SCIENCE, TECHNOLOGY AND SOCIO-ECONOMIC ADVANCEMENT: TOWARDS DEVELOPING LOCAL TECHNOLOGY IN NIGERIA.

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INTRODUCTION:

The present Nigerian experience in Science and technology is infact pathetic. The dependency syndrom seems to have lingered longer than ever conceived initially. We have become enslaved to the foreign technologies which could hardly be maintained. Almost every aspect of our economy is seriously in bondage to foreign powers. The allurement of higher living standards presentsd by an-ever increasing sophisticated technology of the West, has made the development of the indegenous technology less attractive. We are all living witnesses to the treatment towards goods produced in Nigeria. We tag them `Ibomade`, `Onisha-made`, `Kanomade`, `Jebu` etc. So the options offered by the local research efforts are almost tatally undermined. Thus, the local research efforts and the investment in indegenous technology are made irrelevant.

As a result, science and technology in Nigeria tend to be going at a show speed towards development. However, there are reasons attributable to the present technological backwardness of this nation. Pam. (1990) observed that the technological backwardness in Nigeria is due to insufficient investment in research and development, by the governments, individuals and the private sectors. For instance, in the U.S.A. where billions of dollars are being spent on research annually, half of which comes from the private sectors (Pam, 1990). So, firms and manufacturing compaines could help by investing in research.

Another major reason for our technological backwardness is that our local technology was burried in our colonial educational system, where emphasis was more towards humanities and theoretical science. (Pam, 1990). A further important factor for our technological backwardness could be seen in what Enaji, (1989) wrote that - It is ironic to point out that most of our rural technologists are illiterates interms of formal education. They mostly have negative attitudes towards innovations. They believe too much in traditional institution of superstitions. This, however, retards the progress of local technology. The solutions to these problems will be discussed later.

DEFINITION OF SCIENCE AND TECHNOLOGY.

Science is a very difficult word to define. It has been so widely interpreted by so many scientists in different ways to such extent that shaping out a single, universally accepred definition has proved difficult. The concept of science is thought to be a series of organized activities to findout about what, how nd why events happen in our environment. Nawarra et al. (1968) sees Science as a collection of known facts and a way of doing things. Ango, (1990), says that science is a two-way enterprise - PRODUCTS and PROCESSES. In terms of products, science include the knowledge, facts, ideas, figures, formulae, equations, principles and laws generated and perpetuated. In terms of process, scientific knowledge is generated and accumulated through observation and experimentation.

Lastrueci, (1963), mentioned that, science is an objectives, logical and systematic method of analysis of phenomena, devised to permit accumulation of reliable knowledge. From the above interpretations of science, one may deduce that science is a systematic and orderly body of knowledge about nature, as well as the tools necessary for

the acquisition of such knowledge. Such tools include observation, experimentation, measurement, etc.

On the other hand, technology is a positive and practical application of science in the service of man, that is the development of scientific concepts, skills, devices, tools and materials for application by labour in the process of production of material need of the society (Fagbemi, 1988).

Aso, technology is seen by Onwuchula, (1990), as a science of mechanical and industrial arts. Going by these definitions and many others not mentioned here, technology can be seen as the practical application of the theoretical information from science. That is why technology is simply refered to as applied science.

RELATIONSHIP BETWEEN SCIENCE AND TECHNOLOGY

From the on going discussion one can see that science and technology are inseparable. Science is usually seen as encompassing two broad fields. The pure science and applied science which is importantly referred to as technology. The relationship between the two is however, a strong one. Many contemporary scientists have seen them as synonymous to each other.

According to Javons et al, (1982), as cited in Uzuege (1990) Science is perhaps not the father of technology but merely an anonymous well-wisher that sends its gifts to it through the post. Also, Abdullahi, (1982), looks t technology as applied science, which is concerned with finding solutions to practical problems. In addition, Mathias, (1972) believed that science and technology are virtually synonymous or at least equivalent terms; they are in truth as disparate as deduction and induction, or as socialism and capitalism, or one might better say thought and action, since science is (roughly speaking) knowledge of our natural environment, while technology is the exercise of a working control over it.

In a nutshell, science could be viewed as the theoretical information transformed into practical innovation which is technology. In other words, while science tells us what to do, technology proposes how to get it done in practical terms (Adesola, 1983).

CONTRIBUTION OF SCIENCE AND TECHNOLOGY TO SOCIO-ECONOMIC GROWTH.

(a) Positive Contributions.

Advancement in science and technology depends on many years of research and development through qualitative science education at all levels; attracive incentives and huge investment in the area of manpower development and financial allocation towards research and economic growth. However, the roles of science and technology in economic growth cannot be over-emphasized. This is the sense that they have been used to improve the material lot of man. They have brought about tremendous revolutions and uncountable advantages to mankind. They play very important roles in respect of man's culture, comfort and happiness.

According to Adesola (1983), technology divided the north from the south, the rich from the poor, producing from the consuming nations and the leaders and the led. Lamorde, (1988) said that the development countries have used it to increase their agricultural productivity to meet growing population- a situation that has created self-reliance in food production. He continued to say that through science and technology :-

Life expectancy improved through better health care services and delivery.
Transport and communication improve.
Industrial productivity increased using more efficient mechines.
Science and technology also landed man on the moon and unnamed space craft on mars, all to the advantage of man-kind.

Among other things, scientific and technological growth has led to improvement in health sector in most developing countries like Nigeria. This is the form of production of drugs such as antibiotics, antiseptic and other medical materials. Many diseases have been combated by means of these drugs.

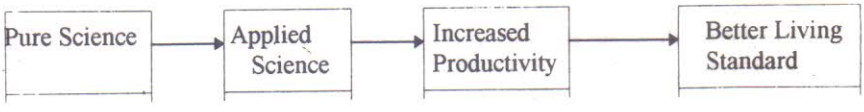
Another improvement in health sector is the EPI - Expanded Programme on Immunization, which led to reduction of mortality rate due to the six-killer diseases of children, namely measles, poliomyletes, whoophing cough, tetanus, diptheria, and tuberculosis. Also through science and technological know-how, it was possible to reduce deaths of children through diarrahoea by means of the discovery of oral rehydration theraphy (ORT).

In the indstrial sector, science and technology have contributed immensely. For example, mass production of household goods, electronics, motor vehicles, stationaries.. etc, are all possible due to science and technology.

Furthermore, science and technology has been the most important factor that has developed agriculture through modern fertilizer production, modern farming tools and improved (hybrid)seeds.

Science and technology has also been very helpful in the area of transport and communication. It has been made possible to communicate from one continent to the othe in a couple of hours which was between people from different places without physical contact, eg, through telephone.

In summary Javons et al (1982) as cited in Uzuege (1990) believe that science and technology lead to socio-economic growth as demonstrated below :-



(b) **Negative Contributions.**

We cannot be so selfish as to be flattering science and technology in respect of our socio-ecnomic growth in general. There are certain areas in which science and technology have done more harm than good. The series of wars that have led to loss of millions of lives properties and goods would not have been so serious if not for the scientific and technological development and sophistication.

Uzuege, (1990) says that the paradox of science and technology is that it destroys the human organic life it purports to improve, It maimes and leaves mankind desperate and destitute (the Chernobyl experience in Russia and India's industrial gas leakage experience). He goes on to say that over the ages due to the involvement of science and technology into destructions, waepons have evolved from the vulnerable B29 bomber, carrying a single atomic bomb of o.o2 megatons to the unvulnerable intercontinental ballistic missile; capable of travelling hundreds and thousands of

kilometres carrying single or multiple warheads of up to 50 megatons and housed in an undetectable nuclear submarine at the continental floor of the ocean.

This scientific/technological development is a retrogressive one for it can lead to total annihilation of mankind. This leaves nations insecure and vulnerable.

Secondly, the effect of scientific/technological development on the natural ecosystem is detrimental. It leads to extinction of natural populations of plants and animals. Mining of mineral resources renders lands rugged, inhabitable and uncultivable (Uzuege, 1990). Oil spillages across the continents over the years have led to the demise of many birds, fishes and other aquatic lives. Koko industrial waste 'episode', plateau desertification are common examples one can think of to back the above assertions.

DEVELOPING LOCAL TECHNOLOGY IN NIGERIA

To a layman, technological advancement connotes the ability of an individual or nation to produce an entirely new thing. Technological development in many areas of socio-economic activities in a country does not necessarily mean inventing as entirely new thing different from those invented somewhere. However, technological advancement means, particularly to a developing country, that it should have the capacity to improve upon what is invented elsewhere. Hence though we should not be in total bondage to foreign technology, we should not completely dissociate from the foreign technologies but we should use them to improve our local technology. This could be seen in what Pam. (1990) said; that for a country to develop technologically for national growth it does not have to dissociate from the foreign innovations. The contributions of science and technology mentioned earlier in this paper are on global perspectives. In Nigeria too, impovement in science and technology at local level has led to a number of achievements.

(a) ACHIEVEMENTS IN HEALH SECTOR

Though, scientific and technological development was backward, there are alot of improvements in health sector. For example, in Veterinary Research Institute, Vom, Jos, new Vaccines for poultry and livestocks from local materials were produced especially against the rinderpest of cattle (FAO,1980). Along this line, new discoveries were made by the medical research scientsts. Example, the discovery of an effective remedy of typoid fever from a local plant 'sanga-sanga' (cassia alata) was recently recommended by medical research scientists in the country, it has been tested by many patients and the result was positive, young leaves of this were also prescribed for a mild purgitive (soft wara,1970).

Also, some remedies in traditional medicine were recorded over the years. Example of these is Ageratum Conyzoides, a plant with a peculier odour often growing in waste places. This is normally used in Nigeria for dressing wounds and ulcers, For Craw-Craw and as an eye wash. (Olivar, 1959 as cited in sofowora, 1984). It is also used as a styptic in East Africa (kokworo, 1976 as cited in sofowora, 1984). These letters uses are due to its anti-microbial property which have been demonstrated scientifically (Durodola, 1977).

Another achievement is that in many African homes, teeth are cleaned in the morning by chewing the root or slim stem of certain plants until they acquire brush - like ends. The fibrous end is then used to brush the teeth thoroughly. In senegal (like in Nigeria) investigations carried out on antimicrobial activity of these chewing sticks show that they all possess antimicrobial activity.This would indicate, therefore, that

these chewing sticks inaddition to providing mechanical stimulation of the gums. also destroy microbes present in the mouth. a feature which is absent in the common toothpastes in the markets (sofoworo. 1984). The advantage of the chewing stick over the convensational toothpaste and brush could explain why many Africans have stronger teeth than caucasians (sofowora. 1984).

The traditional medical system was also able to discover the importenc of a plant- Bridelia ferruginea in the treatment of diabetes. This was disclosed by Ampofo. (1977). after he had carried out a pilot clinical trial on hearing that the plant was a potent antibiotic agent. The use of neem plant (Azadirachta indica) to treat malaria is another achievement by the local medical researchers. Hedges of the neem tree are grown close to houses in Nigeria and other African Countries because this plant is highly esteemed as a fever cure - especially malaria fever which is endemic in Africa. A decoction of the leaves. or of leaves and stem back. is drunk which in some cases the stem back is also used to treat fever by inhalation or hydrotheraphy.

This plant has been shown to possess a slem volatile. only constituent in trace amounts when examined chromatographically (sofowora. 1978). A convincing evidence in support of the antimalarial effect of the neem is from the work of Ekanem. (1978). Who reported a fall in parasite count in chloroquine - senitive strains of plasmodium berghei infected mice when the mice were treated with a decoction of the leaves (Ekanem. 1978).

Also. Ade - serrano. (1982) recently reported the growth - inhibitory effect of this leaf extract on plasmodim falcipar culture and the anti - malarial effect of the boiled leaf was found approximately half of the therapeutic dose of chloroquine sulphate on dry weight basis (sofowora. 1984). A local technologist (Chairman Mujaddadi Engiheering Centre) has produced curatives of Asma. Aids and other diseases. using local materials (Rima Radio Broadcast 12/3/96).

Despite these. another form of development in Nigeria in terms of health due to local technology is the incorporation of traditional birth attendants and bone setters with modern medicine. For example. a hospital was built at Aliero town of Kebbi State. Nigeria primarily for bone setting.

(b) SOME ACHIEVEMENTS IN THE INDUSTRIAL SECTOR

The Federal Government of Nigeria over the years has banned the importation of some foreign goods so that we can appreciate our locally made goods. Local factories such as textile have come of age. so much that. they produce quality materials such as Wax cloth materials by SPECO. NICHEM. ZAMTWX and many others (Onwuchulu. 1990). 'Adire' cloth of Yorubaland amd Sawaye (Hausaland) are all now infashion.

Also. industrially. due to improvement in local science and technology. various engineering works have been recorded. These include the production of locally (fabricated) engines and machines. Examples of these could be seen in what an assistant suprintendent of custom by the name Usman Abubakar Mareri (Gusau) displayed at the just concluded graduation ceremony of Abdu Gusau polytechnic Talata Mafara (at Sokoto). He has invented a space Rocket Missile which he displayed on that day (12/3/96). The Missile was shot and it exploded with a sound in the space like the ones produced by the Western powers. The inventor is the Chairman of Mujaddadi Engineering centre. based at Kano. He has also displayed a laminating machine. capable of laminating many identity cards at a time which was not yet possible by the one produced by the Western technologists.

Another local technological effort by a mechanic (Abubakar Konnawa) has fabricated a jeep car using iron roads to serve as the body and two vesper engines: one for forward stroke and the other for reverse. This was also displayed at the Abdu Gusau polytechnic Graduation Ceremony on 12/3/96.

Another very important technological achievement that needs a mention here. is the energy research effort in this country. Under this umbrella. Usman Danfodiyo University Energy Research centre and Kebbi State Polytechnic Birnin Kebbi deserve commendation for. they made it possible to electrify two villages using solar energy. These are Kwakwalawa and Tungar Buzu respectively. To further improve this sector. massive production of solar panels was embarked upon by the Federal Government. from Solar Energy Research Centres of Usman Danfodiyo and University of Nigeria Nsukka. This is to complement the national grid in providing electricity particularly in rural areas (New Nigeria, Feb, 1996).

Still on Solar energy research effort. a series of contributions were made during the various National and State workshops of Junior Engineers, Technicians and scientists (Jets) over the recent years. These include the solar ovum produced by the Sokoto State chapter at the 1991 workshop at Federal Government College Sokoto. The solar ovum is used for baking flours and frying various foods including meat. Also, a solar boiler/heater was produced by Kanta College Argungu in 1989 and display at the state workshop held at Sokoto Teacher`s College in which the College received second position. The heater was used to boil water by absorbing considerable amount of solar energy. In addition, a welding and bending machine was produced in 1993 at lagos by the Sokoto state branch of Jets. (M.O.E. Inspectorate Division, 1994).

It is also apparent that Blacksmiths in many areas of this country nowadays are improving their technologies by using wheels to blow air to their blastfurnaces. To improve the energiser of the air pumping mechanism, they use motor battery or electricity to avoid using manual power (Sokoto Kraa market, 1996).

Still on industrial sector, remarkable development has been attained. This is in areas of soft drink production whereby the rural women use the flowers of a local plant (Soøorodo) to produce a soft drink which is more natural and cheeper than the modern soft-drinks. They call it `soøo-drink` and this is another way of raising the economic standard of the local producers.

(c) SOME ACHIEVEMENTS IN AGRICULTURAL SECTOR.

Alot of improvements have been achieved through local science and technology in this country. By the use of local compost manure, hybrid seeds and others. For example, high yield of maize varieties such as corgill 5005, corgill 300, capan maize etc, which are of tough husk and resistant to bird damage was recorded (FAO, 1980). These have developed from the International Institute of Tropical Agriculture at Ibadan and are now widely cultivated throughout the country. Along this avenue, a new variety of Cowpea - `Ifebrown` has been introduced to the Nigerian farmers by the Institute of Agriculture, Research and Training Obafemi Awolowo University Ile-Ife. This strain produces flowers after 35 days of planting, thus, producing fruits immediately. In the same token, at the Nigerian Institute for palm oil Research at Benin, a new oil palm referred to as `pisifera` ; a dwarf variety yielding high oil percentage than the tall one was introduced (FAO, 1980). In addition rural roads were constructed to facilitate transport of food and cash crops by DFRRI (Directorate For Rural Roads and Infrastuructures).

(d) SOME ACHIEVEMENT IN EDUCATIONAL SECTOR

In additional sector also, some achievements were made as a result of local technology. These include a Dikeohamatic computer- a simplified method of solving some mathematical problems invented by Innocent Dikoha- Okwu (Democrat, Weekly, Feb., 1996). Another one is a simple mathematical machine displayed by Primary Education Studies, Department in 1991 during the Graduation Ceremony. This uses torch bulbs and some electrical wires to solve some mathematical problems. The bulbs glow (alight) when an answer was arrived at (P.E.S. 1991).

The other achievement in educational sector is the laminating machine mentioned in this paper invented by Mujaddadi Engineering Centre Chairman. This, needless to say contributes to educational development for, it helps in preserving certificates and identity cards (Rima Radio Broadcast 12/3/96).

Generally, in all sectors of National economy modest development has been recorded due to development in local science and technology in this country.

RECOMMENDATIONS

In order to maximize the level of advancement in technology and socio-economy of this country :-

(i) The government should educate the general populace especially in areas of science and technology. This is necessary because we are living in a technological era, thus, the knowledge of science and technology is indispensable. This is justified by Enaji, (1989) that if the technological innovations with all the necessary infrastructional facilities are there without the attitude of our rural populace turned towards the scientific frequency, all the efforts would come to nothing. Thus, the local technologists need a deliberate re-educating to disabuse their minds and strengthen their technological innovations and methodologie in accompolishing their every day tasks.

(ii) To accompolish the task above the government should establish more centres for vacational training and workshops, technical secondary schools and colleges and lay more emphasis on them than the converstional theory types schools.

(iii) To re-educate the local technologists, there is the need for greater co-operation between science and technical institutions and traditional (apprenticeship) institutions on one hand, and the industrial sectors on the other.

(iv) To foster the above recommendation, more emphasis should be laid on the role of such organisations as Industrial Training Fund (ITF). For, such co-operation between academics, tradional and industrial institutions will be of great importance in areas of curriculum design - committees, Conferences and workshops.

(v) Nigerian children that do not have the opportunity to enter universities should be trained to develop special practicl skills. Regarding this, it is ironic to note that both West Germany with elaborate apprenticeship programme and Japan with extensive company training programme have well developed systems for teaching technical skills to those types of people (Pam, 1990).

(vi) The government, private sectors and the general public should fund researches on science and technological activities. This ia necessary because it is clear that in almost every state there can be one or more areas of technology that can be develop fully with adequate funding.

(vii) Individuals or well-to-do-Nigerians should be ready to fund private technicians and researchers like they do in sports, not wait for the government alone. They should copy their counter parts in the developed countries who usually fund technological innovations. For example, Suzuki, Yamaha, Kawasaki of Japan. Mercedes of Germany, Ford cars in U.S.A. etc.

(viii) The government and private organizations should buy necessary tools sponsor engineers, roads side mechanics and local technologists. For example the Mujaddadi Engineering Chairman, the Biafran Engineers who manufactured ammunitions and minirefinary.

(ix) Others to be funded by the Government, companies and well meaning Nigerians should include the Sokoto Kraah Market Lock and other metal workers. Sokoto Aliminium Pot producers, Bunza salt Producers, Sokoto leather technologists and the traditional or harbalist healers.

(x) To energy research institutions, also funding is necessary, to enable the researchers investigate more on how to use solar energy as fuel and to complement the National grid interms of electricity production.

(xi) Finally, iron and steel is very necessary for all industrial endeavours so, the government and private companies should join hands and intensity effort to make Ajaokuta Iron and steel Industry a reality inorder to serve as the local producer of Iron and steel materials for engineering works.

CONCLUSION

Science and technology education is very essential for any meaningful development of this and of course all the developing countries.

Thus, we as teachers and educated parents should educate and guide the younger ones, to deemphasize the non-chalant attitudes to science and technology education. If we fail to do this then we shall continue to recruit nurses, science teachers, medical scientist and engineers from other countries under compulsion- for `when the desirable is not available, the available becomes the desirable.`

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