (3500 BC-500 BC). Archeologists, anthropologists and historians have brought to light the grandeur, might, power, authority and level of growth and development attained at the zenith of these civilisations. Unfortunately, unlike in the economics discipline where base years and indices are used to compute relative values of items over time, civilisation cannot be easily quantified and compared on most of the metrics.

Africa's achievements in knowledge society were grand and incomparable at a point in time. Just like the civilisations noted above, the continent experienced rose to an apex from which it plummeted in a downward spiral**.**

3.3 The continent is made to believe the myth

The arrogance with which some scholars have dismissed the relevance of Africa in the realms of knowledge accumulation, even when in crude form, are unfortunate. Hegel, for example, asserted that Africa was not a historical part of the world, hence, had "no movement or development to exhibit. [6] Hegel recognised four worlds: German, Oriental, Greek and Roman. His interpretation of world history and that of his proponents bordered on the bizarre [7]: Not surprisingly, like-minded scholars attribute the origin of the formal enterprise of philosophy to the West, most especially the Greek civilization [8].

3.4 Paradigm and dichotomy shifts

Centres of learning like Carthage and Alexandria, with which many great philosophers are associated, could thus be apportioned or attributed to the 'civilised world', when it suited the interests of those who arrogated themselves power to do so. It is from the above-mentioned and other centres in Africa that ancient Egyptians became the hub of knowledge, created a powerful empire and became a great world power. They had superior technical knowledge, including craft, Mathematics, medical science and many more areas that transform the lives of humankind [9].

In order to justify paradigm shifts and dichotomy of the terms progress, development and success, the dominant powers at any time in the world have always divided it into among others, the 'old' and 'new', 'developing' and developed, 'east' or 'west, 'backward 'or 'progressive'. For Africa specifically, it has for long been dubbed the 'Dark Continent'. However there are many other researchers who have dismissed the myth of Africa being a perpetually backward continent, with no contribution to the knowledge Society [10,11,12]. Evidence is abundant that the continent had at some point in time a lot to offer in terms of knowledge and its implicit corollary, research. It is from the above-mentioned and other centres in Africa that ancient Egyptians became the hub of knowledge, created a powerful empire and became a great world power. They were also well-known for its precious art, in terms of literature, architecture and sculpture. They had superior technical knowledge, including craft, Mathematics, medical science and many more areas that transform the lives of humankind [13].

3.5 Hope for Africa inspired the East Asia and the Pacific Region

Although many economists attribute the growth of the East Asian economies, particularly Japan, Korea, and Taiwan to impressive and above-average domestic saving ratios, it is also argued that this cannot explain the phenomenal transformation, *per se*. Many countries in the Eastern bloc were having saving ratios not much different from those of East Asia and the Pacific Region. Ability to research, innovate and master technology, it is argued, was a major factor that distinguished the two. It enabled the countries to unusually and successfully catch up with the technologically advanced economies[12]. These countries made enormous sacrifice and heavily invested in human capital. They educated large numbers of the population to become skilled engineers, thereby enabling them to absorb and adapt to the rapidly changing science and technology [14]. Although not exactly coincident with present day geographical demarcations, many of the ancient civilisations have reincarnated into

modern and powerful. Some of them constitute modern day Europe and China. They are among the leading nations in scientific, technological and economic development. The enormous achievements of the East Asian countries noted above .are a source of hope and inspiration that if the African countries can do an evaluation of their past, they can understand where they are in knowledge society and where they can be if they planned, organised and took the right direction.

4. Evaluation of the status quo

Africa needs to evaluate many aspects which have generally retarded its growth and development in the generation, dissemination and accumulation of knowledge. Research is a critical feature of knowledge society. Universities or institutions of higher learning are the bastions of research. Accordingly, various aspects which impact directly or indirectly will be reviewed. Rigorous review of a substantial amount of literature has revealed the dire need for Africa to greatly enhance quality and quantity of research-oriented and equipped doctoral outputs.. At institutional level, universities must have researchers to reproduce and regenerate themselves, survive, grow and competitively so. In aggregate, universities play important roles in the transformation of society. Research-oriented, well-prepared and committed doctoral degree holders at these institutions play key roles by ensuring the continued production and transfer of new knowledge. Doctoral graduates contribute to socio-economic development, by facilitating both the production and reproduction of knowledge, which are important contributors to national development.[15] It has been observed that through generating, accumulating and disseminating knowledge, doctoral graduates help create and support a competitive knowledge-based economy. This position has been confirmed by other researchers who have stated that scholarly productivity by way of refereed journal articles, books, and book chapters. Their quantity and quality are a reflection of the ability of an institution, individual, country or region to provide effective remedies to challenges faced by a community or indeed the entire population of the globe [16].

4.1 Evidence from knowledge society

Table 1 below provides some information indicative of Africa's position regarding scientific publications and related application for patents as at 2009. There is no published evidence that the situation has changed for the better.

Table 1: Scientific publications and patent application by region.

Region	*Scientific publications*	*Patent applications filed by residents*
East Asia and Pacific	25,391	65,506
Europe and Central Asia	40,043	32,728
Latin America and the Caribbean	16,789	40,003
Middle East and North Africa	4,468	926
South Asia	12,127	2,143
Sub-Saharan Africa	3,696	101

Source: World Bank 2009.

Even when the publications from Sub—Saharan Africa are combined with those of the Middle East and North Africa , the total figure (8164) is far less than that of the next least published region, South Asia (12,127). The same applies for patent application by residents. The combined total for Sub—Saharan Africa and the Middle East added to North Africa (1027) is just about half that South Asia

With little effort, it can be deduced that the regions with the most scientific publications and, coincidentally a larger number of patent applications filled by residents, are the more technologically advanced, innovative and economically developed. They are the regions consistently scoring highest on the global indices with regard to human quality of life. This is unfortunate for Africa, for as it has been observed, the production and reproduction of knowledge, propelled by research, are important components of national development. [17]

4.2 An educational systems skewed towards social sciences and humanities

Although the example of East Asia and the Pacific Region gives hope that Africa can achieve higher levels of technological development, innovations, and thus have ability to achieve high level of patenting, the educational system of the continent is, and has for long been, skewed towards social sciences and humanities. The table below indicates the share by this field among graduates in the continent in 2005 was 47%.

Table 2: Distribution of African University graduates by field of study 2005.

Field of study	*Distribution of graduates (%)*
Agriculture	3
Education	22
Health science	7
Engineering	9
Sciences	9
Social sciences and humanities	47
Other	3

Source: World Bank EdStats.

Unfortunately, the preponderance of social sciences does not nurture a conducive environment geared towards scientific and technological innovation and development, which are required for modernity and societal transformation.

4.3 Many factors behind Africa's position

Bad governance in most African countries, wrong priorities and limited or no planning are among many factors to which underdevelopment in most sectors is attributed. Recent studies to explain Africa's position in the society of knowledge are seamlessly interrelated with the factors outlined above.

It is not a mere coincidence that Africa, which has been rated lowly as far as research is concerned by among

others, Science Citation Index (SCI), Careers and Productivity of Doctoral Holders (CDH) survey and Scimago Institutions Rankings (SIR) is performing poorly as regards the Human Development Indices are concerned. As noted above, most of Africa is badly off in as far as research and publication are concerned. Ranking worst in research is the central region of the continent. Though having the greater number of countries, it produces the lowest number of publications. Egypt in the northern region, Nigeria in the center, and South Africa in the south perform well by the continent's standard [18].

4.4 Scholarly productivity of Universities in Africa

A study was carried out in Uganda to establish the level of scholarly productivity in the country. It had a sample of 534 doctoral degree holders, whose median age was 47 years, with age range of 29 to 69 years. They were mostly scientists (80.2%), predominantly male (76.7%), with the largest proportion being doctoral graduates of Ugandan universities (52.7%). This is followed by international universities (38.3%), and the rest obtained their PhDs from other African Universities. It gave interesting results [19].

The data in table 3 below indicates the low percentage of PhD holders vis-à-vis other academic staff at Makerere university, over the period 2004-2006 and 210-2011. The percentage share of PhD degree holders averages 11%. This confirms the challenge there is in the supervision of PhD research candidates.

Table 3: Academic staff profile by qualification (2004–2011).

Year	PhD	Master's	Bachelor's	PGD	Diploma	Certificate	Total
2004	549	2,221	1,715	684		80	5,249
2005	558	2,167	1,694	153	611	75	5,258
2006	746	2,651	1,949	224	772	123	6,465
2010	858	2,967	2,621	209	734	480	7,785
2011	914	3,657	2,923	269	748	191	8,594

Source: Uganda National Council of Science and Technology (UNCST, 2011)

The figures in table 3 above partly explain the results of publications revealed in table 4 below. For faculties to vigorously publish there must be a sufficient number of mentors and supervisors. With the percentage share of PhD degree holders averaging 11%, it is difficult to supervise candidates to produce quality and publishable research work.

Table 4: Distribution of the Status of Publications.

Publications	N	Percentage (%)
None	378	70.8
Either Journal Article(s) or Book(s)	55	10.3
Both Journal Article(s) and Book(s)	101	18.9
Total	534	100

The figures reveal a gravely low level of scholarly productivity, with about 71% of the doctoral holders in the study never having made any type of publication, whether in a journal, book (including book chapters and monographs) and of course both. The figures of those who had published either in a journal or book (10.3%), as well as that of those who had published in both journal and book (18.9%) cannot do much to mitigate the gravity of the situation.

4.5 Rapid expansion of university education

In another study relating to academic research in Uganda, it was observed that the number of universities in Uganda has grown rapidly in recent years, without corresponding increase in research capacity. This puts the already bad situation in as far as research is concerned to get worse. It was further observed that the adjusted by population number of researchers in Uganda is 75% lower than the African average. The country's gross expenditure on research and development (GERD) was, according to the research, among the lowest in the continent. For example, in 2014 it was a mere 0.17% of the GDP, which is miniscule by global standards.[20] In the study, a peculiar recommendation was made that the body supposed to promote science, technology and research related thereto, the Uganda National Council for Science and Technology (UNCST), ought to review the issue of fee charged on researchers to obtain permits for carrying out their research. It is a constraint, as most of them cannot afford to pay it or if they pay, they do so with difficulty. Researchers are supposed to be committed scholars, equipped with tools and ethos of the disciplines. Rigorous levels of training, mentoring and coaching are essential, as are a conducive environment, financial and other motivation, as well as other logistics. The Capability Enhancement Project for Innovative Doctoral Education at Ugandan Universities (CEPIDE) undertook a study with the major objective of uncovering conditions of doctoral education and training in Uganda. It was intended that in due course the results of the study would be utilised to produce more and quality doctorates to meet the high-level knowledge and skills demand in Uganda's growing economy. Several conclusions and recommendations were made. It was established that all universities/institutions offering doctoral education and training were suffering from an acute shortage of doctoral supervisors and mentors. The research revealed that doctoral education and training in Uganda continues to be largely traditional, characterised by misalignment between the formal aspirations and commitments expressed to be the development of doctoral education and training. It was noted there were several systemic constraints to the attainment of the major objectives of doctoral training, key of which is increase in doctoral graduates capable of carrying out productive research [21]. It was further observed that there are traditional biases which must be addressed in the educational system which research reveals are having and will continue to have negative effects on social and economic development of society, and on many other aspects of life.

5. Exponential growth of higher education in Africa

Using the analogy of assembly lines, it can be asserted that Africa has witnessed mass production of universities. It has led to the increase in number and diversity of programs on offer. Over the last three decades, enrollment at university has dramatically increased leading UNESCO to rank it, especially Sub-Saharan Africa, to be the fastest growing in the region in the world over the period. As it can be anticipated, the outcomes have many, of varied consequences and far reaching, with many of them contradictory and undesirable. Nevertheless, at an average growth rate of 10 percent in gross enrolment, Africa still lags behind the rest of the world. The experiences, however, has some exceptions especially in South Africa, Nigeria and some countries in North Africa. In a study that revealed the relationship between growth and other dimensions, it was noted that developments in higher education are both context-contingent but are shaped, or exacerbated by international pressures [22]. Fast growth however raises issue of quality of knowledge generated, and consequently, the social recognition and market value of qualifications obtained. Indeed in many cases, the output is just about average in quality for most programmes as evidenced by the attitudes of employers to the graduates churned out. [23].

In some cases, for public universities, growth has not been through establishing new infrastructure both in terms of physical and human resources, but by converting middle level technical and vocational colleges (TIVET) or polytechnics into full-fledged universities. Invariably, all countries in Africa have established universities which promote regional equity or take advantages of comparative advantage, for example agricultural based ones. Some have undertones of political or religious competition [24].

5.1 Geometric rise in student population

From the time many African countries gained political independence in the 1960s, higher education student population rose from 120,000 to 782, 500 in 1975. For the period 2000 to 2015 it more than doubled from 6 million to slightly over 12 million by 2015 [25]. In Ethiopia, for instance, the number of public universities grew from two in 2000 to thirty-six in 2015 [26]. In Kenya, student enrolment increased from 112,229 in 2006 to 539,749 in 2016 [27]. The global trend is of increasing student enrolment. An average annual rate of 15% was realised between 1985 and 2002 in Africa. Many of the countries exceeded the average. For example, Rwanda (55 percent), Namibia (46 percent), Uganda (37 percent), Tanzania (32 percent), Cote d'Ivoire (28 percent), Kenya (27 percent), Chad (27 percent), Botswana (22 percent), and Cameroon (22 percent) [28]. The geometric growth in enrolment at a big number of universities in various countries in Africa is worrying given that there is no proportionate growth in the faculty, let alone in the number of research–oriented ones. Institutional and government policies have been among the factors that drive exponential growth of universities. In some extreme cases the growth is driven by political greed and rivalry for supremacy, as has been the case in Ghana, Ethiopia and Kenya. A taxonomic rendering indicates four categorisations of the exponential growth. The Universities of Addis Ababa, Ghana, Dar es Salaam, Nairobi witnessed exponential expansion. Major expansion occurred at Chiek Ant Diop, Zambia and Mauritius Universities. At Makerere University and Botswana University there was substantial growth. Stabilisation or indeed decline occurred at Cairo and Ibadan University [29].

5.2 Gender and STEM bias

It is the tradition at universities for academic programmes to be categorised as prestigious versus non-prestigious programmes, STEM versus social sciences and humanities, albeit informally. Some courses are overloaded because of their potential to appeal to prospective employers. [30] In the Capability Enhancement Project for Innovative Doctoral Education at Ugandan Universities (CEPIDE) biases were identified, particularly those relating to gender and STEM. In the case of Doctoral education and training in Uganda, examining graduation booklets of the public and public universities indicates that out of 1,025 students graduating with doctorate degrees for the period 1970-2020 in public universities 240 (23.4%) were female. Almost the same figure is recorded for private universities, where of the 172 PhDs awarded over the period 2001-2020. There were 42 females, about 24.4%. Regarding limited interest in STEM, partly because of challenges of resource constraints like limited physical infrastructure , lack of appropriate number of quality staff, there is imbalance between public (government sponsored) universities and the private ones. It is also because of the preferential and positive discrimination sponsorship systems by government for females in universities in Uganda. At some point in time, all female students were beneficiaries of +1.5 points to those they scored in the Uganda Advanced Certificate of Education. Statistics reveal that out of the 1025 doctorate degrees awarded in public universities for the period 1970-2020, 699(68.1%) were in STEM and only 326 (31.9%) were in non-STEM disciplines. In comparison, for private universities, out of the 172 PhDs 153 (89%) were in non-STEM and only 19 (11%) were in STEM.

6. The Need for Revival and Increased Research in Africa

Universities play a lead role in the transformation of lives of those leaving in their vicinity and far away. In the words of the Koffi Annan, former Secretary General of the United Nations Organisation, the university must become a primary tool for Africa's development. Universities can help enhance technical and professional expertise. They can enhance the analysis of African problems and strengthen domestic institutions. Universities serve as a model environment for the practice of good governance, conflict resolution and respect for human rights, and they enable African academics to play an active part in the global community of scholars. [31] The respected global citizen's stance is supported by many scholars of repute. Universities should be bastions of research. Quality research is key to fast tracking social, economic and technological innovations to enable developing countries competitively position themselves as respected citizens of the global knowledge economy. To achieve this hey need to greatly enhance the quality and quantity of their human resources, who are able, for instance, to generate and leverage increasingly newer and better technologies [32]. More than ten years after Koffi Annan's words of wisdom, the continent is still precariously positioned in the knowledge society.

6.1 The Uncomfortable Positioning

Universities in African are occupying an unenviable position in the knowledge society and are particularly characterised by very weak research capacity. Among the causes are lack of supervision capability for those interested in furthering their academic career, limited capacity to attract and retain talent, overload of the few available faculty who are at the same time underpaid, politically and ideologically contradicting functions and

assignments alongside core academic activities and lack of or limited funding [33]. Realising they have been in academic doldrums for decades some voices became audible, especially over the decade spanning 1990 to 2000, with the most recognised being that of then highly respected United Nations Secretary General Kofi Annan who [34].

6.2 Networks and Collaborations among Universities in Africa

Universities in Africa have also developed networks and collaborations with a major objective of facilitating research and doctoral training. Through these, universities in Africa endeavour to establish active communities of practice and knowledge sharing. To achieve the objectives of the global Sustainable Development Goals (SDGs) and the continent's Agenda 2030 effective tripartite (public-private-academia) collaborations, networks and partnerships must be established, nurtured and sustained over time. The potential benefits of the market offered by the African Continental Free Trade Area, can be successfully exploited this way by emphasising quality research, especially in the areas of science, technology and innovation. Great strides will be made towards attainment of the desired technological, economic, social, and environmental development. Regarding partnership with business or industry, studies focusing on science parks and business incubators encouragingly reveal a positive emergent phenomenon in Africa, although concentrated on a few regions.[35] Examples of collaborations and networks on the continent include the African Research Universities Association (ARUA), African Network for Internationalisation of Education (AINE), Cambridge Africa Partnership for Research Excellence (CAPREx), CARTA Consortium for Advanced Research Training in Africa, Capability Enhancement Project for Innovative Doctoral Education at Ugandan (CEPIDE) Deutscher Akademischer Austauschdienst-German Academic Exchange Service and the European Council of Doctoral Candidates and Junior Researchers and Higher Education Research and Advocacy Network in Africa (HERANA)

7. Africa's Agenda 2063

Africa has a grand Agenda 2063 which envisions a prosperous Africa, with all-round and inclusive growth and sustainable development, propelled by sufficient investment in education, skills development and science. The World Bank estimated the continent's contribution to be a paltry 1% of global research.[36] Favourable rating now puts the estimate at 2%. Its expenditure in this important area constitutes only 1.3 % of that of the whole world. It is therefore not surprising, that its share of patents globally registered is a mere 0.1%. Table 5 below indicates number of researchers per million of various countries. It is evident that correlation exists between the number of researcher vis-à-vis the population and economical as well as technological development.

Table 5: number of researchers per million.

Country	**Number of researchers per million population**	**Country**	**Number of researchers per million population**
United States of America	4,130	Tanzania	n.a
China	459	South Africa	192
India	158	Nigeria	15
Sub-Saharan Africa	48	Mauritius	207
Uganda	22	Kenya	n.a
North Africa	160	Brazil	168
Latin America	261	Ghana	n.a

Source: World Bank 2009

In comparison to the UK and the USA and the other developed western economies who boast of 4,000 researchers per one million of their population, Africa has 198 researchers for a similar number of people.

7.1 Research supervision a key factor

Governments in Africa could inevitably cope with the rate of increase in demand, public universities had to be complemented private university investors. To maintain quality there is need for establishing robust quality assurance systems [37]. The matter was extensively debated at the Vice Chancellors Conference in South Africa in 2003 [38]. The rapid increase in demand for teaching and supervisory capacities led to serious deficiencies in supervision, most especially of PhD candidates. This is glaringly evident in the newly established public universities and in private ones. For the majority of universities in Africa, less than 30% of the academic staff are PhD degree holders [39]. Even for the relatively better placed member of the knowledge society in Africa, South Africa, only 43% of all permanent academics in South African universities had doctorate degrees in 2014, which is a constraint to the supervision of doctoral candidates [40]. The effect is that in most countries on the continent, and with a view to enhance and maintain quality education, only a small percentage of the accredited universities are allowed to offer PhD programmes. For example in Nigeria, when it had 152 accredited universities, only 63 were allowed to offer PhD programmes by 2017[41]. It is not surprising therefore, that the continent suffers droughts when research based global rankings are carried out. In 2015, for example, there was not a single university in the 100 leading universities in the world. Of the first 500 best ranked universities, the developing world contributed only 10%. Among the giants of Africa in the list were the University of Cape Town, the University of the Witwatersrand, Stellenbosch University, the University of KwaZulu-Natal, and Cairo University and Alexandria University in Egypt [42]. The lucklusture performance of in research output is largely attributed to the lack of a critical mass of PhD graduates [43] . South Africa is the only sub-Saharan African country producing a significant number of doctorates, although it should be noted that more than 30% of doctoral enrolments were from other African countries [44]. In 2012 of the 634 Africans graduating with a doctoral degree from South African public universities 427 were from South Africa designated by race as Africans. Others were Africans from outside South Africa. Similar categorization was used for 2016 when out of 930 doctorate graduands 507 were from South Africa designated by race as Africans. The rest were Africans from outside South Africa.

8. Findings

From each of the sections above revelations by way of facts and figures point to Africa having been a powerhouse of knowledge generation, dissemination and application. With time, and as it happened with many other civilisations, the twilight set in and eventually dusk did. The rapid rise in number of universities and related exponential growth in enrolment of students though desirable, has unfortunately not witnessed linearly related growth in infrastructure, financing and quality of human resources. This has negatively impacted on the quality of the graduates of some of the universities.

9. Limitations

The amount of literature reviewed was enormous. It had to be concisely but meaningfully compressed into text to take into account of available space given restrictions on the number of acceptable words. The time available for review of the literature was also limited.

10. Conclusion

Africa's positioning in the society of knowledge can be enhanced efforts are made to, among other avenues, paying more attention to improving the supervisory capacities of researchers in terms of numbers and quality. The growing number of collaborations and widening of networks is a major boost and should not only be maintained but also boosted. More research should be carried about it in Africa, with a view to boosting it.

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