

**AFRICAN ENVIRONMENTAL ETHICS AND THE CHALLENGE OF
DECOLONIZING SCIENCE AND TECHNOLOGY FOR AFRICA'S GROWTH
AND DEVELOPMENT**

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Abstract

Natural Science as a field of expertise is dominated by Western foreign individual names. Names like Newton, Galileo, Leibniz, Kant, Descartes, Einstein, Bohr, Heisenberg and so on are replete in the enterprise of science. This can be explained from the angle that science is a unique creation of the West and it has to do with an attitude as well as a disposition to enquiry that long develop by the West as a system of preserving their thoughts in written form. This position as well as persuasion holds enormous implications for Africans. The study interrogates two fundamental positions: the first is, "is the Western mind carved out for technological enquiries such as science by nature"? Secondly, "what can Africa do to becoming a player in the enterprise of science despite arriving late to the scene"? This study, employing the method of historical and critical historical analysis examines science and by extension, technology as a Western creation and the possibility of decolonizing it for Africa's benefit. The decolonization of science and technology in this instance is not to recreate science but to provide a framework where Africans can engage in and with their own findings in their environment for the development of the continent and its people. The goal of this position is informed by the need to make Africans less dependent on the West for their scientific and technological needs.

Keywords: Nature, Laws, Theories, Science, Technology, Independence, Homegrown, Solutions, Decolonization.

Introduction

The West has become formidable because of their knowledge of the workings of the universe. Knowledge of why and how things work has led to the birth of the scientific enterprise and this didn't come about haphazardly. It took a lot of time and efforts in

research, observation and experimentation for science and by extension, technology to be what it is today. From the proceeds of science and technology, the West were able to build ships, military gadgets/equipment's, telescopes and the likes which made it easier for them to colonize other nations of the world. Africa is one continent that was plundered by the colonialists whom because of their superior fire arms could forcefully invade a land, take away their belongings and people as slaves into a foreign land. This is to make the point clear that there is a great nexus between science/technology and colonialism.

It would have been very difficult for the colonialist to make an inroad into Africa without Science and technology. It would also have been very difficult for the colonialist to have invaded Africa if Africans had a more sophisticated military fire power. This truth dovetail to how politics in the world today is approached. We still see those supposed stronger nations going to war with the perceived weaker ones in terms of military might and power. This correlation as suggested by McClellan III (2010, viii), is one that seems inseparable hence, "questions of science and technology thus appeared to me as a major problem of Haitian society, problems for which the exercise of political power could not be separated".

The nexus between science, technology and colonization is an interesting one. Nations who are good in science and technology commands enormous respect in the comity of nations undoubtedly. The necessity of having indigenous science and technology even if it is unsophisticated dominates the thinking about a nation's freedom and independence. It is a fact that there are so many nations that are still dependent on foreign nations for their military supplies. Ironically, no nation exports its best gadgets following the law of comparative advantage. Mentan (2015, ix) notes that "capitalism in its corporate imperialist form today has predominantly assumed the form of global neo-liberalism".

Science and technology have given a new face to our world. This does not however exempt it from its dark side of human annihilation. History holds ample evidence of how science and technology have been deployed to the destruction of human species. Colonialism is one of such medium through which science and technology was deployed to subjugate others especially those considered to be weak. Does this suggest that traditional Africa did not have its own homegrown science and technological ingenuity and aptitude? They certainly did but the sophistication in comparison to that of the colonial West can be understood. Ngozi (2014, 29) affirms that:

Technology is conventionally understood as reforming to the practical application of technique and knowledge to productive processes. This act is known in Africa since the dawn of human history evidently proven with the discovery of early human remains in the Great Rift valley with tools. In other words, when

indigenous knowledge finds applications in tools, techniques, processes and methods that help in solving problems, indigenous technologies arise.

The politics of science and technology, otherwise understood as using the advantage accrued from the knowledge of nature and its products for the gain of a nation over and above another cannot be ruled out in the world's construct today. This is why research targeted at science and technological innovations and advancement is being taken seriously by nations of the world as a policy framework. The understanding is that, he who has a better "know-how" of science and technology can command enormous respect and enjoy advantage among nations of the world. This is the reason why nations go to war with other nations to conquer, dominate or subjugate them.

Apart from the gains of science and technology which include conquering territories, economic products are also the offshoot of science and technology. When a nation produces something of value to other nation, it takes away its resources and puts itself at an economic advantage. All of these and many other reasons underscore the need to interrogate how Africa as a continent and a people can decolonize science and technology. By this, the study is advocating for a new philosophy for Africa that will minimize or out rightly jettison dependence on the West for science and technologically related assistance. The study holds the position that the aptitude for science and technology is a natural gift to all men, tribes and tongues notwithstanding.

African Indigenous Science and Technology

Science and technology are held as objective disciplines that is universally accepted and applied. It will be erroneous to talk about African, Asian, American, European science and technology. However, the title African indigenous science and technology lays credence to how the African people engages with the knowledge of nature for its advantage as well as its skills in producing gadgets that aids work. Ngozi (2014, 59), on the importance of a people's engagements with their environment writes:

The growth of any economic forecast lies in what it has and can adequately make out of its resources without external aid. In the digest of the above, ancient African communities extensively exploited their environment which gave rise to their mastery of iron working with arts, textile weaving and dyeing, herbal drugs, agriculture etc. The decline of this prestigious technology, specifically blacksmith industry is the result of lasting impacts of colonization as well as the tide of globalization.

Technology cannot be technology if it does not take into cognizance the principles and laws of science. To this effect, traditional Africans can be said to have knowledge of the laws of nature as well as the mathematical equations and measurement that accompanies science. The difference majorly is that, while African knowledge is dubbed as “community” that of the West is “individualism”. The identification of some names like Newton, Galileo, Copernicus and Einstein in the field of science does not preclude the fact that there were wise sages in traditional Africa that were gifted with the knowledge and wisdom of nature and the apprehension of its laws. Horsthemke (2021, 2-3) notes that “the motivation for a focus on indigenous African knowledge, science and technology is fairly easy to explain especially when one considers the denigration, suppression and exploitation of traditional knowledge systems during and even after colonialism”.

Deductively, it can be stated that Africa was doing very well in the area of knowledge of nature and its attendant practical know-how before the colonialist invaded the continent. The colonialists came with their supremacy mentality. They saw everything that is connected to them as the best; they saw their science and technology as second to none. They denigrated and despised the indigenous knowledge of the Africans in servitude so that they can continue to dominate and plunder their resources. Ijiomah (2014, 4) agrees with the above submission when he asserts that “Aristotle characterized man as a rational or reasoning animal. Levy Bruhl celebrates it with an impression that the cognitive status of Africans, before the advent of the Europeans, had no logic. By implications, this stands to mean that Africans by tradition are semi-human beings”.

The term indigenous science is usually understood to be referring to areas of human inquiries in astronomy, indigenous physics, ethno medicine, ethno botany, ethno zoology as well as ethno psychohistory. While indigenous technology refers to the application of indigenous science, the whole body of methods and materials used in such application, that is, the body of knowledge available to a civilization that is in used in fashioning implements, practicing manual skills and arts, and extracting or collecting materials” African forebears knew a lot about their immediate environment. From naïve realism, i.e crude observation, they were able to understand the causal law of nature as well as regularity. These accorded them the opportunity to make sense of their existential reality and the preservation of their lives. Like every technology in its primordial form, African indigenous technology may not be as sophisticated as it will be expected, but it was technology nonetheless and it aided in making work easier as well as the clarity of the workings of nature.

Africa’s pre-colonial heritage or what is referred to as indigenous knowledge is very robust and profound. That it is so called reveals the epistemic content of such knowledge

and its application to meeting needs. For instance, (Kaya and Seleti, 2014, 30) notes that “in the perception of African scholars, a traditional healer who is able to cure a particular disease using specific herbs has the knowledge and the theory of the plant species and their characteristics”. This is to make the point that, whether African indigenous knowledge is held to be scientific or not, following the paradigm of what science is held to be, it nevertheless is knowledge about nature. The kind of knowledge that traditional healers have couldn't have come about ‘out of nothing’. There must be some kind of revelation which is also ‘knowledge’ as well as the scientific attitude of observation and experimentation. If these aspects were to have been documented in the pre-colonial and colonial era, the world would have been astonished at how rich in knowledge traditional African sages were about the workings of nature as well as its laws and principles.

The Colonialism of Science and Technology

Science and technology can be held as independent disciplines with its non-unique method and methodology that can be termed universal and objective. But it is not in doubt that science and technology can be manipulated to achieving a certain aim. Science and technology are prone to easy manipulation by its wide acceptance as objectifying truth. Science and technology have become some sort of power knowledge since power and knowledge are inseparable categories. Hasenohrl (2021,122) notes that “tracing the manifold flows of knowledge, ideas, technology, goods, organizations, capital or people across the globe and exploring their impact on different societies and environments. The history of technology has started to question some of its assumptions and directions, particularly its traditional focus on “western” actors and technologies”. Thomas Kuhn, in his *The Structure of Scientific Revolution*, have argued that there is a community of scientist who decides what paradigm is commensurable or not and whether to jettison it or not. One would wonder why there should be such a community if the method/methodology of science is flawless Whitt (2009) avers that numerous historians of science have documented the vital role of late-eighteenth and nineteenth-century science as a part of statecraft, a means of extending empire. In extractive biocolonialism, the valued genetic resources and associated agricultural and medicinal knowledge of indigenous peoples are sought, legally converted into private intellectual property, transformed into commodities and then placed for sale in genetic market places.

Censorship of scientific and technological knowledge by the state is one area where colonialism of knowledge can be identified. This is done to give a particular country advantage over the other, and explains why not all knowledge is made open to everyone. These are classified knowledge that ensures a country continually stays ahead of others. Even in world politics today, the strong country countries that are scientific and

technological doing very well are accorded respect by the least disadvantaged countries. This might only be the explanation why Russia decided to invade Ukraine because she has more military power and might compared to Ukraine one would think. Laying credence to this, Foerstel (2010) states that scientist and researchers understood the need for control over the technology of nuclear weapons, but they were skeptical of the advisability and effectiveness of controls over pure research. After all, they argued, one cannot hide the secrets of nature, which are available to anyone with an inquiring mind.

The idea of censorship is parochial because it is not carried out for the greater good of human world community. It is done from a point of view of advantage maximization so that the strong can continually dominate the weak, ruling and plundering its resources. This explains why investments in science and technological knowledge is a big deal to several nations today even those considered as small nations. There is a craze and competition for long range nuclear missiles acquisition by different nations of the world. The motive is for colonial domination and self-assertion. The politics of science and technology is to further the empire of a nation while asserting its prominence and interest. Science and technology has a colonial undertone that must be decolonized. Nations that depend on other nations for their military supply are under some form of neo-colonialism. Neo-colonialism is a subtle form of colonialism that puts the nation at the receiving end at a disadvantage. They can never get the best form of such equipments neither will they have the technical know-how of how to produce such. This is where the need to decolonize science and technology for Africa's growth and development becomes imperative.

Decolonizing African Science/Technology

Science, from the Latin word *scientia* simply translates as knowledge and this knowledge is agreed points to physical or natural reality. By this, laws and workings of nature are understood and applied for the overall benefit of man. Technology on the other hand is from the Greek root word *techne* which translate as skill. Technology involves the right application of the laws of science whose aim is to make man's work easier through skillful innovative production of gadgets. Since science and technology are different systematic disciplines requiring the scientific method of inference and mathematical expertise, some thinkers in the persons of Hegel, Kant and Levy-Bruhl insists that Africans and the African continent (pre-colonial) cannot have science or technology. Hence, when we talk about African science, it remains whether science as well as technology can be localized. What do we then mean when we talk about African philosophy of science and technology?

African philosophy of science and technology in today's age can be understood as the extent to which African treatment of science and technology is premised upon the West. But this too has to be decolonized from the perspective that, pre-colonial Africa had knowledge of the workings and the laws of nature as well as proficiency in the art and science of fabrication of technological gadgets. So to decolonized African philosophy of science and technology is in a sense to set the record straight that science and technology as we know it today is not exclusively Western even though the West have done a lot more in this area with breakthroughs in different areas covering the air, land and sea. Russell (1961, 501) avers that:

The men who founded modern science had two merits which are necessarily found together: immense patience in observation, and great boldness in framing hypotheses. The second of these merits belonged to the earliest Greek philosophers; the first existed, to a considerable degree, in the later astronomers of antiquity. But no one among the ancients, except perhaps Aristarchus, possessed both merits and no one in the Middle Ages possesses either.

If scientists were called natural philosophers before the 17th century, is it the case that there were no men from African descent in the continent of Africa who were skilled in science and technology? Science in its modern form is not what it used to be. It was not as sophisticated as it is today. Since every age has its own philosophers and thinkers, will it be fair to deny that Africa never had its own scientists and technologists who would have helped made life in traditional Africa less stressful or cumbersome? Writing on the basis that traditional Africa has a culture of science, Ojong opines that scientific development in Africa seems to have been truncated. A lot of reasons have been advanced to account for this slow pace of scientific progress. Some scholars like Rodney have attributed it to the accident of history in respect to the scourge of slave trade, colonialism and neocolonialism. We have gone beyond socio-political issues to locate the problem of the progress of science in Africa on the issue of the proper understanding of the methods of doing science. The methods of science are ever evolving and each method affects the progress of science in its unique way. Ojong notes that (2008, xii) "the Western method of doing science is not the only method."

Science in its modern outlook is modeled after the West. This is some sort of imperialism because whatever is to be accepted as science must be tailored after the Western scientific method. In fact, Randall Jnr. makes the point that in attempting to define 'science' and 'scientific method', and to compare it with other methods, the philosopher must have an eye to what has gone by that name in the past and to what is involved in the practice of natural science and mathematics today. In so doing, (Randall Jnr, and Buchler, 1971, 57) states that "he is confronted with a complex gigantic structure to which full justice can be

done only by a detailed analysis”. African science/technology has never followed the Western scientific method, yet it has a functional basis as well as uses. To understand the African approach to scientific methodology, we must understand the depth of African ontology and metaphysical framework upon which African scientific epistemology originates. The African worldview contains its cosmology, epistemology and methodology. Cosmology is concerned with the science or theory of the universe, and what there is in the world. How the Africans know and relate with this world or environment can pass for the methodology.

Traditional African metaphysics become the basis upon which traditional Africans confronts the world and make sense of it. Traditional Africans confronts the cosmos or the world using divine forces. This cannot be made possible if there is no knowledge of epistemology on how this works. Divine forces reveal knowledge of medicine for certain ailments through dreams and visions as well as how to control and predict the forces of nature. If these were not pragmatic, it would have been difficult to live in traditional African space at a time when there were no modern vaccines or medicines. One may query that beliefs in the non-physical or material entities has no place in science. If this is true for modern science, it then shoot itself on the foot because so many aspects of modern science also deal with issues that are non-physical in nature such as strings theory, black holes, quantum entanglement and so on.

Evaluation

Western science has an aspect of rationalism where the internal logic of a system is known differently from the derivable laws of nature captured under the scientific method. This is where Popper introduces critical rationalism into the scientific method. Inductive reasoning alone is not enough hence the need to introduce deductive reasoning into the province of natural science. In the same vein, there are deductive explanation of several occurrences in the African cosmos same as induction which are not absolute. All these depend on the will of divine forces informed by the adherent’s belief. The method of science as has been observed in the West cannot explain African epistemology about the universe. In Western science, what distinguishes its method is “the manner in which its theories become transformed into knowledge. And this consists precisely in “the process of universal testing, the individual introduces ideas; the scientific community appraises them by its objective criteria” (Randall Jnr, and Buchler, 1971, 59).

For traditional Africans, the knowledge about the cosmos is derived from divine forces and validated by them also. Man is only a custodian of this knowledge for the general good of the people. But Western imperialism has made the idea of African science to be

contrasted with its own science so that African science is now pejoratively seen as purely esoteric, personal and devoid of elements of objectivity and rigorous theorization. Some African scholars like Afisi (2016, 59) has argued that African science can be seen as a distinct method “that can be termed scientific....there exist varieties of inquiry beyond what has been developed in the West which can still be justifiably termed scientific. The social character of science, which makes it a part of social and cultural traditions, qualifiedly justifies “African science as a true science.” It is a truism that if what the scientist does is to understand the cosmos through observable evidences in order to proffer appropriate technical and rational solution to it, then this is an approach that can be significantly found in every rational and intellectually open society. In ancient North East Africa (though still disputed whether they were blacks) these regions such as Egypt, Nubia and Aksum had evolved large, complex state systems which supported a division of labour that allowed for the growth of science and the more practical technologies involved with the engineering of public works.

In the other parts of Africa, city states, kingdoms and empires, science and technology also developed in various ways. The applied sciences of agronomy, metallurgy, engineering and textile production as well as medicine were common place. These are well known and historically documented. African Traditional Knowledge (ATK), variously called rural peoples’ knowledge, indigenous knowledge, or cultural knowledge, among others, is as old as the existence of the African peoples themselves. This knowledge base has provided sustenance for Africans in a diverse, complex and risk prone environment. Spirituality is the bedrock of this knowledge, system that makes it remarkably different from other knowledge/sciences. Bio-cultural diversity is another feature that characterizes African traditional knowledge. (Millar, *et al*: 2006, 8) avers that “non-Africans and so-called “educated Africans” have often denied recognition for this knowledge base since colonial times”.

African philosophy of science and technology must chart a new path for scientific discourse in Africa by doing so much in terms of excavating the episteme latent in traditional Africa and putting it on a new pedestrian. The important point to note here is that African science/technology must not look like that of the West. It can be unique in its own way and provide solutions to the problem of humanity complementing the gains of Western science. It would be an error to measure science from Western paradigm as that will limit the gains that should accrue to humanity if other sciences are considered in their different terms. This is the point Paul Feyerabend was advocating when he states that there is no scientific method, no single procedure, or set of rules that underlies every piece of research and guarantees that it is scientific and, therefore, trustworthy. Every project, theory, procedure has to be judged on its own merits and by standards adapted to the

processes with which it deals. Feyerabend (1978, 98) expresses the idea of “a universal and stable method that is an unchanging measure of adequacy as unrealistic as the idea of a universal and stable measuring instrument that measures every magnitude, no matter what the circumstances.”

African science/technology must be given its own corpus. It is true that the craft is somewhat esoteric and open to only initiates; but it can clearly be documented in writing at least for its preservation. The body of knowledge in this field is very wide and can be studied even in conventional universities as it is done in South Africa currently where witchcraft is studied as a degree program. The West does not need to accept it as being a viable worldview neither do they need to give their approval. As long as it works pragmatically and helps to minimize or outrightly remove the challenges of its believers, it is sufficient. African forebears used this art/craft and they were able to live long despite the presence of other forces contending to diminish theirs.

Earlier sociologists and anthropologists from the Western world have studied Africa and its people as objects of interests relating to their fields of work, which is rooted in the academic, political, economic and cultural context of colonialism and post-colonialism. The recent upsurge of interest of knowledge of indigenous people of Africa has challenged the assumed superiority of mainstream Western science over sciences that have their roots and dynamics in Africa. The Asian scholars for example are doing science in their own cultural way not caring about Western approval or acceptance. Acupuncture is a well known and recognized alternative medical therapy that does not follow Western scientific method. Yet, by its workability, it has been accepted even by the Westerners as very viable in terms of its curative powers.

Conclusion

African scholars have a lot of work to do to decolonize the continent from always pursuing after the acceptance and validation of whatever Africa does by the West especially with regards to its indigenous science and technology. Inferiority complex can somewhat be responsible for this constant push for African validation by the West because of the stride the West have attain with regards to science and technology which are visible everywhere. This is not to discredit the West for the great feat they have achieved in science and technology but “contemporary Africa can borrow a leaf from the westerners and intentionally invest in homegrown scientific research in order to be a team player in the global space.” (Isife,2022,88). Hence, the fact remains that, no nation of the world would want to give away the area they have comparative advantage over others. This is because their sources of wealth and power are from there. This also goes to show

that every nation of the world should improve on their own strength and use it to their own advantage. Asians are doing that same as Americans and that is the way to go. Hence, the call for decolonization of African philosophy of science and technology is not made in bad faith but to remind Africans that in global politics or economics, comparative advantage is always pursued.

African culture for instance, does not assume that reality can be perceived through reason alone. There are other modes of knowing such as, imagination, intuition and personal feelings. This is why the deepest expression of the African cultural reality has been through art, myths, and music rather than through the Western mode of logical analysis. This multi-valued logic of the Africans is different from the two-value Western logic. Differences in knowing and thought processes necessitated these differences in the outcome of reality. In traditional African worldview, the universe is a spiritual and material whole in which all beings are organically interrelated and interdependent. In the process of reclaiming/affirming our indigenous stories, cultural identity and voice, we need to decolonize our minds. To this end, African educators must move beyond a focus of specialization to holistic knowledge from materialism to spirituality; from a focus on structure to understanding processes and from objective to subjective methods of enquiry.

Western education was used not to promote the healthy co-existence of the Western and African cultures but as a sanitizing and civilizing medium. This already suggests that it is a 'given' that Western education is superior to that of Africa. This situation has resulted in "the continued dominance of western philosophy in its curriculum..." (Isife, 2021, p.111). The African education curriculum is tailored towards theory not practical, which is a continuation of western colonial education. The necessity of colonialism as well as its aim was not meant to directly favor the African course. It is not as if the West loves Africa so much and wants to see the 'primitive' continent delivered from its supposed primitiveness. The West had an agenda to destroy African indigenous science and technology by replacing it with its own invented technology and science.

Some scholars have made a case for a modernized African science. According to Akpan (2011, 17), "the method of the modernized African science is a mixture of the traditional African scientific method and the method of modern science." In each of these cases, the process of observation, experimentation, causal explanation and generalization are brought into play. But here, the modernized African scientists incorporate the techniques of Western science, like using scientific instruments such as microscope, telescope, stethoscope and so on in his experimentations. He may even have traditional laboratories, and the products may be standardized. This kind of thinking is one that is still under the grip of Western colonialism or neo-colonialism. African indigenous science and

technology can and should operate side by side with Western science and technology as that is exactly what the Asians are doing. Until Africans especially the thinking population begin to see the need to develop traditional African science in a manner in which it can begin to solve the problems of Africans and humanity, we would only be deceiving ourselves that we are free from colonialism and its effect.

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