IMPERATIVES AND GUIDELINES FOR BAMBOO DEVELOPMENT POLICY IN NIGERIA

A.A. Ogunwusi
Raw Materials Research and Development Council, Abuja

Abstract
Nigeria’s industrial policy has always hinged on the development and utilization of its locally available raw materials. The current industrial policy which came into operation in 1988 aimed at increasing private sector participation in the manufacturing sector and accelerated development and utilization of local raw materials by the manufacturing sector. Studies carried out on the wood and wood products sector of the Manufacturers Association of Nigeria showed that total wood available down to 30cm cutting diameter in national forests is approximately 293,775,500m³. When this is juxtaposed with annual requirement estimated at 59,955,000m³ for 2010, extreme wood shortages are expected in the near future. As a result of this, the nation has to develop a substitute or complementary raw material to wood. One of the most recognized substitutes is bamboo. Bamboo has been used as substitute to wood in most applications and new uses are emerging. As Nigeria is blessed with abundant bamboo resources, efforts should be made to develop the nation's bamboo resource. The imperatives that will lead to sustainable development of bamboo as an industrial raw material in Nigeria are its role in biodiversity conservation, impending wood deficit, bamboo's high industrial potentials and its abundant availability in the southern and central parts of the country. To foster bamboo development, there is need for a comprehensive and long term support that only a policy can provide. The goals of such a policy and its approaches and strategies to be adopted must be clearly highlighted in the policy document. The guidelines for the development of such a policy are outlined in this paper.

Keywords: Imperatives, bamboo, industrial policy

Introduction
Nigeria’s industrial policy with respect to local raw materials development had been chronicled by Aribisala (1993). According to Aribisala, (1993), the nation’s industrialization policy has always been hinged on the development and utilization of local raw materials. The level of exploitation and degree of development of the raw material resources have played central roles in the nation’s economic and industrial development aspirations.

The First National Development Plan, 1962-1968, adopted the import substitution strategy, whereby, the industries established were structured to depend on foreign inputs including raw materials, machinery, technology and to some extent, human resources. The Second National Development Plan, 1970-1974, elucidated the weaknesses of the first plan. The most important among these are limited markets coupled over centralisation as the industries established does not have optimal spread within the country. To redress this, government policy shifted to public sector led industrialization strategy. The discovery of oil in commercial quantities and availability of petrodollars led to displacement of agriculture as a major national occupation and as foreign exchange earner.

The petrodollars occasioned by the sale of oil continue to fuel government’s participation in industrialization, and in 1975-1980, the Third National Development Plan continued to favoured public sector investment in heavy industries. There was a general failure of private investment inflow into production of goods and these continued to make the economy highly dependent on imports. The Fourth National Development Plan, 1981-1985, coincided with the global economic recession of the 80’s and the oil glut of the era exposed
the structural weaknesses of Nigeria’s industrialization strategy. A number of industries were closed down and contractions were experienced within the economy. Survival of local industries, most especially, ventures in agriculture was threatened. These led to introduction of measures aimed at increasing the volume of non-oil exports and to reduce the level of government participation in industrial enterprises. Backward linkage investments were encouraged to increase agricultural production and productivity through establishment of Agricultural Development Programmes (ADPs), the National Agricultural Land Development Authority, etc.

To promote utilization of local raw materials by the manufacturing sector, government in 1986 introduced Structural Adjustment Programme (SAP), and, a new industrial policy in 1988. SAP aimed at restructuring and diversifying the production base of the economy. Among the objectives of the 1988 industrial policy was to increase private sector participation in manufacturing activities, encourage accelerated development through utilisation of local raw materials rather than depend on imported ones, increase the local content of industrial outputs and to improve technological skills and capacity available in the country.

The establishment of the Raw Materials Research and Development Council (RMRDC) in 1987 by Act 39 of 1987 was one measures taken to resolve the crises in the manufacturing sector. RMRDC through various studies commissioned into raw materials availability, demand and supply to the wood and wood products industrial sector in Nigeria noted that there is need for development of alternative raw materials to wood if the sector is to operate in a sustainable manner (RMRDC, 2004). As reports have highlighted that bamboo development globally has proceeded to the extent that nearly all wood products such as plywood, boards, flooring and block boards, etc, are now made from bamboo (Panday and Shyamasundar, 2008; Wong, 2008 and Negi and Tripathi, 2008), it is imperative that Nigeria should put into action efforts to develop its bamboo resources. In addition, bamboo fibres are now used in several high engineering applications such as substitutes to glass fibres in automobiles and as cellulose fabrics in the garment industry. To ensure that bamboo contribute significantly to raw materials sourcing and local content development, there is need for the development of a National bamboo policy to guide its sustainable development and utilization locally. This paper examines the imperatives for bamboo development locally and highlight policy statement and guidelines for promoting development of the bamboo sector in Nigeria.

Challenges of bamboo development in Nigeria

A number of problems have been outlined as constraining Bamboo development and impeding potential of bamboo to generate income and alleviate poverty in developing countries including Nigeria. According to Leonard (2000), there is general lack of understanding of the industrial potentials of bamboo among policy makers. Bamboo is mostly treated as a weed in most communities and little or no attention is given to its management (RMRDC, 2004). Annual burning is common. Although, its use for scaffolding generates revenue through trading in bamboo for the constructing industry, the quantity of revenue generated is for less than 0.01% of what is achievable if it is sustainably developed and its industrial potentials harnessed. Currently, there is only one modern bamboo processing company producing floor tiles in Nigeria. The use of bamboo in handcraft production is still at its infancy as it is limited to production of crude handmade products. Also, there is limited capacity building for the crafts men whose skill is limited to a number of simple items that cannot compete in the global market (RMRDC, 2004).

The immediate impediment to bamboo development is the lack of interest by government agencies to use the potentials of bamboo in meeting rural subsistence needs and in reducing deforestation. The national forest policy which exist within the frame-work of agricultural policy is aimed at conserving and protecting the environment. The strategies
adopted by the forest policy are to manage the forests to supply goods and services, creation of manmade forests for firewood, pulpwood, timber and amenities; development of non-wood forest resources significant to local economies and exploitation of forest resources at a rate lower than their regeneration. This holistic approach to natural resources conservation neglects the principle for conservation of indigenous trees, shrubs and bamboo which are thought to be of little importance to the timber industry (Osemeobo, 1997). Aside from policy issues, some of the other constraints militating against development of the sector, according to Ongugo et al (2000), include:

- Classification of bamboo as a minor forest product
- Lack of organization among the various user groups
- Lack of the recognition of the sector in the national economy
- Poorly developed marketing structures
- Lack of information on availability of planting materials
- Lack of information on propagation, establishment, crop management and harvesting methods
- Poor infrastructure in bamboo growing areas
- Lack of appropriate technologies for processing bamboo

With this sustaining in Nigeria, no reform on development of bamboo will work unless bamboo industry is adequately developed (Wang, 2006). In China, the Anji county land tenure reforms granting forest users right to farmers succeeded in generating greater productivity on both agricultural land and bamboo stocks due to strong bamboo demand in nearby markets by bamboo based industry which gave farmers incentive to manage bamboo stands better in order to increase their profit (Wang, 2006). Additionally, Anji is well suitable to take advantage of China's economic trade centres and two of China’s most important export ports in Shanghai and Hongzhou (Wang, 2006). In other counties that are rich in bamboo resources, the development of bamboo has been hindered by lack of industry demand for bamboo raw materials, thereby limiting the impact of government enacted reforms similar to Anji (Wong, 2006). Studies indicated that unavailability of bamboo manufacturing concerns in those areas was caused by lack of market information, inferior product quality and low value added products (Hu, 1997; Fu, 1999, Chen, 2002 and Cao1994). For example, the value of bamboo produce in Yunnan province, located in the Southwest, accounts for mere 30% of that of Zhezhang province, even though, the bamboo area in the two provinces are nearly the same (Li and Lin, 2004). Without demand to drive bamboo growers, farmers don’t have the impetus to put more labour, technology or money into improved bamboo management (Wang, 2006).

To address the lack of industrial demand for bamboo raw material, there is a need to develop a stronger manufacturing base and an efficient system linking growers to processors and buyers. A stronger manufacturing base would increase technical know-how, production capacity and demand. Wang (2006) observed that creation of growers and producers associations and provision of low interest loans increase the cultivation and processing bamboo.

To address the impediments to bamboo cultivation in India, the Indian government has established a National Mission on Bamboo Technology and Trade Development (Rawat, 2001). The principal objectives of the Mission are to use bamboo development as an instrument of poverty alleviation and employment generation, particularly in the rural sector; diversify, modernize and expand bamboo based industries through the application of modern technology and financial support; and use bamboo as a means to achieve ecological security through plantation development of quality species needed by the industry and the handicrafts sector (DOAC, 2005). The mission’s area of operation includes Bamboo Research, Plantation Development, Post Felling Management and Bamboo Trade, Product Development, Processing and Value-addition of finished products. At the state or provincial levels, some state governments have established
Bamboo Development Agencies (Wang, 2006). Their activities include mapping of bamboo resources, regulation of bamboo harvest, establishment of bamboo plantations, organization of bamboo trade fairs and exhibitions in collaboration with bamboo growers and the bamboo processing industry, promotion of bamboo enterprises, and dissemination of market information (GOM, 2002).

**Imperatives for bamboo development in Nigeria**

Four major challenges will promote bamboo development and utilisation in Nigeria. These are its role as raw material for industries, generation of employment and poverty alleviation, ecological security by conservation of forests through timber substitution as an efficient carbon sink and as an alternative biodegradable and high embodied energy material. Some of the forces that will promote industrial utilization of bamboo locally are discussed subsequently.

**Availability of in situ bamboo resources.**

RMRDC (2004) reported bamboo to be widely distributed in the south and middle belt regions of Nigeria. Bamboo was reported to be in abundance in all the States of Southern Nigeria except Lagos and Bayelsa where the distribution is considered relatively less. The most endowed states in terms of bamboo occurrence are observed to be Ogun, Oyo, Osun, Ondo, Edo, Delta, Rivers, Akwa Ibom, Cross River, Abia, Ebonyi, Enugu, Anambra and Imo States. The report indicated that at least 10% of the natural vegetation in these states are dominated by bamboo, with existing bamboo clumps showing appreciable gregarious growth that is contiguous over large areas. In Lagos, Ekiti, Bayelsa, Kogi, Kwara, Benue and Nasarawa States bamboo distribution was observed to be frequent, indicating that between 6.0 to 9.0% of the natural vegetation is occupied by bamboo. Pockets of bamboo clumps were also reported in Niger, Taraba and Plateau States as well as within the Federal Capital Territory. There are 12 states where bamboo occurrence is rare. These are Adamawa, Bauchi, Borno, Gombe, Kano, Kaduna, Katsina, Kebbi, Sokoto, Jigawa, Yobe and Zamfara States.

According to RMRDC (2004), the major uses in all the states are as scaffolding materials. The use of bamboo for this purpose has opened up domestic trade for bamboo culms. Other uses include fencing, yam stakes, environmental amelioration, handicrafts and fuel wood. In the construction of story buildings, bamboo culms are used as pillars to provide temporary support for the deck. In many of the rural areas, especially in Cross River and Awka Ibom States, bamboo is also used in the construction of mud houses. In these areas, bamboo culms are used as frames to provide the skeleton for building. Mud is then used to cover the entire skeleton. Houses built this way usually have very straight walls, and are stronger than mud houses built without bamboo. Apart from the above, several other uses exist, though on a relatively small scale. For instance, there are some situations where bamboo is used as poles for aerial antenna, electrification, rafters, fishing traps, etc.

**Deficit in industrial wood supply.**

The Nigerian wood and wood products sector was one of the most highly organised and developed sectors of the Nigerian economy prior to independence and up to the 1970’s. However, by the mid 1990’s, capacity utilisation of most of the prime wood industries have started declining as the pioneer industries started experiencing tottering problems. Most of them are now out of production. The major problems that led to the demise of the industries are increasing wood scarcity, dependence on foreign machinery, spare parts, and secondary raw materials. According to RMRDC (2010), the total useable volume of wood down to 30cm cutting diameter limits in the reserved forest areas of Nigeria is 293,775,500m³. This is not significantly different form 473,509,2059.43m³ reported by Akindele *et al* (2001). When these figures are juxtaposed with the total wood requirement in Nigeria projected to be 59,955,000m³ (Bourgione 1991) in year 2010, extreme wood shortages are expected in the near future. From the figures above, it is evident that the total wood available in the natural forests including
forest reserves may not last more than 10 years at the current rate of utilization; thus, necessitating the introduction of credible alternatives. If adequate steps are not taken, Nigeria may have to depend on import of raw logs if the current situation persists as this is already influencing capacity utilisation by the industries in the sector. In 1989, capacity utilisation within the sector was estimated at about 58% (RMRDC, 1991). However, in 2003, most of the industries operated below 25% capacity utilization (RMRDC 2004). Although, plantations of Tectona grandis were established to supply wood raw material to the sector, the mature stock in the plantations had been exhausted through uncontrolled exploitation for export in the 70’s. Focus is now being shifted to the use of Gmelina arborea species that are available in 89,000 hectares of plantations in Nigeria (RMRDC, 1991). Although, the plantations which make up about 40% of the existing hardwood plantations in Nigeria contain mature trees, the properties of the wood limit its use in certain applications. This made the development and utilisation of bamboo important as it is gaining worldwide acceptance in view of its properties and accelerated development of technology and equipment to process it.

High industrial utilisation potentials of bamboo.

In view of its properties, bamboo continued to be used for development of new products. Ply bamboo which is now common all over the world was developed in China during the Second World War. Various other types of bamboo panels/composite boards, particle boards, etc have been developed in China (Naxium, 2001). Bamboo mat board is being manufactured in China, India, Thailand and Vietnam (Sattar, 1990). These products are increasingly being utilised in building construction. Bamboo parquet and bamboo fibre reinforced plastic, etc are also being used in house construction. In the 1900’s when vast area of tropical forests were being denuded of timber, bamboo and other non wood products were normally discarded or destroyed during logging operations. Thus, the multi-functional range of bamboo uses has only lately received more attention. Experiences in Asian countries have shown that it may prove beneficial as a valuable and sustainable natural resource (Naxium, 2001). More recently, bamboo had been reported to have more than 1,500 documented applications, ranging from medicine to nutrition and from toys to aircraft production (Salam, 2008). It is used for pulp and paper, construction and engineering materials, panels, chemical, textile, food and pharmaceuticals production. Many nutritious and active minerals, such as vitamins, amino acids, flavine, phenolic acids, polysaccharide, trace elements and steroids are now extracted from bamboo culm, shoot and leaf. Many of these have anti-oxidation, anti-aging, anti-bacterial, and antiviral properties (Naxium, 2001). Consequently, bamboo is valuable in health care delivery and can be processed into beverage, medicines, pesticides and other household items such as toothpaste, soaps, etc.(Naxium, 2001) Bamboo leaf contains to 2% - 5% flavine and phonelic compound that have the power to remove active oxy – free – radicals, stopping nitrification and abating blood fat. Figures of nutrient contents of Bambusa vulgaris show it to contain crude protein (10.1)g, crude fibre (21.7g), ether extract (2.5g), ash (21.3g), phosphrous (86mg), iron (13.4mg), vitamin B.1 (0.1mg), vitamins B2 (2.54mg), and Carotene (12.3mg)/100g), respectively (Paglione, 2003). Bamboo beverage and beer have been widely accepted particularly in Asian countries such as China, Korea, and Japan mainly because of their value in healthcare. Some materials extracted from bamboo are used in fresh flavour and preservation of food. Bamboo shoot is one kind of vegetable that is free in pollution, low in fat, high in edible fibre and rich in mineral. It function well in removing sputum, enhancing digestion, relieving toxicity, improving diuresis and it is often used for healing swollen tissues or edema and abdominal disease in which watery fluids collects in cavities or body tissues (Naxium, 2001). The shoot also contain saccharine, which can resist little mouse tumour and also has anti – aging elements. Of late, research has shown bamboo charcoal as one of the base materials for human health, from water treatment to its uses as shield from electromagnetic radiation. With its high growth rate,
wide range of applications and high re-newing ability, bamboo resources occupies a significant position in the 21st century as a versatile and important raw material (Salam, 2008).

**Biodiversity conservation potentials**

In many industries, bamboo has largely replaced some of the plant species which were initially used as raw materials. These have led to savings of several plant species that would have been harvested and processed into various products. For instance, in the wood and wood product industries, bamboo is saving forests by replacing traditional wood species being exploited and converted to a number of products. In Costa Rica, one thousand houses of bamboo are built annually with materials obtained from 60 hectares bamboo plantation. If an equivalent project used timber, it would require 500 hectares of diminishing tropical forests. Consequently, using bamboo to replace timber saves the rainforests. With a 10 to 30% annual increase in biomass compared to 2 to 5% for trees, bamboo creates greater yield of raw material for use. Apart from this, the application of bamboo as an industrial raw material for production of ply bamboo, bamboo pulp, briquettes for fuel, houses construction and rebar for reinforced concrete beams annually lead to substantial savings of forest and biodiversity. As diversity makes bamboo adaptable to many environments and can be harvested in 3 to 5 years compared to 10 to 20 years in most softwoods and 30 – 50 years for hardwoods, bamboo is a very versatile plant to fight the adverse effects of climate change and poverty. Bamboo can be harvested and replenished without any adverse effect on environment and can grow in many environments hostile to other plant species.

**Guidelines for bamboo development policy in Nigeria**

The bamboo sector need a comprehensive and long term support that only a national policy could provide. The major pillars of such a policy could be sustainable management of existing bamboo resources and setting up of bamboo-based industries. The policy is expected to promote establishment of appropriate institutions, scientific management, linkage between production and utilization, establishment of industries, preferential treatment of bamboo, formulation and implementation of grower friendly rules and regulations on growing, management, harvesting, transporting, marketing, appropriate publicity, research and extension services. Implementation of strategies laid out in the policy should pave the way for sustainable development of the bamboo sector and livelihood of people in bamboo growing communities.

**Approaches to bamboo sector development**

To achieve the objectives above, the following approaches may be applied:

i) Conservation of bamboo diversity, germplasm and preservation of indigenous bamboo species.

ii) Introduction of exotic bamboo species with high industrial potentials.

iii) Sustainable management and use of dedicated bamboo forests and bamboo regrowth areas for industrial purposes.

iv) Promotion of bamboo cultivation as cash crops using high yielding bamboo species for income generation and supporting bamboo based enterprises and trade.

v) Promotion of private bamboo plantation as key thrust area for achieving the objectives enshrined in the policy. The focus will be on developing the sector as market driven and people oriented.

vi) Development of a regime of incentives, subsidy, technical and professional support with regard to planting materials, improved plantation technology, processing facilities, and support services such as training, credit, marketing, export facilitation, etc.
Strategy

Environmental protection
i) Bamboo should be produced in situ and ex-situ on degraded and erosion prone lands. Example is the erosion prone land in the eastern part of Nigeria. Bamboo should be used for catchment, regulation of water flow, recharge of water table, conservation of flora and fauna and protection of infrastructures such as roads, bridges, human settlements, etc.

ii) Protection and preservation of native bamboo species and ecotypes.

iii) Detail inventory of bamboo resource and database development.

iv) Promotion of dedicated land use for bamboo in areas of abundance and high frequency of occurrence.

v) Bamboo resources in the forest reserves and areas outside the reserves should be managed on sustainable management principles in association with local communities. The existing bamboo clumps should be harvested and utilised by employing improved and modern harvesting and utilisation technology.

Regeneration in natural stands
Natural bamboo stands should be given technical support and incentives by the state and federal departments of forestry to improve productivity and regeneration. The management and regeneration strategy of natural stands should focus on preferred species, keeping in view the end user requirements.

Bamboo plantation Development
Currently, a number of private sector operatives and Etiti, Ondo and Osun state governments have shown interest in bamboo plantation establishment. Ekiti state government requested one million seedlings from RMRDC. Local capacity to produce this low. Efforts to interest the Forestry Research Institute of Nigeria in production of the seedlings have proved abortive. As a result of the above, the following should be pursued by a bamboo policy:

i) Plantation establishment should be encouraged and promoted due to their high value, productivity, uniformity of crop and choice of species as linked to people and industrial needs.

ii) Establishment of bamboo nurseries of industrial species should be promoted. Quality seedlings of clonal origin should be raised to meet requirements of bamboo plantations.

iii) Linkages between bamboo plantation

Protection from fire.
Fire prevention strategies should be adopted and implemented by the state and local government forestry departments in collaboration with communities living in bamboo growing areas. Required fund and support are to be provided by the state governments.

Regulation of bamboo harvest
At present bamboo harvest is unregulated. Members of communities harvest as the need arises while people outside the community pay small amounts of money. Annual bamboo harvest has to be predetermined through felling regulation, seasonal requirement and market needs.
growers, industries and craft centres shall be established.

iv) Accessibility and market linkages should be the guiding factors for site selection and bamboo plantations.

Bamboo industries

i) The bamboo policy framework should encourage and promote establishment of cottage, small and medium industries. The current incentives such as pioneer industries, 100% capital repatriation etc shall fully apply to pioneer industries in the sector. Emphases should be laid on adoption of proven technology.

ii) Joint ventures, including direct foreign investment should be encouraged.

Entrepreneurship development

Entrepreneurship should be promoted through education and training, cluster formation and provision of support such as funding, credit, leases and tenural security.

Market information system

Information may be disseminated through brochures, radio, television and IT network.

Research and Development

Research and development on all aspects of bamboo production and utilisation should be encouraged.

Appropriate technology and technology transfer

Technology parks should be set up to facilitate laboratory to commercialisation. Information should also be disseminated through campaigns involving media, exhibition, demonstration centres, etc.

Institutional arrangement

It is imperative that a Bamboo and Rattan Development Council with funding by the federal government of Nigeria be established. The institute should cater for research and development requirement of bamboo development and should be actively associated with the implementation of bamboo development programme.

Policy review

The policy shall be reviewed periodically so that essential policy guidelines and directives are evolved from time to time.

Conclusion

The role of bamboo in the development of the nation’s industrial sector can no longer be overemphasised. Bamboo can become a versatile raw material for the development of the wood and wood products sector, pharmaceuticals, pulp and paper and textile industrial sectors in Nigeria. This will lead to substantial increase in capacity utilisation within these sectors as bamboo is readily available and the technology for its production and processing fully developed.

This paper has presented the guidelines for bamboo policy formulation for Nigeria. For sustainable development and industrial utilisation of bamboo to be possible in the country, there must be willingness on part of the policy makers to ensure that this aspiration is optimally pursued. The guideline provided has outlined major areas that must be focused on in line with the objectives of bamboo development initiatives globally. Nearly all developing tropical countries with a modicum of bamboo resources are putting efforts at developing bamboo in view of the success story achieved by China and the income it is currently generating for the country. The development of a bamboo based industrial sector is achievable with adequate commitment, assiduous planning coupled with spirited efforts at following the objectives and goals of well formulated plans.

References


