
Policy Issues in Technology: A Challenge to Technical/Vocational Education Training

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Abstract

The genesis of policy on technology as a means of Nigeria's development belongs to colonial era. When Nigeria realized the importance of technology in national development, she began to establish research institutes and other organs for intent of achieving technological breakthrough. All efforts in this respect yielded very little results as a consequence of unstable and ill-managed policies vis-a-via the fact that technology is not yet part of the Nigerian culture. Furthermore, vocational education, with its impressive potentials for training the needed technological manpower faces many challenges among which are poor funding and neglect of indigenous technology as a dependable basis for Nigeria's industrial development. Despite these challenges vocational and technical education still holds the key to the solution to Nigeria's developmental problems. Improvement of the situation lies in better management of development-related policies and making technology part of Nigeria's culture.

Introduction

The underlying theme of this paper is policy issues in technology. This theme suggests the relevance of considering first the concepts of policy, issues and technology. Policy is a set of plans of actions agreed on by a government, political, business or other groups. It can also be viewed as a principle or set of ideas that one thinks is sensible or wise. The term is also applicable to a contract between an insurance company and a person or organization (Rundell, 2007 and Hornby, 2005). According to the same sources issues are topics or subjects that people discuss or argue about especially relating to society, politics, technology, education etc. Issues in this paper refer to the topic, “technology” which is being discussed or talked about in the interest national development. The term “technology” refers to new machines, equipment and ways of doing things that are based on modern knowledge about science and computers (Gadsby, 2008). Technology may also be viewed as man’s effort to satisfy his material wants by working on physical objects or the application of scientific knowledge to create things and solve environmental problems (Elekwa and Associates, 1985; Obedele and Egotanwa, 2000). It is a cultural tradition developed by human communities to deal with physical and biological environments. Technology, in all its definitions, reflects innovation, application of scientific knowledge to create things and solve environmental problems. Policy issues in technology are, therefore, statements of plans about the use of technology or applied science and computers for the attainment of national development. Vision 2020-the “brain child” of Yar’ Adua’s administration focuses on an era of prosperity, comfortable and secure living for all Nigerians by the year 2020. The Seven-Point Agenda has been adopted as a strategy for achieving vision 2020 which is to witness Nigeria becoming one of the 20 industrialized nations of the world. The instrument for realizing this dream is technology. The question to raise at this point is: Is it possible for Nigeria to attain the Agenda-Vision 2020 in ten years from now? The industrial development of any nation is not a magical venture, it requires proper education based on realistic curriculum, talents, patience, commitment and sincerity of purpose. All of these put together consume time which is a commodity no one can pass by (Usoro, Usoro, Akpan & Otu, 2010). The aforementioned requirements imply that the foundations for the achievement of Nigeria’s dream could have been laid long before now. For example it look European counties several centuries to develop the great technologies which have sustained the revolutionary leap from poverty to prosperity. The Americans had their break-through within a century. It look the Japanese even less and China and the Asian Tiger countries lesser (Susu, 2010). Susu (2010) further pointed out that to reap the fruits of technological innovation evolved through centuries of sweat and toil, these countries developed a trend of strategies for rapid integration of science and technology in their national life. In other words, science and technology constitute part of the culture of the foregoing nations. By Susu’s observation, Nigeria must make science and technology the bases of vocational education, a part of her culture.

Policy Issues in Technology

Policy issues regarding Nigeria's development as an industrialized nation have revolved around "technology" as the "Magic Boy" which can perform the miracle of rapid development. In the real world, there is no miracle of rapid development. Technology, the bedrock for development is "developed" over time, with patience, hardwork and creative talents. In the light of the above, it is useful to take a look at policy formulation and implementation with respect to technological development of Nigeria.

The formulation and implementation of policies on science and technology in Nigeria can be traced back to the colonial era when the Missionaries controlled education policy. In accepting the dictum of Thomas Fowell Buxton that, the Missionary, the schoolmaster, the plough and the spade should go together "the Missionaries pursued the policy of encouraging industrial education (Oladapo, 1987). The colonial government implemented a complementary policy on science and technology which like the efforts of the Missionaries, advanced British industrialization with Nigeria as one of the raw materials bases of the empire.

Sequel to political independence in 1960, Nigeria became more aware of the importance of technology in its national development. Nigeria's participation in the United Nations' Conference in 1963 on the application of science and technology for the benefit of developing countries and the international Conference on research and training in Africa organized by UNESCO in 1964, awakened the country to begin to take positive steps towards policy formulation on science and technology.

In 1966, Nigeria established the National Council for Scientific and Industrial Research (NCSIR) to advise it on science and technology policy. This body failed to take off on account of the Nigerian Civil War (1967-1970) (Oladapo, 1987, Fagbule, 1992). The National Council for Science and Technology (NCST) was established in Nigeria through UNESCO's advise (Kayode, 1986; Fagbule, 1992; Oladapo, 1987 and Momah, 1995). The national council was made up of a Board for policy formulation. NCST advised the Federal Government on Policies relating to the establishment of four research councils namely: Agricultural, Medical, Industrial and Natural Science Research Councils of Nigeria. NCST functioned for six years without achieving substantially in the area of National policies and priorities in Science and Technology. NCST was transformed in 1976 into the National Science and technology Development Agency (NSTDA) which functioned as an executive arm of government. In 1980, NSTDA became a full-fledged ministry of science and technology (Kayode, 1986; Oladapo, 1987) Emovon, 1994; Fagbule, 1992 and Momah, 1995). The year 1980 saw the merging of the ministry of science and technology with the ministry of education. Thus science and technology formed a wing of education. The scrapping of the ministry of science and technology in 1992 led to the institution of the National Agency for Science and Technology Infrastructure (NASENI). The management of science and

technology once more assumed ministerial status in 1993 (Emovon, 1994, Momah, 1995).

National Policy on Science and Technology

The basis for the justification of science and technology policies in the third world nations of Africa and the imperatives for their success have been provided by Lubunga (1985:70) thus:

The concept of technology is a human activity, consisting of procedures, processes, methods, know-how and patterns of organization oriented towards making things; it has been developed and adapted by society in order to solve specific problems and satisfy social needs. Neither science nor technology is neutral, both are part of the social system, and are necessarily influenced by its traditions and values as well as by the institutional framework which is closely tied to the existing distribution of power. African countries need a science and technology policy outside the traditional framework, one which emphasizes the social origin as well as social purpose of the science and technology sub-system, and makes explicit its role in the process of long-term, sustained development.

Nigeria cannot be described as a country with a science culture, therefore, the formulation of policy objectives for the development of science and technology must be a necessary condition for the effective and efficient implementation of the nation's strategy of using science and technology in development. Accordingly, a National Policy on Science and Technology (1986) was prepared to guide the nation's activities in science and technology. The overall objectives of this policy are, to enhance and coordinate the nation's productivity forces through research and development, and to provide measures for all sectors of the society to embrace and support scientific research and technological development (FRN, 1986:3). In 1991, the National Policy on Science and Engineering Infrastructure (NPSENI) decree was promulgated. NPSENI complemented NPST as both seek to support Science and Technology through incentives of tax deduction on money spent on research by industries and companies. They also provide measures for mobilizing the society to understand and appreciate the importance of Science and Technology in economic growth and national development. In recognition of the great advances in Science and Technology globally, the policies emphasize inter-regional and international cooperation for improving on the quality of the nation's Research and Development output, and also to promote technology transfer, a concept which has received criticisms from individuals (Mobisson, 1988).

The objectives of these policies are adequately incorporated in the mandates of the various research institutes. The continued change of opinion by Government about Science and Technology policies, the status and priority given to Science and Technology and their superintending government agencies, have had a toll on the effective implementation of the policies, and firmly substantiated the low priority accorded Science and Technology in the face of other national priorities. They have

thus betrayed government's low priority rating of Science and Technology to the nation's psyche. Recovery from this situation is apt to take much time and effort (Ugot, 1998).

Much emphasis has been laid on science and technology as the bases of development. The two concepts are definitely not the same, but they are two sides of the same coin for indeed the one does not make sense without the other. Science and Technology also constitute the basis of vocational and technology education training. Because of this, vocational and technology education is very responsive to changes in science and Technology. They dynamic nature of science and technology also demands changes in policy issues regarding national development.

Nigeria has continued to demonstrate efforts involving education in the use of technology to achieve its development. These efforts have led to the policy formulation with respect to:

1. Establishment of a division of science and technology in the Federal Ministry of education.
2. Establishment of research institutes to generate information for technological development.
3. Establishment of tertiary institutions of technology for the training of technological manpower for national development.
4. Investment of resources by state and federal governments towards skills acquisition in science and technology education for entrepreneurial benefits and for national development.
5. Establishment of National Board for Technical Education (NBTE) as accrediting body to control and evaluate the quality of products from technology education programmes.
6. The formation of "Industrial Training Fund" to see to the improvement in skills of technical education products through Students Industrial Work Experience Scheme (SIWES). This scheme permits the students to apply their laboratory skills in the real world of work (Okafor, 1991).
7. Formulation of the national Policy on education (FRN, 2004) which accredits vocational education programmes for the purpose ensuring the quality of vocational-technical skills acquired by students. This ensures that the policy guidelines are aggressively followed by institutions in their training efforts. In addition to the above the Federal Government has entertained the idea of using "transfer of technology" as a means of technological development or technology acquisition. This approach to national development has received serious criticisms to the extent that technology transfer is seen as an "illusion or at best wasteful" since technology is developed and not necessarily transferred (Elekwa and Associates, 1985).

Another approach to national development involves the policy of using Seven-Point Agenda to achieve Vision 2020. The Agenda focuses on Power and Energy, Food Security and Agriculture, Wealth Creation and Employment, Mass Transportation, Land Reforms plus Qualitative and Functional Education. A perfect state regarding all the foregoing is to be achieved in 2020. Rational thought holds an opposite view vis-à-vis the initial problems which still prevail and must be solved so that Nigeria may move forward.

Policy Issues in Technology and Associated Problems

There are thirty problems associated with issues in technology as indentified by Ugot (1998). Some of the problems are:

1. A dual- spaced economy, characterized by a dichotomy between the rural and urban areas. In the rural sector, traditional technology remains undeveloped, the economy is subsistence and abject poverty is prevalent. In the urban sector, the technology is foreign, the economy is import-dependent and the average income per capita is several times higher than in the traditional sector.
2. Limitations imposed by the lack or shortage of functional, operational and effective economic infrastructural facilities like reliable power supply, dependable potable water supply, telecommunications, good networks of road, waterways and railways, seaports, airports etc.
3. An import- oriented economy which discourages and suppresses Research and Development initiatives in the country.
4. The literacy rate and level, and in particular the technology literacy rate and level, in the country, are very low.
5. The capacity to significantly increase enrolment in the education system nationwide does not exist.
6. Education is generally under funded, ill-equipped, inadequately and inappropriately manned, all of which have resulted in the noticeable fall in standards and expectations.
7. A near total absence of a science and technology culture in Nigeria.
8. Low government priority rating of science and technology, except in rhetoric only.
9. Lack of a political will to develop traditional/indigenous technology.
10. Ineffective mechanisms for the implementation of government policies.
11. Poor funding of Science and Technology Systems in the country.
12. Over-dependence on Western technology for development in the country to the detriment of the nation's traditional and indigenous technology.
13. The nation's mass of technical manpower, although inadequate, is not even properly and effectively engaged in essential Science and Technology activities.
14. Research institutes in Nigeria are debilitated by institutional instability, programme instability, research staffing instability and governance instability.
15. Insufficient and in some cases, total non-availability of basic science and engineering materials to work with.

16. Traditional medicine which could be used to increase the nation's health care delivery capacity is ignored and not recognized.
17. Inefficient electric power generation, distribution and use.
18. Lack of agricultural produce storage and preservation facilities, resulting in a lot of wastage.
19. Policy processes in Nigeria are often characterized by poor conception, unclear direction, inconsistencies and poor implementation.

Policy Issues in Technology: A Challenge to Technical/Vocational Education Training

The question to raise regarding the above is: What contributions can technical/vocational education training make towards resolving policy issues in technology for Nigeria's development?

The origin of policy formulation and implementation in science and technology belong to colonial era. Nigeria, being aware of the importance of science and technology in national development has demonstrated efforts in establishing councils, research institutes and agencies for the purpose of accomplishing its goal.

The handling of issues on technology has been beset with problems leading to low achievement of science and technology in national development. Vocational and technical education as a workshop-based education with its potentials for training manpower in more than one thousand occupations or careers has the capability of facilitating the implementation of policies on science and technology (US Department of Labour, 1977 and Hryklund, 1970). The capability of vocational and technical education in playing this role lies in the fact that it has scientific base. Vocational and technical education has demonstrated its potentials in the development of the U. S. A. (Roberts, 1971). It can also do the same for Nigeria provided the enabling conditions are satisfied.

Vocational and technical education has the capacity to meet the challenge of policy issues on science and technology, but there are setbacks.

There are setbacks associated with policy issues on science and technology as identified by Ugot (1998) and there are also setbacks to be overcome by vocational and technical education if it must meet the challenges of the said policy issues. The setbacks faced by vocational and technical education training for national and sustainable development include inadequate funding, poorly equipped laboratories (Okoro, 1993), insufficient tools and facilities for effective teaching and learning, unemployment of vocational education graduates, inability of the industry to indicate what it needs in terms of skills; this hinders proper planning of vocation education programme (Otu, Udo & Usoro, 2010). Poor treatment of vocational and technical education teachers, greater government emphasis on other programmes, inadequate student-teacher ratio for laboratory learning, non involvement of industries in skills training; inadequate infrastructural facilities, expensive nature of vocational and technical education facilities and equipment (Otu, Udo & Usoro, 2010).

Other setbacks include lack of integration of computer services into vocational education, lack of indigenous texts, inadequate teaching aids, low regard for technical education degrees as compared to regular academic degrees etc. (Dike, 2007 and Susu, 2010).

Summary and Conclusion

The origin of policy issues on technology belongs to the colonial era with the educational activities of the early missionaries. Upon the realization of the importance of technology in national development, Nigeria began to show active interest in promoting technology education through establishment of councils, boards and research institutes in order to implement its policies on technology for the nation's advancement. Despite her efforts towards technological development, through established agencies, the medium of technology transfer and Seven-Point Agenda for Vision 2020, not much has been achieved. The related policies formulated had and still have problems which have hindered Nigeria's industrialization through technological breakthrough.

The associated problems of the policy implementation have posed a challenge to vocational and technical education training. Vocational education with its wonderful potentials (of over 8 service areas) for producing technological manpower in over 1000 careers has its own problems. These problems are rooted in the government and societal attitudes towards vocational education. Vocational education has the capacity to meet the challenges posed by ill-managed policies, if the right conditions are satisfied. Technological development should begin at home, reinforced at school and perfected in the world of technological endeavours. Technology as well as vocational and technical education should be part of the Nigerian culture. So far, vocational education holds the key to the solution of problems hindering Nigeria's technological development.

Recommendations

1. Nigeria should develop the political will for effective management of the policies on national development via science and vocational-technical education.
2. Science and technology policies should be supported by appropriate complementary policies in all the sectors of national life.
3. Vocational and technical education should be accorded the statutory recognition it deserves and properly funded for the wellbeing of the nations.
4. Raising the level of adult literacy rate is imperative. This is likely to assist individuals who could not complete their primary and secondary education to acquire basic skills for the retired who constitute greater part of the unemployed group in the society.
5. Nigeria should integrate technology into her culture as this is a dependable foundation for industrialization.

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