

# SCIENCE AND TECHNOLOGY A SOLUTION TO POVERTY ERADICATION AND NATIONAL DEVELOPMENT

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## **Abstract**

*This paper adduced that the combination of science with the technologies it has fostered, has been successfully harnessed for the material benefit of the rich. However, this instrument has not yet been equally applied to the plight of the poor. Instead, the poor have differentially suffered the inimical consequences of these tools. It is therefore, preferred that, with judicious application and a more equitable approach, science and technology (S&T) can become powerful eliminators of poverty. It is argued that for the poor to gain from the positive transforming influences of S&T, they must fully participate both in the definition, as well as, the active resolution of their problems. Further, it is reasoned that for this to happen the poor must have a greater influence on the affairs of their communities, and this will depend on the adoption of deeper, broader and more compassionate participatory democracies. This paper outlines the logic, as well as, the ways and means of inculcating these strategies in the developing countries.*

A modern fact of disturbing significance is that there is an expanding technological divide within and among nations, which separates the might of the rich from the aspirations of the poor. This schism is destined to worsen with the increase of globalization fashioned on liberalization of trade and open market competition. The inequity, which emerges, is a source of great insecurity and tension, and threatens to destabilize societies while putting undue pressure on fragile ecological balances, prospects for socio-economic sustainability and a peaceful future for mankind. This paper is an attempt to demonstrate that a bleak future for mankind can be averted if wisdom is allowed to overcome senseless greed and misdirection of power. At the crux of this belief is the demonstrated incisiveness of science and the utility of the technologies it has created. This argument will be developed by first placing the current dilemma in the context of what science has already accomplished, and what are the various accompanying parameters that must be considered in evaluating its success, including their underlying principles and defining characteristics. Finally, how science and technology (S&T), the greatest generator of knowledge and practical methods conceived by man, can reduce poverty, the greatest man-made predicament through wider and deeper democratic participation and respect for a finite environment, will be adumbrated (Skuse 2000).

## **Science**

Science is an organized system of knowledge dealing with nature, society and thought, which is structured on the accumulation and verification of facts determined by deductive and inductive reasoning. Science, therefore, can be seen as a way of understanding our surroundings using systematic observational, experimental and logical means. These means are based on the adoption of the scientific research method which gains its power from seeking to nullify rather than to prove hypotheses (Ventura, 2011). There is a tendency to see science as a mystify agent, however for its full expression, it must not only impress but also must inspire, so that it does not puzzle nor alienate those it is to serve. It should become a democratizing agent.

## **Technology**

Technology is the spectrum of knowledge, skills, experiences and organizations, that are required to produce, utilize and control goods and services. Technological proficiency depends on two sets of knowledge, those which can be codified or, “know that”, and others that are tacit and dependent largely on the experiences of skilled workers. Although “the know that”, or codified information, is where emphasis is often placed, the widespread short-comings in knowledge

application are more inclined to be found in knowing who can supply or sell information at reasonable prices, knowing how best to acquire the information, or when to acquire or negotiate for what is needed, and making others willing to supply such information, or tacit knowledge (Alan, 2014).

The acquisition of technology therefore depends on attaining learning skills. This can be done by doing or using technology, adopting or copying imported technology, setting up production systems or designing new processes. Learning can also take place by organizing and implementing technology training programme, or searching for disembodied knowledge and hiring specialized staff. Each of these technological learning strategies can be usefully applied depending on the nature of what is to be accomplished.

### **Science versus Technology**

Today there is a very strong reciprocal relationship between science and technology. Where science ends and where technology begins is often difficult to decipher. Technology is increasingly becoming scientific in that technological progress rests on experimental and scientific findings, while science increasingly demands technical solutions to unravel its many questions. Nevertheless, clear distinctions can be made between science and technology and these can have profound influence on how one affects the other, and what can be expected of each. Science thrives on ideas, technology, on the other hand, has to work from the least amount of speculation as possible. Sen, (2007) posited that Science has different starting points from technology. Science predicts unknown end results from known starting points. While technology starts with desirable end results; but the starting conditions to produce them are unknown. Furthermore, technological applications are more direct and often produce faster economic results than what can ensue from waiting for scientific returns to be translated into technology. However, modern technologies are fashioned from firm scientific bases. Scientific research, therefore, allows facility with the knowledge platform to understand these scientific technologies, and accordingly, permit their effective modification, use and improvement.

The cost to move from scientific results to appropriately applied technology is high, and impossible without adequate local information, management and skills. For poor developing countries, science has the clear role of permitting a reasonable level of technical comfort with the functional bases of technologies, thereby allowing the intimate understanding, proper transfer and timely adaptation for domestic purposes. Knowledge gleaned from scientific understanding combined with local technological skills, raises the potential for innovations to improve domestic production, service and trade.

### **Global Influences of Science and Technology**

Before the ascent of S&T, differences between the power, influence and wealth of nations were small Salmon (2008) noted that with the rise of the technological age, there has been an overwhelming concentration of material wealth in a few nations, as well as, their surrogates within poor societies. Thus creating and emphasizing poverty and what is now referred to as the technological divide. Nevertheless, because of the fact that S&T has clearly been the driving force behind these sweeping economic, social and political changes, optimism has been heightened to use this tool to reduce poverty, and thereby materialize the idea of sustainable human development. This notion is quite realistic, when it is reasoned that technology has changed the structure of production and prompted social adjustments, affecting both comparative and competitive advantages, division of labour, income levels, productivity, employment, skills profiles and patterns of trade and political relationships. Microelectronics, biotechnology, new materials, alternate energy and nanotechnologies, are among a wave of emerging methods that are flexible, mobile, easily packaged, energy and resource conserving, knowledge-intensive and available, accordingly offering a range of combinations and options for an assault on poverty and ecological stress. With these advancements, all that seems necessary to innovatively tackle the scourge of poverty and ultimately attain sustainable development, are social and political wills, and complementary organizational structures (Alan, 2014).

Furthermore, scientific methods from the social, psychological and physical sciences are at hand to allow a thorough understanding of the poverty problem, and subsequently, how to engage the poor in empowering themselves with the technologies which are suggested, once the parameters of

poverty are clearly uncovered. The idea to move beyond the mere increase in production to improve the lives of all concerned is therefore attainable.

There is fifty times more consumption in the industrialized countries compared to the developing ones. This level of consumption clearly cannot be sustained in every poor country without the over consumption problem, now being seen in the developed countries, overwhelming the planet at the individual, resource and ecological levels (Ventura, 2008). A more equitable and democratic approach must now be considered to ensure that the use of the earth's resources, and indeed, the wastes which flows from these high levels of consumption, be contained within realistic and ecologically sustainable limits.

### **What is Poverty?**

How a problem is perceived will often determine the way it is tackled. When poverty, for example, is based on income, consumption, or capabilities, or some combination of the three, individuals or groups, which fall below an established standard, or the poverty line, are said to be in a state of penury, and attempts at resolution are focused on increasing perceived shortages. However, seen in this way poverty may well continue after remedial actions. If poverty is visualized as an income problem, income may be increased, yet there may be failures to ensure the fulfillment of the basic needs of targeted populations. Income generation alone, for example, may not ensure the provision of essential services. Likewise, the notion of absolute and relative poverty, as determined from a consumption perspective, is subjective, and what poverty is, will merely depend on what goods are available. Similarly, capable people may well hail from the ghettos but their gainful occupation may not be realized, simply because of the stigma of indiscipline and unreliability attached to people from these areas. In attempts to broaden the definition of poverty, and remove some of these inconsistencies, Sen (2007) in Heller (2002), defined poverty simply as "individuals who lack entitlements and absence of capabilities". This was picked up by the UNDP's 1997 Human Development Report, which interpreted poverty as the denial of opportunities and choices most basic to human development, which include a long, healthy and creative life, a decent standard of living, freedom, dignity, self respect and respect for others. This definition, however, is so broad that any denial of opportunity or choice may be construed as poverty. This concept therefore can be rendered vague, and consequently meaningless, to the point that poverty may be seen as unavoidable. Recently, Salmon, (2008) offered a comprehensive definition of poverty that separated the problem into three categories, namely chronic poverty, consumption poverty and resources or capabilities poverty. Chronic poverty was said to exist when an individual is incapacitated, and/or, incapable of independently procuring the requisite means of sustenance. This included those who were unable to work because of chronic physical or mental infirmity, or old age, and children without parents. People in this category were considered the primary beneficiaries of safety net programmes. Consumption poverty referred to the able-bodied poor, both employed and unemployed, who are unable to meet their basic consumption requirements. Resources or capabilities poverty, included those who were deprived of access to private and public resources, such as basic healthcare, basic housing, roads, transportation, healthy environment, water and employment. Consequently, (Salmon, 2008) defined poverty as follows "A multidimensional social condition in which

- individuals are incapacitated and/or incapable of independently procuring the requisite means of sustenance,
- able-bodied adults who are unable to meet their basic consumption requirements, as determined by per capita consumption
- Individuals who are deprived of access to such private and public resources as basic education, health care, housing, roads, transportation, healthy environment, clean water and employment" (Sarton 2006).

With poverty so defined, every society can establish a list of capabilities, combined with socially determined income and consumption levels that its citizens should possess. When poverty is understood in ways to make it measurable, and there is clarity in what are its components, or strictly, what poverty really means, amelioration activities can be specifically targeted and followed. Furthermore, any definition that attracts wide social consensus increases the probability that poverty

can be eradicated. Once this consensus is reached, scientific ways to measure poverty can be determined and ultimately used to monitor the progress being made in its curtailment.

### **Consequences of Poverty**

Poverty is not only ethically intolerable, but it is also socially dangerous. It affects the structure of society, its cohesiveness and its future. The poor live under brutality and abuse and so relate to the rest of society in a similar fashion. The rise of rage on the streets and anti-social behaviour of the young are symptoms of not only material poverty but also poverty of the mind, as a result of mal-socialization, often borne of parental and social neglect. Many are now saying that to restrain escalating crime and violence really means stomping out poverty. The delinquency of poverty is very costly to society. It not only forces large expenditures on policing, maintaining order and imprisonment, but it robs society of a number of precious talent and their innovations (Adebayo, 2008). Instead of social assets, the poor have become serious liabilities to themselves and the rest of their communities. Since the poor share the same air, water, and general environment, it is difficult to separate the consequences of their actions from the rest of society. Instead of a strategy of separation from the poor, privileged society should seek full integration. Science and technology can become great facilitators in this imperative. Most countries are faced with the conflicting challenges of heightening competitiveness and containment of extreme poverty. The rich and the rest of non-poor society do not depend anymore to any great extent on the work or production of the poor, and therefore, the benefits from the eradication of poverty have to be seen in much wider terms, if S&T is to be supported and used remedially and effectively. Unfortunately, the logic of modern knowledge does not feature the collective welfare of the earth, as it does the task of competitive business innovations. If it did, scientific knowledge, and the creativity it fosters, would be focused on the overwhelming poverty problem.

### **The Role of Science and Technology in Eradicating Poverty in Nigeria**

As mentioned earlier, despite the astonishing rate and bewildering scope of scientific progress, the quality of life endured by most humans has not significantly improved (Agbaje, 2010). Instead poverty, anxiety and disillusionment, have reached climatic portions. So much so that science seems irrelevant to the throngs grasping at the travails of survival (Balogun, 2000). This situation is inevitable or immutable? All the countries which presently are considered industrial and well-developed were once underdeveloped and poor, and all have used the tools of S&T to improve the efficiency of their agriculture, and technology making it less labour-intensive and thereby releasing most of their rural workers to gainful employment in manufacturing, services and other industrial and cultural activities. Although not all of their poverty has been banished, it was manifest that S&T had materially lifted the economies of the developed countries to the point where today they are considered post-industrial societies. Their lingering residue of poverty is more a matter of neglect than a consequence of the inherent character of the methods deployed. As a matter of fact, the power and privilege which S&T has bestowed on favored individuals, sections and regions of their societies, have created large gaps between those at the top of their economies and those at the bottom. Similarly, those in the developing countries who are closely linked to the endowed groups also have prospered. These growing fissures have now become flash points of agitation and tension among those largely left out of the development loop.

### **Steps to Reduce Poverty**

The most comprehensive account of steps to reduce poverty has been forwarded by the UNDP. Although S&T may have an immediate, effect, on all the factors determined to be important in poverty reduction, it is instructive nevertheless to remind ourselves of all of them. These are as follows:

- Basic Social Services-for education and primary health care
- Agrarian reform - for equitable distribution of land and other resources
- Credit - to open markets
- Employment - for sustainable livelihoods

- Participation - to design economic, social and political development
- A social safety net - for those excluded by the market
- Economic growth - for increase productivity of the poor
- Sustainability - for reduce pressure on the eco-system

To remove the poor from being liabilities to efficient contributors to overall development of their nations, they must be gainfully employed. The strategies contemplated for this to happen are given by Okereocha (2008) as follows:

- *Education and skills - investment in education, training and skills formation of all citizens.*
- *Enabling environment - to support the market by providing fair and stable macro-economic policies, equitable loyal work force, sufficient physical infrastructure and adequate investment incentives.*
- *Access to assets - physical assets and means of production, such as credit and information.*
- *Labour-intensive technologies - to exploit labour advantages, tax and pricing policies, should be introduced where feasible, to promote labour intensive employment. (This of course will evolve as the poor become better trained and able to utilize more intimately scientific technologies.)*
- *Public works programme - where the market falls short, government should step in to ensure survival.*

It must also be recognized that nature's violence also is a factor causing, or aggravating, poverty, because the poor often remain the most vulnerable to floods, hurricanes, earthquakes, droughts and other natural calamities. Technologies to alert, protect and remove the poor to, and from the vagaries of nature, must be marshaled in the interest of those most exposed.

### **A Two Phase Approach to Poverty Reduction**

Work on confronting poverty in the Nigeria suggests that a two-phase approach may be necessary, with either phase being the emphasis depending on the nature of the poverty being tackled (Soyinka, 2008). In the first phase, the basic needs of a society should be addressed, especially, those dealing with safety net questions, such as food, health, shelter, as well as, education, information and infrastructure. The next phase logically should be strengthening the scientific and technological base of the community to enable more commercial and small-scale economic activities, during which the poor take charge of their own lives. The ultimate of this phase is to deliver training, transfer technology, encourage entrepreneurship, assist with marketing and credit, and ensure that whatever the poor do is done more efficiently and more environmentally friendly. There is substantial evidence which shows that whenever S&T is used for improvement of production along the lines being advocated, it has impacted positively (Adebayo, 2008). Two essential ingredients in these two sets of strategies are access to relevant information and unbridled participation.

### **Information**

Information is the stuff that will empower the poor and permit them to participate more effectively in their own rescue. This includes, inter alia, knowledge about applying for credit, possibilities for product diversification, market conditions for their products, potential buyers, price and availability of inputs, transportation alternatives and schedules, profitable linkages with the formal sector, and options about techniques for production. Systems must be set up to receive, process, analyze, share and monitor data, collected at the local level on quality of life indicators, progress of development projects and opportunities, efficiency and continued relevance of technologies, and challenges for continued progress. All the information avenues and techniques that are practical must be utilized, and this may include the introduction of the most up-to-date information and communication methods and strategies. Government must play a vital role; non-governmental organizations have proven to be reliable sources of such information and the monitoring of their use. Multilateral organizations can do much to enable both government and non-government organizations to discharge their respective roles.

### **Conclusion**

From what has been presented, it is clear that billions of dollars and other resources have been spent on poverty reduction with little positive effect, either on the rate, or on the actual numbers, of people mired in poverty. It is fitting then for a thorough review of the poverty dilemma and an assessment of what has been done to reduce it. This is an attempt to survey the S&T and allied implications of the problem. In this paper it is argued that the poor has not shared in the progress of S&T and instead has suffered its inimical consequences, and therefore, it is being proposed that a new more participatory democratic model of development should be adopted. This approach must go beyond the prevailing forces of free market capitalism, private sector competition and globalization of trade, to help the poor in a direct manner to become more willingly participants and contributors to their societies. At the centre of this notion is the provision of relevant information, better communication and other technical and management tools, to provide credit, self-help technologies and restored dignity and pride to allow the poor to help themselves.

### **Recommendations**

From what has been outlined a number of priority actions present themselves. It ought however to be pointed out that no one action by itself can deal with the complexities of poverty, and not all recommendations are relevant to each situation. While some can be undertaken with expected results in the short to medium terms, others are more long term and require significant social and attitudinal changes. With this understanding, the following recommendations are made:

1. Nigeria must map its poverty situation and should identify its basic needs priorities and national strategies to satisfy them.
2. A study to sharpen existing poverty alleviation indicators including the true cost of poverty, to societies, should be undertaken to provide better ways of monitoring and evaluating remedial actions.
3. A review of existing national policies and plans should be undertaken, to ensure that they do not work at cross purposes to basic needs strategies.
4. Countries should be urged to include S&T resolution models for poverty eradication as integral parts of their industrial development and trade policies.
5. Local S&T communities should be called upon to implement plans to help satisfy basic needs as an important part of their mandate, and consequently, they should be provided with the necessary incentives to assertively undertake this task.

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