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Indigenous Technology for Sustainable Development in West Africa

S.S. Manabete
Academic Planning Unit, Adamawa State Polytechnic, Yola, Nigeria
E-mail: manabete@yahoo.com; ssmanabete96@yahoo.com

Prof. Bobboi Umar, FNIAE, MNSE, MASABE, COREN Reg.
The Rectorate, Adamawa State Polytechnic, Yola, Nigeria
E-mail: bobboiumar@yahoo.co.uk

Abstract
Technology is the scientific application of knowledge, skills and resources for the purpose of meeting the needs and aspirations of a people. It refers to a device, tool or piece of equipment. Technology designed and fabricated based on the culture, tradition and needs of a people and which is adopted for use in the environment of those people is called indigenous technology (IT). One vital characteristic peculiar to IT is that through meaningful interactions, it seeks to engage and evoke significant knowledge and experiences reflective of the indigenous world. West Africa and indeed the whole of Africa possess a vast amount of indigenous technologies (ITs) and knowledge which are embodied in the continent's cultural and ecological diversities. For instance, several communities in Nigeria, just like the Aboriginal people of Australia, have IT items such as tools and implements, weapons, boomerangs, nets, baskets and bags, as well as watercraft and canoes. In Africa, these items can be harnessed to meet international standards. If they are properly harnessed, they stimulate industrial development and domestic capacity building, impose checks on imports so that local industries can grow, and propel a nation to attain technological self-reliance. Indigenous technology and knowledge are relevant to such sectors and strategies as agriculture, preventive medicine, community development and poverty alleviation. One key impediment to the development of IT is the low patronage it has received from governments and citizens. African peoples seem to have a penchant for foreign technologies. However, because of the fact that such technologies were not designed peculiar to the African environment, they are often confronted with the problem of spare parts, knowledge of the design principles and maintenance and repairs. Indigenous knowledge which forms the bedrock of effective IT development is facing extinction, occasioned largely by the absence of strong mechanism for ensuring that such knowledge is passed on from generation to generation. More so, IT fabricators and developers lack effective mechanism for market promos and for guaranteeing their protection. In order to enhance indigenous technologies and knowledge, governments of West African countries, just like India, need to form strategic alliances between them and the indigenous technology developers. Governments can purchase the indigenously developed products and can as well promote them in such a way that they make in-roads into the global market.
Keywords: Technology, indigenous knowledge, indigenous technology

1.0 Introduction

One fundamental problem responsible for the technological backwardness of West Africa and indeed the whole of Africa is the inability of governments, stakeholders and peoples of the region to explore indigenous viable options. A key answer to this problem lies in according indigenous technology the attention and pride of place it deserves. The feeling of a people in respect of their culture and tradition which define their identity and station in global events propels their desire for development. When a people's indigenous knowledge, experiences, precepts, traditions and history are thrown off in favour of foreign ones, it beclouds and endangers the people's corporate survival and identity.

Indigenous technology, viewed against the backdrop of technology, is not a new concept. The paper therefore, looks at the concepts of indigenous knowledge and indigenous technology. The characteristics of indigenous knowledge and technology are considered. The paper also looks at the threats to indigenous technology and knowledge. It outlines the developmental opportunities offered by indigenous technology for West Africa in particular and Africa as a whole. Finally, the paper discusses ways of enhancing indigenous knowledge and technology.

1.1 Technology

There is a great confusion about what technology means and stands for. As a result of this, Bijker, Hughes and Pinch (1987) argued that it is pointless wasting valuable time trying to reach a consensus definition as the term does not carry a single meaning. In fact, Lawson (2008) pointed out that attempts at trying to reach an all-sharp and embracing definition over the years has only led to failure.

Technology can be better understood and defined if we see the concept from Foucault's (1988) perspective of four types of technology which always function together but are not irreducible to one. These four types of technologies are technologies of production, technologies of sign systems, technologies of power and technologies of the self. According to Foucault, technologies of production allow us to produce, transform or manipulate things; technologies of sign systems permit us to use symbols, signs or meaning and technologies of power determine individual behaviour. In the words of Peters (2003), technologies of the self is an approach to study the ethics of the individual.

This paper dwells on the technologies of production which deals with production, transformation and manipulation of things. However, against the backdrop of the porous nature of the African environment in respect of peace and tranquillity, which can impede production practices, a brief discussion on the technologies of the self needs to be offered. Technologies of the self can better be articulated by considering the human factor (HF) theory advocated by Adjibolosoo (1995), who opined that the human factor refers to the "spectrum of personality characteristics and other dimensions of human performance that enable social, economic and political institutions to function and remain functional over time" (p.33). In the words of Muranda (2003), the HF characteristics involve commitment, responsibility, honesty, integrity, accountability in the conduct of activities in the work place. Integrity means an exhibition of a high degree of adherence and commitment to sound moral principles (Adjibolosoo, 2003).

Perhaps what West Africa and indeed the whole of Africa would require now is the technology of the self in the light of growing tensions and corruption and bribery in the African region. It is obvious that ethnic and regional tensions and corruption impede progress. Many African States have not been able to achieve technological independence because of growing unrests and corruption. It becomes absolutely difficult for any nation to develop and harness her indigenous technologies when the atmosphere to do so is threatened by fighting and other forms of dissension. Therefore, Africa desperately needs the technologies of the self at this critical period in her history.

At the beginning of the 20th century, the public meaning of technology was associated with achievement, progress and purpose (Adams, 1991; Pacey, 2001). Abdulkareem (1992) saw technology as the art and science of applying man's knowledge in human endeavours so as to satisfy man's needs. Burkitt (2002:224) defined technology to mean "a form of practical action accompanied by practical reason which aims to instil in the body certain habitual actions – either moral virtues...or technical skills." Burkitt added that technology is a means by which human beings produce products and works. The International Technology Education Association (2002:2) defined technology as the way "people modify the natural world to suit their own purposes...it refers to the diverse collection of processes and knowledge that people use to extend human abilities to satisfy human needs and wants." The South African Department of Education (2002:4) defined technology as the "use of knowledge, skills and resources to meet people's needs and wants by developing practical solutions to problems, taking social and environmental factors into consideration."

From the Renaissance period into the present era, technology has been seen as a body of knowledge about the useful arts and its contemporary understanding is associated with modernity. Consequently, technology cannot be defined statistically. Keirl (2006) suggested that in order to have a better understanding of the term technology, it is important to consider the attributes of technology. These attributes are central to a people's life and culture. Consequently, Keirl (2006) viewed that all technologies are created by a manufacturing process resulting from human intention and design. In other words, it is not possible for technology to be in any functional sense without a rational human engagement. In etymology, the Greek root "techne"' of the word "technology" means belonging to the arts, crafts or skill (Vandeleur, 2010).

From the foregoing, technology can be defined as the application of knowledge towards the design and fabrication of devices, tools and appliances to better the condition of man. Technology is the art of using knowledge appropriately to create something that alters the condition of living of a people. It refers to the application of knowledge, skills and resources to meet people's needs and wants. It can be accepted that technology is the tool that keeps going the socio-economic life of a people. It can as well be accepted that technology refers to the science and art of putting to use man's knowledge, skills and experiences in human endeavours so as to meet the needs and wants of people.

1.2 Indigenous Knowledge (IK) and Indigenous Technology (IT)

As with technology and other related terminologies, indigenous knowledge (IK) does not have an all-embracing and sharp definition. This is because the concept is highly structured on the identity and culture of a people. In other words, the concept is sometimes referred to as local or traditional knowledge. Explaining IK, Warren (1991) said it refers to the local knowledge which is unique to a given culture or society, stressing that IK here is contrasted with the international knowledge system generated by universities, research institutions and private firms. Warren added that IK is the basis for local-level decision making in agriculture, health care, food preservation, education, natural resource management and other activities in rural communities. The World Bank

Group (n.d.) said IK encompasses the knowledge, skills, experiences and insights of people applied to maintain or improve their wellbeing.

IK has been contrasted with the international knowledge system. Warren, Slikkerveer and Brokensha (1995) contrasted IK with globalised knowledge by pointing out that IK means the local knowledge that is unique to a given culture or society. Consequently, Grenier (1998) saw IK as the unique, traditional, local knowledge existing within and developed around specific conditions of men and women indigenous to a particular geographical area. On this basis therefore, Siyanbola, Egbetokun, Oluseyi, Olamede, Aderemi and Sanni (2012) saw agreement in these definitions of IK and stated that the concept deals with the matured long-standing traditions and practices of certain regional indigenous and local communities. This includes the knowledge, wisdom and teachings of the communities.

Indigenous knowledge is peculiar to a particular people. It concerns the essential things embodied in the knowledge system of the people. It entails the perception, understanding and explanation a people can offer about their existence, beliefs and precepts and what is considered moral and immoral. Consequently, Siyanbola et al. (2012) identified the following as the characteristics of technology:

1) It is centred on local or indigenous peoples and their beliefs and practices;
2) It is generally bound by geography in that the knowledge, most often, does not transcend the locality it originates from;
3) It is generally tacit in nature, being most times orally passed from person to person, for generations, through stories, folklore, legends, songs, rituals and laws; and
4) It is not dated in the sense that the knowledge or practices do not necessarily have to be primordial.

The fact that IK deals with the beliefs and practices of a people demonstrates the uniqueness of the people and their culture and traditions. Most traditional practices and beliefs are not necessarily written down. Through the process of oral transmission, they are known and understood and adhered to. Of utmost importance to this discussion on IK is the presence of the sage in most communities of Africa. These people, who can be regarded as the ancient people, hold, protect and preserve the traditions of the people. Though their vast amount of knowledge is not written down, they constitute a very valuable source of research endeavours, especially on indigenous technologies of African peoples both in Africa and in the Diaspora.

There is no effective discussion on indigenous technology (IT) without a discussion on indigenous knowledge. That was why we undertook a discussion on indigenous knowledge (IK). It need to be stated unequivocally that it is difficult to comprehend IT without adequate indigenous knowledge. In fact, IT operations are predicated on essential indigenous knowledge systems. In view of this, indigenous technology has been perceived from several perspectives. The concept refers to the study, mastery, adoption and adaptation of existing technologies to suit the needs of an environment (Adelaga, 1997). Aliyu (2003) saw IT as a coordinated system of technologies developed by indigenes for their use based on available raw materials and tailored to meet local needs and conditions. IT is therefore, viewed as any technology designed, fabricated, adopted and used in an environment for the advancement of people of that environment. As has already been pointed out, IT and IK cannot be divorced from each other. In fact, IT acquisition is predicated on useful indigenous knowledge. Consequently, in the words of Siyanbola et al. (2012), when IK finds application in tools, technologies, processes and methods that help in solving problems of society, indigenous technology has sprung up.

According to the Native American Academy Silver Buffalo (n.d.), there are certain characteristics that are peculiar and distinct to indigenous technology. Some of the characteristics are as follows:

1. ITs emerge from the implicit order to reflect the art of skilful living. It is pragmatic, responsive and responsible to the ecology in which it lives.
2. IT attracts the learning spirit; it provides a learning ecology that supports the revitalization and transformation of awareness and knowledge.
3. Through meaningful interactions, IT seeks to engage and evoke significant knowledge and experiences reflective of the indigenous world.
4. ITs have the obligation to come into existence, to be used and to transform within an ethical space that is responsible to life in all its forms.
5. IT is coherent with the natural order. In other words, the ability or capacity to make something does not constitute a valid reason for its existence.
6. ITs have intrinsic value because we know their ancestry where they came from, what their place is in our world. We know they will transform and pass from this place to return to the realms of energies.

West Africa is blessed with a vast amount of indigenous technologies (ITs). First, there is a great commonality between the Aboriginal people of Australia and many African tribes in respect of indigenous technologies. The commonality is conspicuous in areas of tools and implements, weapons, boomerangs, nets, baskets and bags, watercraft and canoes, bush food implements and shelters. The Australia Government (n.d.) pointed out that the Aboriginal people were however, the first to introduce ground edges in cutting tools and to grind seed. They used stone tools to do many things, including making other tools, tilling the ground to get food,

preparing food, chopping wood and preparing animals. They use spears as weapons for hunting, fishing and fighting. They use boomerangs to kill small animals or knock down larger ones. In fact, it was based on the principle of the boomerang flight that Inventor David Uniapon (Australian Government, n.d.) in 1914 anticipated the helicopter. He was fascinated by the idea of perpetual motion and consequently invented such things as centrifugal motor and multiradial wheel. Today David Unaipon is commemorated on Australia's $50 note.

In Africa and elsewhere, one of the earliest indigenous technologies was the rubbing of stones against each other to produce fire which was used for cooking, lighting and keeping houses warm and comfortable (Abdulkareem, 1992). Several years before the advent of colonialism in Africa, a number of indigenous technologies existed in many communities. These ITs included iron smelting in the Old Oyo kingdom, tin smelting around Jos in North-Central Nigeria, artistic bronze works in Benin Empire and Ife in Southern Nigeria. There was also the local manufacture of Dane guns, cutlasses, hoes and axes by local blacksmiths (Aliyu, 2003). In many communities in Adamawa State, North-Eastern Nigeria, notably the Chamba, Longuda and Higgi peoples, just like the Aboriginal people of Australia, there exist similar tools and implements such as knives, spears, axe-heads, hoes, bows and arrows, drinking vessels and catapults (L'kama, Manabete, Kamaunji & Ahmed, 2008). The work of Amuda, Amuda and Waziri (2012) showed that very many years ago, indigenous technologies and science practices were common among women in Borno State, North-Eastern Nigeria. The practices included using glass mirrors, washing plates and clothes, splitting of firewood using the axe-head, treating fever, diarrhoea and cough by steaming leaves and other herbs, and applying natural products like ash, ground pepper and animal dung to protect crops against pests and diseases.

There have been in existence indigenous industries in Nigeria and in several parts of West Africa. These IT industries include the production of pots from clay, and especially the wonder clay pot and stove from Sierra Leone (shown on Gotel TV in Adamawa State, Nigeria). Others are textile making, cloth weaving, production of aluminium metal scraps and pots, leather tanning and bronze casting. Indigenous leather tanning industries are prominent in Northern Nigeria, notably in Sokoto, Kano, Jigawa, Borno and Zamfara States. The methods of acquisition of these technologies are mostly through apprenticeship, oral transmission and observation (Siyanbola et al., 2012).

1.3 Threats to Indigenous Knowledge and Technologies

Over-reliance on foreign technologies constitutes a serious threat to the development of indigenous technologies (John, Manabete, Zambwa, Abba & Abdullahi, 2009). Consequently, most of the technologies in markets of developing countries of Africa are of foreign origin (Adelaga, 1997; Manabete, Zambwa & Mallum, 2006). In other words, many Nigerians and people of Africa, just like the people of India, have a penchant for foreign technologies. For the Indian people, the reasons for this development are lack of a benchmarking exercise either by the developmental agency or by government and the ignorance of the buying agencies about the potently developed indigenous products. This has led to shelving or neglect of indigenous developmental programmes in spite of huge sums of money being pumped in that sector (Innomantra Consulting Private Limited, 2011).

The imported technologies did not take into cognizance the indigenous knowledge systems of African peoples. Consequently, four fundamental problems present themselves, namely, problem of adequately articulating the foreign language of the technologies; problem of adequately articulating the design principles of the technologies, lack of adequate knowledge of repair fundamentals, and the problem of spare parts availability. The work of Manabete, Zambwa and Mallum (2006) lends credence to this position. The work essentially examined the dual tube four-in-one rechargeable lantern which from 2001, saturated markets in major cities in Nigeria. A fundamental finding of the study was that repair personnel faced difficulties relating to training, service manual, appropriate service tools and spare parts. A follow-up study by Zambwa, Manabete and Thuku (2009) on the availability of electrical and electronic spare parts for repair work found that the parts were not available and repair personnel were in a deplorable and undesirable state.

Language plays a vital role in the articulation of concepts, theories and principles. For most African peoples, language in technological development is an issue that needs to be addressed. The question is, Can't Africa teach her peoples to develop and harness her indigenous technologies, since the technologies are of their very local environments? Must an old man in an African village who is a master craftsman and who possesses indigenous knowledge necessarily articulate a foreign language before his product can be considered viable? It is a known fact that countries in Europe which spearheaded the industrial revolution up to the present developments in science and technology employed their indigenous languages in communication and instruction. Britain, Germany, Russia, France and countries in the Balkans in South-east Europe, among others, all used their indigenous languages for communication and instructional purposes to develop their technologies to a world-class status. The Asian Tigers, notably North and South Korea, Japan, China and to a certain extent, Malaysia, used a great deal of their indigenous languages in instruction to enhance their technologies.

Another threat to IK and ITs is that in the African environment, they are at risk of extinction. The World Bank Group (n.d.) and the African Ministerial Council on Science and Technology, AMCST (n.d.)

lamented that in spite of the numerous contributions of IK and ITs, and because of the rapidly changing natural environments and fast pacing economic, political and cultural changes on a global scale, IK and ITs are at risk of total destruction. The AMCST argued that IK and ITs have not been properly protected and promoted in most African countries. The World Bank Group identified intrusion of foreign technologies on developments and concepts that promise short-term gains as the main cause of this threat to IK systems. The AMCST held that the erosion of African indigenous technologies was due largely to absence of strong mechanisms to ensure ITs and knowledge are passed on from one generation to another. What this entails is that the younger generation, receiving no knowledge of African indigenous technologies from the older generation, are completely deprived of essential knowledge regarding their roots. Those who will be greatly affected by this however, are those who have acquired vital IK, developed viable ITs and are running small scale enterprises (SMEs), but unfortunately market prospects for the IT trade are waning. In other words, indigenous technology developers are likely to run out of business if the current penchant for foreign technologies continues on a large scale. Consequently, useful indigenous knowledge, skills, artefacts and expertise will be lost.

Indigenous knowledge and technologies are facing the threat of exploitation by foreign technologies. A case in point is the kiondo basket of Kenya. Though the basket was weaved and used in the Kikuyu and Kamba communities, it was unfortunately exploited and protected under Japanese patent rights. The Kenyan communities received none of the proceeds that accrued from the trade (Gakuru, 2006). It is no doubt that many indigenous articles in many communities in Africa have been exploited by foreign technology developers. In many instances, when the indigenous knowledge and technologies are "stolen", they are refurbished, refined and brought back and sold to Africans. That explains why Africa is considered a dumping ground for all sorts of foreign technologies, especially brought from China like torches and rechargeable lanterns. One fundamental feature of these technologies is that they do not last long. You could buy, for instance, a Chinese torch light today and tomorrow early in the morning the product is "dead".

1.4 Developmental Opportunities Offered by IT for West Africa

In spite of the low patronage IT has received from indigenous peoples and governments, it has several prospects for development for West Africa. According to the Innomantra Consulting Private Limited (2011), IT, when pursued vigorously offers the following opportunities for development:

1. It catalyses the economic growth of a nation along with providing employment opportunities to citizens.
2. IT helps a nation attain self-reliance in the technological arena.
3. It provides ample opportunity for innovation, modernization and technological competitiveness.
4. IT stimulates industrial development and domestic capacity building
5. It creates awareness and demand for it in the global market. In Nigeria, for instance, there are demands in the global market of indigenous methods of processing cassava, cocoa, yam and in shelling crops like maize and ground nuts.
6. IT has the tendency to impose checks on the imports from overseas and to provide opportunities for exportation of technology.
7. Increased opportunities in the field of agriculture. Generally, the Answers Corpor (2013) said indigenous technologies are helpful for farmers, for good production of crops, increased fertility of soil, rise in quantity and quality of food. The African Ministerial Conference on Science and Technology, AMCST, publication (n.d.) stressed that the continent has a relatively rich body of indigenous knowledge and related technologies which is embodied in the continent's cultural and ecological diversities. The AMCS document held that indigenous knowledge and technologies play vital roles in biodiversity, conservation and sustainable development, contributing to increased food production, fighting against the dreaded disease HIV/AIDS and related diseases, as well as considerably stemming environmental degradation.

The World Bank Group (n.d.) asserted that IK is part of the lives of the rural poor. Their means of livelihood almost entirely depends on specific skills and knowledge essential for their survival. In the developmental process therefore, the World Bank Group said IK is of particular relevance to the following sectors and strategies: agriculture, animal husbandry and ethnic veterinary medicine, use and management of natural resources, primary health care, preventive medicine, saving and lending, community development and poverty alleviation. For West Africa, what this means is that indigenous knowledge and technology offers a wide spectrum of opportunities for development. In fact, all these opportunities are indicative of the developmental needs of various African communities. Therefore, if governments of West Africa are able to use what was handed down to them from time immemorial (indigenous knowledge and technology), her peoples will have initiated development for themselves without foreign intervention. All that is required is the political willpower to do so.

1.5 Enhancing Indigenous Technologies (ITs)

According to Folayan (1998:1), "Every culture has her technology for achieving desired goals. However,

knowledge of other existing technologies/methods and materials often lead to better choices and therefore, better results." Consequently, in the last three decades, Nigeria has made giant strides in the design, fabrication, refining and development of ITs, especially in the agricultural sector. Ademosun (2002) provided a catalogue of those agricultural ITs to include cassava planter, cassava harvester, melon sheller, grain separator, rice thresher, maize sheller, cassava peeling machine, cow pea thresher, crop transplanter, manually operated electrostatic planter, cocoa plantation weeding machine, groundnut harvester, maize dehusker-sheller, water hyacinth harvester, donkey driven cultivator cum-seeder and thresher for locust bean. Often, the indigenous knowledge of those technologies is refined by a more scientific knowledge and methods so as to not only improve its quality but to raise its reputation in the global market. Buttressing this point, Siyanbola and others (2012) held that in order for any nation to withstand competition in this era of globalization, there is need for that nation to detect its niche areas and then build on it by applying scientific methods towards improving and enhancing its indigenous technologies.

In Nigeria and indeed in many African countries, it is most unfortunate that research and development (R & D) efforts are left with the academia, perceived as a mere academic exercise. Successive governments and people who should be considered rightful stakeholders in tertiary education, more often than not, do not think that it is a worthwhile venture to commit time and resources to R and D, especially in the area under consideration in this paper. This is not the case with India, however. In India, there is a strategic alliance between government and technology developers. In other words, R and D activities receive tremendous government funding (Innomantra Consulting Private Limited, 2011). This mutual partnership between government and technology developers has yielded the following benefits:

1. Mutual technological, managerial and financial strengths
2. Setting up realistic specifications, reducing and optimization of trial cycles and elimination of moving goal post strategy.
3. Reduction in time for development, production and induction of products that meet the service requirements.
4. A mediated and reasonable sharing of costs by the alleys
5. Encouragement for the development of spin-off technologies which can be applied in civil sectors.
6. Encouragement for exportation of indigenous products which would create a pull for those products in the domestic market.
7. Government can implement effective price control on products developed in alliance with private technology providers. This creates a dual advantage. First, by entering into cooperative alliance with private technology providers, a private firm could turn around an unhealthy project/establishment into a profitable one. Second, government could enable a healthy government R and D firm to run on more effective and efficient lines by collaborating with private partners.

There is absolutely nothing that can stop countries in the West African Sub-region, especially Nigeria, from encouraging, supporting and funding R and D efforts and initiatives. It need be pointed out that modern technologies evolved, through time, study, exploration and innovation, from primitive cultures and traditions. This must be accepted as a fact because no nation in the world ever came into being as a fully developed technological nation, though today the protagonists of modernism have frequently viewed technologies used in traditional societies as non-innovative, primitive, unscientific, backward and of low cost (Boyne & Rattani, 1990; McGoven, 1990), though Siyanbola and associates (2012) conceded that one basic problem with ITs is standardization and codification which makes knowledge transfer easier and preserves the integrity of ITs. Nonetheless, it is argued that the coveted hi-tech of the West came from a low level on the technological scale of development. In fact, the industrial revolution which started in Europe was a consequence of Africa's underdevelopment by the former (Rodney, 1972). Therefore, governments of West Africa need to rise up to the challenge of developing their indigenous technologies. This can be done by entering into partnership with indigenous technology developers for the purpose of capacity building and funding.

One important way to enhance ITs towards standardization and codification methods is to explore the option of transfer of technology (T of T). T of T is viewed here not from the perspective of the cargo cult (Achebe, 2000) but fundamentally from the acquisition of functional scientific skills, knowledge and experience for incorporation into indigenous knowledge systems (Manabete, 2005). This is necessary because West Africa and indeed Africa as a whole needs to compete favourably with countries from across the globe.

Another way to enhance ITs is to combine Western and indigenous training especially in the field of medical practice. A clear example is the Chinese. The Chinese today have a life expectancy of 73 years. They do not only combine western and indigenous training but they believe a great deal in nature. In other words, the Chinese use natural products which pioneered their indigenous medicine. A common example is the preparation of tea. The Chinese, down through history, hold tea ceremonies in which they use fresh or dried tea to make natural tea (Acharya & Shrivastava, 2008; Siyanbola et al., 2012). In order to standardize their methods with modernity, the Chinese chose to study biomedicine in Japan. Biomedicine deals with the application of

biological knowledge to human health. Chinese traditional practitioners realized the need to appropriate standards common to biomedical knowledge, technology, education, and research. Today, many Chinese herbal products have been sanctioned by the National Drug Law Enforcement Agency and Control (NAFDAC) in Nigeria. Such herbal products are found in mini and large supermarkets across Nigeria. They include herbal tea, slimming tea, green tea and other products like balms, tooth pastes and ointments (Siyanbola et al., 2012).

What the Chinese method of traditional medical practice entails is that a great challenge lies before West Africa and Africa as a whole in trying to enhance indigenous knowledge and technology, especially in the area of medicine. Long before the advent of western civilization, African peoples possessed vast knowledge on various aspects of medicine. Treatments were offered in areas of snakebites, dog bites, bone disorders and several other ailments. Indigenous pharmaceutical and medical treatments were common, including treatment of psychiatric disorders (Aliyu, 2003). Therefore, it would not pay to simply dismiss indigenous traditional practice as being primitive, non-innovative, unscientific and backward (Boyne & Rattani, 1991; McGovern, 1999). Many times, western medicine and traditional medicine stay very far apart. In fact, western medicine in particular, looks with suspicion at traditional medicine and its practices. The question is, Can a synergy be created between traditional medical practice and western (modern) medical practice? Can traditional medicine, rid of superstition and fairy tales, be examined, refined and adopted in modern medical practice? Can western medicine be "humble enough" to settle down to the study of the principles, practices and methods as well as content of traditional medicine? These questions are necessary, for they promote enquiry and a re-examination of the concepts, precepts and ideals which western medicine has held so dear since breakthroughs were recorded in that field. The Chinese got the secret and they are making no mistakes about the steps they have taken.

1.6 Conclusion

One basic issue which West Africa and indeed Africa as a whole needs to deal with is how to make indigenous technology (IT) relevant to people, especially in the present era. Technologies imported into Africa from Europe and Asia have faced severe limitations especially in areas of training, spare parts and maintenance and repairs. The indigenous tools, devices, articles and items which the continent has in abundance can be harnessed to meet global standards.

Technology has been defined as the science and art of putting to use man's knowledge, skills and experiences in human endeavours so as to meet the needs and wants of people. Indigenous knowledge (IK) provides the identity of a people. It entails the perception, understanding and explanation a people can offer about their existence, their beliefs and precepts and what is considered moral and immoral. IK is centred on local or indigenous peoples and their beliefs and practices and is generally bound by geography. IT is any technologies designed, fabricated, adopted and used in a particular environment for the advancement of people of that environment.

IT has faced disturbing threats from in and outside Africa, such as low patronage from governments and her agencies and other stakeholders, over-reliance on indigenous technologies by governments and peoples of Africa, resulting in its low effect. Other threats to IT is fear of extinction and exploitation by industrialized nations. Many times the knowledge and skills gained from Africa are used to produce technologies of Africa and sold back to Africans.

In view of the numerous threats to the survival of indigenous technologies in West Africa, the following recommendations are made. This paper has found the recommendations given by Innomantra Consulting Private Limited (2011) very useful and so has made them relevant in this discussion. Governments of West Africa and indeed Africa as a whole, as well as their agencies, should as a matter of utmost national importance:

1. Provide for sustained and focusing technology efforts and initiate steps for brand enrichment and product marketing.
2. Be committed to purchasing the indigenously developed products which are at par with the overseas products. The indigenously developed products are however, losing grounds due to lack of such commitments.
3. Go through the trade practices, especially the buying trends of common wealth nations and promote the indigenously developed products in such a way that they make in-roads into the markets in common wealth nations.

Indigenous knowledge and technologies need to be preserved, respected and propagated. In this connection, article 8 of the Rio Conference (Eionet Gemet Thesaurus, 2012) mandated the parties to "respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional life styles...and promote their wider application with the approval and involvement of holders of such knowledge, innovations and practices..." Buttressing this point, the World Bank (n.d.) stressed that IK can be preserved, transferred or adopted and adapted elsewhere. Therefore, governments of the West African Sub-region and developmental agencies (non-governmental organizations, donor agencies, local leaders and the private sector) need to recognize, value, uphold and propagate IK and IT for the benefit of various communities.

It is only when this is done that West Africa and indeed Africa as a whole will be confident enough to talk about its invaluable contribution to the global quest for technological development.

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