

## HIGHLIGHTING THE RELEVANCE OF KARL POPPER'S FALSIFICATION THEORY IN NIGERIA'S SCIENCE ENVIRONMENT

**Charles Kosolu Onebunne (PhD)**

Department of Philosophy, Nnamdi Azikiwe University, Awka, Nigeria

Email – ck.onebunne@unizik.edu.ng

Phone - 07039442817

### ABSTRACT

Karl Popper's falsification theory postulates that the advancement of scientific knowledge occurs through conjectures and refutations, whereby hypotheses are subjected to rigorous testing with the aim of falsification. This paper adopts the method of philosophical analysis to examine the relevance of Popper's falsification theory within Nigeria's scientific environment, particularly by emphasizing the need for scientific inquiry and progress. The application of Popper's theory in Nigeria's research culture would nurture and enhance the quality of scientific output by provoking critical thinking and promoting a culture of philosophical skepticism. This paper argues that incorporating Popper's falsification theory can help to revolutionize the scientific landscape of Nigeria. It therefore recommends that researchers and educators in Nigeria embrace Popper's falsification framework as a means to foster scientific progress and, by extension, national development.

**KEYWORDS:** Falsification theory, Science

### INTRODUCTION

This paper focuses on Karl Popper's Falsification where he proposed that science relies on putting up a hypothesis by way of conjecture and then falsifying it. According to Popper, so long as a hypothesis is falsifiable, near-objectivity of science is assured. Of course, in doing this, Popper hoped that falsification draws a line between what is scientific and what is non-scientific. Thus, this study is focusing on the relevance of Karl Popper's Falsification to Nigeria's science environment; that is how Popper's Falsification Theory can be applied to the Nigerian scientific endeavors in order to get better results in terms of solving Nigeria's problems in some major key sectors such as Education sector, Agricultural sector, Trade Medicine/Health sector and Research culture in general. But before moving further, this study deems it insightful to throw light to the two key words in this study - *science and falsification* in order to highlight their meaning as it concerns this study.

**Science:** Etymologically, science is from the Latin word *scientia*, which means knowledge. Samir Okasha, in his book – *Philosophy of Science: A Very Short Introduction*, defines science as “an attempt to understand, explain, and predict the world we live in”<sup>1</sup>. This definition brings forth the conception of science as the intellectual and practical activity which has to do with the systematic study of the structure and behaviour of the universe. Another definition of science holds that “science is a systematized knowledge derived from observation, study and experimentation carried on in order to determine the nature or principles of what is being studied.”<sup>2</sup> Furthermore, science has been defined as the organized body of knowledge that is derived from observation and that can be verified or tested by further investigation.<sup>3</sup>

These definitions of science point to the fact that science is a body of knowledge whose facts and theories must be able to survive a period of critical study and testing in order to be universally acceptable.

**Falsification:** Falsification is simply the principle of falsification which stipulates that a scientific theory is falsifiable if it is capable of conflicting with observable phenomena or events. It is a principle which states that “it must be possible for an empirical or scientific system to be refuted by experience”<sup>6</sup>. This implies that there must be a logical possibility for an assertion to be demonstrated as false by observation or physical experiment. Therefore, a good scientific statement must be capable of being refuted by empirical events. However, it must be made clear that for something to be falsifiable does not in any way imply that it is false; on the contrary, falsification means that every scientific assertion must contain within it the tendency to be checkmated by observation and experiment. If there is no means of falsifying a theory, then that theory is anything but scientific. At this juncture, it is pertinent to note that Popper's views of science is prescriptive and not descriptive. This simply connotes that his view on science focuses on what scientists should do and not necessarily on what scientists do. That is to say that his view of science is a shift away from the usual traditionalist and conventionalist view of science. It is also worth stating that Popper's view of science is based on his projection of problem-basis of scientific progress. This explains why for him, falsification aims at proffering satisfactory explanation and solutions to problems. For him therefore, science tries to understand the laws of nature, harness them and apply them to solve the needs of mankind. This way, Popper's falsification is perceived as having opened a new vista towards understanding science and progress in science. This is even clearer with Popper's assertion that “in so far

as a scientific statement speaks about reality, it must be falsifiable, and in so far as it is not falsifiable, it does not speak about reality”<sup>7</sup>.

## **THE RELEVANCE OF POPPER'S FALSIFICATION THEORY IN NIGERIA'S SCIENCE ENVIRONMENT**

### **In Education/Science Education**

Having a proper basic understanding of science is very vital among Nigerian students. This understanding of science has something to do with the nature, purpose and mode of operation of science. To be specific, science is a body of organized knowledge that is deployed for the purpose of proffering satisfactory explanations and solutions to the problems of mankind by means of conscious and careful experimentations. Given this definition of science, it becomes indubitable that students should be well introduced to science early enough in their lives. That is to say that science education in Nigeria should be structured in such a way that students should understand the intricacies of science, its purpose and the procedure thereof. Unfortunately, what obtains in Nigeria is a situation whereby students are made to behave like robots, assimilating everything like dogmas without having to ask some vital questions. This is observable mostly in class of physics, chemistry, biology, etc, where students are taught to memorize various laws of physics and/or chemistry without letting them know how such laws came about and the possibility of such laws being modified (where applicable) to suit current realities. On the contrary, these students should be made to acquire necessary skills for scientific enquiry. Such skills as imagination, open-mindedness and critical rationality, as propounded by Karl Popper should be infused in students at the early stage of introduction to science education. It is in line with this that G.O. Ozumba alluded that Popper advocated for “open market practice of science”<sup>8</sup>. This is a situation whereby a scientist should be made to understand that beyond already established laws or theories in science, that there is still more that a scientist could discover especially within the ambit of necessity of science within a particular scientific environment.

Science education in Nigeria should be able to equip students with the capacity of identifying and defining problems, recognizing assumptions, making hypotheses, collecting and testing data, making sound generalizations, and above all developing critical attitude in all of this. For instance, someone might ask a question as to why some students in Nigeria cannot think beyond the contents of their physics or chemistry text books. Someone else might answer that it is because such students are hungry and that hungry persons cannot analyse the taste of food in their mouth let alone being able to think beyond the laws in their physics or chemistry textbooks.

Here, a scientifically – minded person might take it up from there as to whether it is true that a hungry person does not feel the real taste of food in his mouth? And if it is true, why? This is a hypothesis that has arisen from recognition of the problem that some students in Nigeria do not think outside their physics or chemistry textbooks. This hypothesis is that – a hungry person does not perceive the taste of food in his mouth. That is, he cannot actually say that the food is palatable or delicious or not. Regarding the reason to support the hypothesis, someone can come up with a bold conjecture (as Popper posited) that the reason is that the hungry person is in distress and as such the brain and the sense of taste are unable to have a proper communication. Again, the hungry person is after quenching hunger and nothing more. This scenario is the situation of things in Nigeria where students and teachers are still battling to satisfy the stomach infrastructure. If this is the case, one wonders how science education would achieve its desired goal in Nigeria. To this effect, this study is recommending that government at all levels should wake up and ensure that teachers are well remunerated and proper teaching and learning atmosphere be enabled and activated so much so that both teachers and students are well equipped to embrace the real business of knowledge seeking. Again, government should introduce free education at the level of primary and secondary education at least in government owned schools. If this is done, it will go a long way in reducing distractions among students who would now be more focused in their pursuit of knowledge. They will also gain the concept of the fundamental unity of science as well as the right approach to problems of scientific nature. In all, teachers and students of science education will be enabled to acquire the requisite science culture that prepares them to brace up and tackle the challenges of the new world order. The science culture referred to here is being able to adopt the habit of critical and dynamic approach to scientific matters and problems.

It also entails being open and receptive to innovations and ready at all times to interrogate any hypothesis, laws and theories in science irrespective of the origin or source. What we have hitherto is a case of assimilating anything that come from the white man. Science education in Nigeria should be structured in way that both teachers and students should imbibe a critical attitude to science in order to understand that no theory or law in science is exempt from critical review.

### **In Agricultural Sector**

Agricultural sector is the most important sector in the life of any nation. Luckily enough, Nigeria falls within a tropical region where we have soil types that are favorable to a wide range of crops. However, there is more that we as a country can do to actually improve on what God has blessed us with. Interestingly, there are quite a number of agricultural institutes, colleges and universities that are saddled with the responsibility of steering the agricultural sector to the right direction. But the question is - are these institutions really living up to expectation? While they need to be commended for their exploits so far, they also need to be reminded that they should not rest on their oars because there is a lot more to achieve. It is because of what more that can be done in our agricultural sector that the need arose to introduce Popper's thesis to our agricultural sector.

As it were, the personnel in our agricultural institutions have to be adventurous, innovative and pro-active in achieving the goal for which their institutions were established. They should not stop at what they feel they have achieved. They should not also over-rely on the outcome of researches conducted in Europe and America; European and American climates are different from Nigerian climate. Therefore, our agriculturalists and agricultural researchers should not regard any knowledge or outcome of research from Europe and America as sacred truth that cannot be falsified and improved on. In the opinion of Karl Popper, "One of the things that a philosopher of science may do and one of those that may rank among his highest achievement is to see a riddle, a problem, or a paradox, not previously seen by anyone else"<sup>9</sup>.

It is in line with this that this study calls on Nigerian agriculturalists and agricultural researchers to be hungry of breaking new grounds in agricultural sector. They should possess the culture of seeing new ideas apart from what are already on ground.

This study is suggesting some areas in agriculture that require the application of Popper's philosophy of science. Such areas include: soil development, crop development, storage system that suits Nigerian space, local pesticides, manure, rodents control, etc. If the falsification principle is applied in soil and crop development for instance, Nigeria will witness a tremendous transformation of impossibilities to possibilities in our agricultural exploits. The kind of hybrid crops that would be developed would be surprise - laden. Again, with soil development, some crops that hitherto do not grow in Nigeria will become household - crops in Nigeria. If our agriculturalists and agricultural researchers were to actualize this goal and of course cause the knowledge to trickle down to the real farmers, Nigeria will be a huge reference point in terms of food production and self-sufficiency.

### **In Trado Medicine/Health Sector**

The sorry state of Nigeria health sector is very disturbing. Apart from its negligence on the part of corrupt government, there is also this attitude of over reliance on colonial structure. That is to say that our health sector is somehow anchored on the imitation of foreign practice. Take for instance the way our medical doctors, nurses and pharmacists are trained. They are trained in the curriculum of the white man. If otherwise, how is it that an average graduate of pharmacy will be more eager to open a pharmaceutical store rather than to subject himself to the real practice of his profession which has to do with manufacturing of drugs? Even more worrisome is the fact that some of them who summon the courage to start up pharmaceutical companies still import a greater percentage of their raw materials (mostly chemicals) from abroad at the expense of abundant pharmaceutical raw materials here in Nigeria. It is even more head-shattering to know that there is the possibility of some pharmaceutical companies importing hundred percent finished products. Is it not a terrible scenario when our professionals can actually do some exploits with what are on ground in Nigeria and do a total turn-around of our health sector?

However, one may be forced to think that the sorry state of our health sector is as a result of lack of know-how and think-home mentality. Therefore, the minds of the stake holders in our health sector need to be agitated, they need to be woken up from their dogmatic slumber even as they need to be tutored on the vital and salient points in Popper's philosophy of science. At this juncture, this study is recommending that trado medicine be integrated and infused into our health care system. But before this is rightly done, there is the need to consciously and conscientiously engage our trado medicine practitioners in training of scientific system as propounded by Karl Popper. This scientific system entails that they see their profession as a problem-agitated profession, that they see the need of the possibility to question already existing knowledge within the confines of their profession, that they should encourage growth and progress in their practice, and above all that the way to achieve all that is to be bold to venture into new discoveries that run in line with currency of time.

The need for the training of our trado medicine practitioners is of essence because of the perceived general lack of trust in them. This lack of trust stems from the uncoordinated nature of their practice as well as its lack of objectivity. Recall that science is in itself a very coordinated and objective endeavour. Expatiating on objectivity of science, Popper asserted thus:

Even the fact, for me so firmly established that I am experiencing this feeling of conviction, cannot appear within the field of objective science except in the form

of a psychological hypothesis which, of course, calls for inter-subjective testing; from the conjecture that I have this feeling of conviction the psychologist may deduce with the help of psychological and other theories, certain predication about my behaviour, and these may be confirmed or refuted in the course of experimental test.<sup>10</sup>

The above assertion of Popper entails that no matter the level of one's feeling of conviction about a given statement or outcome of an activity, that cannot form the ground for its justification as scientific. What it implies is that as uncoordinated and unobjective the current state of trado medicine in Nigeria is, that it can still be elevated to scientific status by means of critical evaluation which involves experimentations and inter-subjective testing. What this means is that there should be intensive and extensive scientific researches on the herbs and plants. This research must involve proficient taxonomists and phytochemists who would identify the structure of plants and the chemical compositions of plants respectively. This study hopes that once this is done, not forgetting to adopt Popper's scientific system, our health system will witness a massive boost with local and indigenous content.

### **In Scientific Research Culture in General**

No nation can grow without possession of a viable research culture and programmes. This is because every nation has their peculiar challenges that require internal scientific research programmes that are capable of addressing such challenges. By viable research culture, the researcher means a research culture that is characteristic of scientific progress Popper highlighted the importance of progress in science when he insisted that "continued growth is essential to the rational and empirical character of scientific knowledge ... if science ceases to grow it must lose that character"<sup>11</sup>. The moment science loses this character of growth that moment science and scientific culture will die off.

In Nigeria, there are research institutes scattered across the country. But it is to some extent doubtful if all of them really represent the reason for their establishment. For instance, in Nigeria, there are various research institutes with their specific areas of specialization or interest; some of them have interest in areas such as medicine, technology, information technology, agriculture, education, security, democracy, leadership etc. All these are on ground in Nigeria but Nigeria still suffer deficit in some of those mentioned area. The fundamental question is – where lies the problem? The problem is simply that there seems to be lack of adequate understanding of the nature of science and scientific research among most personnel of these research institutes. This explains why there is existence of these research institutes, yet Nigerian population still rely on the outcome of researches conducted in overseas to address their education, infrastructure, security, leadership, agriculture, technology problem.

The above outlined failures of scientific research culture in Nigeria is the reason why this study is recommending the adoption of Popper's concept of science and scientific growth for Nigeria. This is very crucial because the way researches are conducted matter to a great extent. Scientific researchers should be able to break away from any conventionalist or rigid method of science, bearing in mind that science is meant to address some problems. Therefore, they should be able to make bold conjectures and carry out some meaningful interactions around the conjectures by way of testing and experimentation. Addressing the issue of interaction in science, Park Seungbae, in his article titled – *To Be Scientific is to Be Interactive*, quoted Popper when he wrote that "according to Popper pre-Socratics initiated science by being engaged in a series of conjectures and refutations over the basic stuff of the universe".<sup>12</sup> It should be understood that the ultimate stuff of the universe was what bothered the pre-Socratics and so that constituted the subject matter of their research programmes. Today, the world has moved from that concern and have transcended to the subject matter of what to make out of the stuff the universe in made of. It is therefore, very instructive that Nigerian scientific researchers should key into the global concern of using what is available within the confines of their environment to address their homebound challenges.

Finally, for Nigeria to grow in scientific research culture, her researchers really have to learn how to do it by themselves. They need to understand the purpose of scientific research, the nature of scientific research and the route to progress, growth and advancement of scientific research. The purpose of any scientific research is to solve one problem or the other. Feyerabend put it succinctly when he aligned with Popper that "an investigation starts with a problem".<sup>13</sup> This goes to underscore that without a problem, scientific research is meaningless. This is because it is problem that gives a direction to every research. That is why the success of every scientific research programme is measured by how far it was able to tackle a problem that gave rise to it. In the light of this, findings of every research programme in Nigeria must be documented and of course must be implemented. If the findings are not properly utilized, it is as good as saying that researchers have engaged in fruitless ventures. Again, utilizing the research findings will also help in gauging the workability and implementability of such findings as to whether the findings were really able to solve the problems that initiated them. If all these recommendations are adhered to, research institutes in Nigeria would be reservoirs of solutions to Nigeria's critical challenges.

## CONCLUSION

Popper's doctrine of falsification has exerted tremendous influence among philosophers of science. As earlier established in this study, falsification provides a new vista for understanding scientific progress: theories are proposed, subjected to refutation, and subsequently replaced by better ones. In this way, falsification undeniably contributes to the growth of scientific knowledge.

Falsification thus enables science to stand out as a progressive enterprise by purifying and refining scientific theories. Given this, science can always be viewed as a problem-solving activity. If science is understood in this light, would it be rational to allow scientific theories to remain stagnant when there are compelling reasons for improvement? The reasonable answer is no, because change, growth, and progress are integral aspects of human existence. Therefore, if falsification is considered a pathway to scientific progress, why should scientists not adopt it in their work? It is through falsification, testability, criticism, revision—whatever terminology one chooses—that better theories supersede good ones, and that even those better theories may eventually give way to superior theories, where necessary.

## REFERENCES

1. S. Okasha, *Philosophy of Science: A Very Short Introduction*, (New York: Oxford University Press Inc., 2002), p. 1.
2. Webster's New World College Dictionary, 4<sup>th</sup> edition, (Houghton Mifflin Harcourt, 2010), p. 522.
3. [https://explorable.com/definition of science](https://explorable.com/definition-of-science) (26/04/19).
4. T. Hunderich, (ed). *The Oxford Companion of Philosophy*, (New York: Oxford University Press, 1995), p. 809.
5. T. Mautner, (ed) *The Penguin Dictionary of Philosophy*, (London: Penguin Books, 2000), p. 472.
6. T. Hunderich, (ed). *The Oxford Companion of Philosophy*, P. 810.
7. K.R. Popper, *The Logic of Scientific Discovery*, (London: Routledge, 1989), p.34.
8. G.O Ozumba, *The Philosophy of Logical Positivism and the Growth of Science*, (Calabar: Mission Business, 1999), p.58.
9. K.R. Popper, *Conjectures and Refutations; the Growth of Scientific Knowledge*, (London; Routledge and Kegan Paul, 1963). p.184.
10. K.R. Popper, *The Logic of Scientific Discovery*, (London: Routledge Classics, 2002), P. 46.
11. K.R. Popper, *Conjectures and Refutations; the Growth of Scientific Knowledge*.
12. P. Seungbae, "To be Scientific is to be Interactive", *European Journal of Science and Theology*, 12 (2016), p.77.
13. P. Feyerabend, *Against Method*, (London, The Thetford Press Ltd, 1984). p.26.