The Crisis of Technological Underdevelopment in Africa

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Abstract
Most countries in Africa lack even the ability to feed their own populations and rather than gain grounds, are rapidly falling behind other third world states. This research attempts an analysis of factors that impede Africa's development bid. Corrupt governments, often kept in power by foreign donors, repressive states concerned with preserving their own power, and governments with no political will to change existing harmful political and economic structures, foreign ideologically motivated aid programmes, unfair trading practices, are cited among factors responsible for this underdevelopment. The odds are seemingly overwhelming against any sort of economic development for most of the African states. Based essentially on exports of raw materials and mass imports of manufactured goods, African economies are characterize by dependence, a low growth rate of gross domestic product, a huge trade deficit and a heavy foreign debt. In spite of these, the search for developmental models must vary. Though, there are common problems, but they interact in different ways in different places and some are more pronounced and intractable than others. The paper concludes that rather than seeking general strategies for the resolution of such problems, developmental efforts should be made towards analyzing individual states. Every country has its own peculiar problems and must therefore seek its own path to technological advancement.

Introduction

> "Economic development is something much wider and deeper than economics,… its root lie outside the economic sphere, in education, organization, discipline and beyond, than in political independence and natural consciousness of self-reliance. It cannot be produced by skillful grafting operations carried out by foreign technicians or an indigenous elite that has lost contact with the ordinary people. It can succeed only if it is carried forward as a broad, popular movement of reconstruction with primary emphasis on the full utilization of the drive, enthusiasm, intelligence and labour power of everyone. Success cannot be attained by some form of magic produced by scientists, technicians, or economic planners. It can come only through a process of growth involving the education, organization and discipline of the whole population. Anything less than this must end in failure" (Schumacher, 1973:190-191).

The ability to generate, spread, assimilate and apply the knowledge of natural phenomena has been the determinant in acquiring material wealth, and the absence of this ability is

correlated with the poverty of a country. It is natural; therefore, to think that improving the capability of science and technology is imperative in aiding development. The present development crisis in Africa is alarming, yet it is not due to a shortage of human or natural resources. In addition to the enormous potentials of its young population, Africa is enormously endowed with huge mineral resources. Moreover, the continents huge energy potential is at yet virtually untapped. It is therefore surprising that a continent so well endowed with natural wealth should be in a state of economic stagnation, or even decline. Thirty six (36%) percent of the regional population live in economies that in 1995 had not regain the per capita income levels first achieved before 1960. Another six (6%) percent are below levels first achieved by 1970, forty-one (41%) percent below 1980 levels and eleven (11%) percent below 1990 levels. Only thirty five (35) million people reside in nations that had higher incomes in 1995 than they had ever reached before (Freeman and Lindauer, 1999).

When the colonies in Africa and Asia became independent, their political leaders were faced with two main challenges: achieving domestic political stability and transforming their economies from the production of raw materials to industrial production. Although Asian nations went through many conflicts in the early years, by 1965 most of these conflicts had been resolved. Asian leaders turned to the second challenge of developing and diversifying their economies. The African case on the other hand became far more complex. Many old conflicts, including such wars as in Ethiopia and Eritrea, Angola, Sudan, etc, continue. More recent conflicts, such as the case of Sierra Leone, Liberia, the genocide in Rwanda, Sudan, continue to erupt on a scale and ferocity difficult to fathom. With few exceptions, African political elites have driven their nations' economies backwards.

Many scholars had expected Asia to remain mired in poverty while Africa steamed ahead. A comparison between Ghana and South Korea, two countries that were at similar level of development in the 1960s, reveals that the opposite was the case.

> "In 1965… incomes and exports per capita were higher in Ghana than in Korea… Korea's exports per capita over took Ghana's in 1972, and its income level surpassed Ghana's four years later. Between 1965 and 1995 Korea's exports increased by 400 times in current dollars. Meanwhile, Ghana's increased only four times, and real earnings per capita fell to a fraction of their earlier value" (World Bank, 2000).

Anyone with even a passing interest in the 3rd world studies can not help but be aware of Africa's seemingly perpetual state of crisis; usually portrayed in terms of the continents' failure to keep pace economically with other parts of the so called developing world. Should we not therefore seek the cause of the problem in the inadequacy of Africa's scientific and technological capacity?

Underdevelopment in Africa continues to be one of the most perplexing issues in recent times. Conventional development policies have failed throughout the continent, and lack of scientific and technological capabilities is considered among the primary causes of the prevailing crisis. Attempts to address underdevelopment have been conducted in terms of what is scientifically and technically feasible in industrialized countries instead of what is

socio economically and culturally desirable in Africa. Undue reliance on foreign scientific and technological expertise hinders local innovation and creativity, which are crucial to self-sustained development. A redefinition of science and technology policies is urgently needed. Africa should not circumvent the use of science and technology in the quest for development, but it is crucial that African policy makers determine in whose interests science and technology would be developed.

For a technological solution to be successful, it must be consisted with the environment that exist in the context. The technology that is imported will have been developed to suit a different environment. Consequently, there will always be possibilities of mismatch.

Technological Underdevelopment

"Despite gains in the second half of the 1990s, Sub-Saharan Africa… enters the 21st century with many of the worlds poorest countries. Average per capita income is lower than at the end of the 1960s. Incomes, assets, and access to essential services are unequally distributed. And the region contains a growing share of the world's absolute poor, who have little power to influence the allocation of resources" (World Bank, 2000).

The desire of all developing nations is to become technologically independent. Technological independence or autonomy is attained when a nation is able to conduct its own feasibility study for an identified problem, and find solutions compatible with its resources and restrictions that exist. Technology involves a series of activities starting from the identification of a human or societal need and the corresponding innovative process, and ending with the production and marketing of the required product. It must be designed to meet the identified need, consistent with the local environment and national policies. Unfortunately this is not the case with the African states. Development efforts in the continent run up against a great number of difficulties, the major caused of which are the partitioning of Africa, the dependence of the economic system, unsuitable development policies and strategies, the educational situation and the handicap of illiteracy.

At the root of Africa's problems are the ruling political elites that have misused the economic surplus generated by the African continent over the past years. African political elites have exploited their position in order to bolster their standard of living to Western levels, undertake loss-making industrialization project that were not supported by the necessary technical, managerial and educational development, and transfer vast amounts of money from agriculture and mineral extractions to overseas private bank accounts, while borrowing vast amounts from developed nations. The consequence of this exercise is that Africans are poor and always getting poorer. The political elites that took over African states at independence in the 1960s, saw government as a source of personal enrichment. One of such apostles of the struggle for power, the former president of Ghana-Kwame Nkurnmah, urged the pioneer political leaders to "seek ye first the political kingdom and all else shall be given" (Yergin and Stanislaw,1998:84). The history of Africa is that of groups of elites seeking the political kingdom with the main aim of enriching themselves. Built into that quest for wealth is the exclusion of outsiders, including both the masses and the weaker parts of the political elites. Competition for economic resources exacerbated the ethic and religious tensions that were already present.

This explains in part why there have been so many intra state conflicts in Africa. When African states became independent, foreign corporations lost their colonial protectors. Not

long, they fell prey to the appetites and whims of the new African political elites that controlled the newly independent African states. The lucky corporations were nationalized and their owners compensated. The unlucky ones were confiscated by individual politicians without compensation. Many corporation survived as best as they could. They bribed the new elite or found ways of ingratiating themselves with their new masters. Even the great Western oil companies have not escaped the destructive power of Africa's political elites. They are sometimes made to pay huge amounts of money to private foreign accounts of presidents/head of states of their host countries (UN,2004).

The political elites in Sub-Saharan Africa largely refrained from seizing the heavy manufacturing and mining companies. Foreign owned companies therefore still dominate those sectors, with state owned enterprises or parastatals increasingly playing a minor role. In Nigeria; for instance, the most productive companies are those owned by multinational corporations (MNC) or by non African industrialists, such as Chinese, Lebanese, India, etc (World Bank,2002). All of those owners are easy preys, as the are subjected to all sorts of official and unofficial taxes, ranging from bribes for factory inspectors and customs officials to artificially high electricity tariffs, arbitrary municipal rates, etc. As political elites obstruct the operations of industry and divert profits to elite consumption and capital flight, Africa's manufacturing industries are unable to grow and thereby contributes to fostering Africa's underdevelopment.

The partitioning of the continent into small states and the impact of imperialism and neocolonialism are yet other problems for the peoples of Africa. The natural resources are very unevenly distributed among these states with millions of inhabitants. While some of these inhabitants live in countries poorly endowed with natural resources, others live in poorly irrigated or drought-prone areas. These and many other geographical and linguistic considerations are so many reflections of a fragmentation generating economic, commercial, scientific and technological constraints that are difficult to surmount within territorial boundaries, which are usually narrow and often not clearly defined.

All the features of underdevelopment are to be found in African economies. Based essentially on exports of raw materials and mass imports of manufactured goods, these economies are characterized by dependence, a low growth rate of gross domestic product (GDP), a huge trade deficit and a heavy foreign debt. The limited range of exports makes African economies even more vulnerable. While raw materials prices are collapsing on the world market, the manufactured goods imported by African countries to meet their consumer needs are becoming more and more costly, entailing a persistent deterioration in the terms of trade.

Consequently, the world economic crisis, which has now lasted for over a decade, has had a harsher impact on the African economies, leading to an unprecedented socio-economic and food supply crisis in Africa. This situation is in fact only the final stage in a process which began long ago, with he introduction of economic structures during the colonial era based on production strategies where the major aim was the fulfillment of needs external to the African continent.

The adoption of an import reproduction model in most African states in the transition years not only required relatively large amounts of capital, but also considerable inputs of locally scares resources in the form of both embodied technology and the technical capabilities to design, construct, operate, maintain and modify imported machinery and

equipment. Yet throughout the transition and turning points years, despite the appearance of a technology gap, little attention was paid to building indigenous design management or engineering capabilities at either the micro-level of the firm or the macro-level of society (Lall,1987).

In all of Africa, during the transitional years, both the state and missionary schools tended to provide a classical education emphasizing basic administrative and literacy skills rather than the training of skilled labour, engineers, chemists, managers and accountants needed by industry. This pattern of education, supplemented by training in the pure sciences, persisted well into the post-independence era and has contributed to the lack of integration between what can be called the knowledge production and the goods production sectors. It would be difficult; even today, to find universities in the Sub Saharan Africa offering majors in such fields as textile or petroleum engineering, and the training of skilled workers and line supervisors through post-primary vocational schools or apprenticeship programmes remains seriously deficient (Lall,1987:65).

Merely increasing the supply of trained manpower, however, may not improve the situation if at the micro-level, modern sector firms, irrespective of their ownership structure, rely more on imported technical and managerial skills. The problem is thus, not only that of supply, but also that of demand generated by the application of an import reproduction model.

To date, the most worrying aspect of school and university education in Africa remains that of the relevance of its general tendencies and content compared to the needs and objectives of African social and economic development. One of the problems of the existing education systems in African countries is the limited development of technical and vocational education and the scant attention paid to guiding students towards scientific and technical subjects. Science teaching is virtually nonexistent in primary education, while in secondary education, where students are first introduced to science and technology, courses lack practical content for want of suitable equipment and qualified teachers.

Near total economic dependence is yet another area of concern in the African development. The modern sector of the African economy is often heavily dependent on international markets and foreign capital. After many years of independence, this situation has not changed. The development policies implemented by African States themselves have created additional crises: limited development of human resource and failure to explore them properly - extremely inadequate scientific and technological capacity, reflected in low labour and capital productivity, poor organizational and management capabilities of both public and private administrations and enterprises.

In agriculture; the dominant sector in most African economies, development policies and strategies are marred by inadequate investment, lack of incentive measures for farmers, problems in the application of research findings due to the limited development of extension services, particularly with regard to food crops, the lack of a pricing policy and the inadequacy of the system for the marketing, distribution, storage and conservation of agricultural produce. The industrial sector is still undeveloped and greatly dependent on foreign capital.

Most companies are established by means of transfers of frequently tedious foreign technology that is ill suited to the economic situation in African states. Consequently, the goods produced by local enterprises are far from competitive. Evidence also abound that

as a result of the product and process choices, MNCs from the developed industrial nations tend to have fever linkages within the domestic economy than the national firms, they source locally, less frequently for knowledge imputs such as engineering services, and rely more on external sources of technology than on the building of indigenous technological capabilities (Kaplinsky,1978).

When discussing about MNCs, it is misleading to consider them as if they merely augment the opportunities open to the host countries, and to simply describe the policies that an omniscient and benign government should implement to utilize, to advantaged the augmented capital and technical inflows implied by the multinationals entry. The policymaker must rather take into account the fact that the entry of MNCs may itself constrain the policy choice that can be made.

Necessity for Differences in Approach

> " … It is an old principle that the development of the individual (nation) imitates that of the race. Thus also the new nations should try to imitate, and learn from, the intellectual development and technical rise of the old ones, and not try to emulate their scientific status … Every country must make an all-out effort itself. There is no substitute for the effort the country makes itself, and it is not true that one can telescope the development of young countries …" (Bergman, 1961:77).

The need for the concentration on local problems is that the institution that grows out of these efforts has its feet firmly planted in the realities of life. The disparities in the levels of science education in the 3rd world nations are so large that no single package solution can be offered. Nations that may try to employ a blind copy of the methods available in other countries probably due to shortage of trained man power or equipment, without first building up a local competence will lead to serious problems. Many countries that have received foreign aid in the form of equipment have most often dumped or stacked up those equipment for fear of damage.

Each country is unique, in terms of its social and cultural heritage, its health problems, ecology and environment, the availability and nature of resources, raw material, by-products and wastes. Some degree of scientific expertise must be brought to bear upon developmental efforts which are based on these factors. The uniqueness of each country in these respects would imply that little or no information may be available on these areas in other countries. Research merely following the developed countries is wasteful. At the same time without exposure to the advanced scientific expertise, the 3rd world nations loses the advantage. Ways must be found therefore to combine these talents in understanding the nature and using the resources of the community to benefit same community.

The developing countries have wide variations of traditions, cultures, religions, and size of population. Unitary solutions are therefore not possible and not suggested for the development of scientific research. A balance between dependence and national capability should be adopted.

> … At the current time, no country in sub Saharan Africa, nor any

> external aid agency or think tank, has found a lasting solution or model that can usefully be applied to all sub-Saharan countries. Perhaps this is an unreasonably high expectation. There are common problems, obviously, but they interact in different ways in different places and some are more pronounce and intractable than others. Rather than seeking general models for such a vast and diverse region, scholars could make a greater contribution to development efforts by analyzing individual countries … in a search for possible solution … every country in sub Sahara Africa faces its own problems and must seek its own path to improving the living conditions of its people (McCarthy,1994).

The high reliance on sophisticated methodology chosen without regard to cultural needs will be a barrier, and will terminate in counter productive effort. Sudden and violent disturbance of a people's socio-cultural ecology may produce a shock effect on the community, the ultimate results of which may not be immediately foreseeable.

Most developing nations are within the tropics. Tropical soil management techniques differ from those used in temperate farming. It is therefore, necessary for expertise to develop indigenously in developing countries to deal with regional or local problems and assets such as abundant sunlight, monsoon rainfall, and lateralization of the soil and the characteristics of the tropical forests.

Also the technology of industrial nations with its reliance on mechanization, agro chemical and in indifference to recycling of wastes would not be appropriate for developing countries. Nor will primitive traditional methods suffice. Techniques such as waste recycling must combine advance technology with certain traditional elements, often in a skillful and complex manner. For these reasons, adequate knowledge of the limits and potentials of the local environments is fully needed (kalpage,1970).

Still on agro-chemicals and other agricultural needs, there is a lot of inadequacies of indigenous production to meet local demands as such productions are capital intensive and depends on availability and exploitation of raw materials, the necessary technical know-how, and skilled manpower. These factors vary in the different developing countries, and hence no universal rule can be laid down with regard to the strategy to adopt for meeting the agro-chemical deficits.

In the maintenance of Primary Health Care, ways of solving the health problems of different countries and communities vary from one place to another. In providing solutions, considerations about the social needs, goals, aspirations, cultural influences and practices of the particular community must not be ignored. Though the problems that majority of the 3rd world nations face are similar, but the scientific base, the industrial base, the raw material resources situation, the urgency with which the solutions are sought, among others, vary from country to country. As a result, the manner of obtaining the technological solutions, whether through indigenous development or regional/international exchange or import has to be consistent with the environment that exists in the context. The technology that is imported will have been developed to suit a different environment. Consequently, there will always be possibilities of mismatch between the conditions necessary and the conditions imposed. The technologies that are appropriate to the developing nations should be people centred (Schumacher,).

In the application of science and technology in the exploitation of resources, the choice of technology would have to be very carefully made. It should be for the optimization of the use of natural as well as the human resources. It should not be a question of adaptation of a large-scale sophisticated technology to suit the smaller units, but generation of technology relevant to the local situations. The 3rd world countries should therefore strive hard to develop such technologies indigenously which suit the natural resources mix of their countries.

Exposure to research training in developed countries is useful, but should not be allowed to alienate the researchers from the development problems of their own country. There is an urgent need for new development strategies more responsive to the aspirations of the masses. The concepts of development should embrace the political needs and cultural patterns of their societies, so that life styles in the developing countries do not become pale imitations of experiences else where but a proud extension of their own value systems. A major advantage of this concentration on local problems is that the institution that grows out of these efforts has its feet firmly planted in the realities of life. It is for these reasons that the developing world must first attempt to bring about local competence in designing and developing its own equipment with locally available materials.

Conclusion

The role of technology in the development of a country can not be over emphasized. The fact that technology can also be used for destructive purposes does not reduce the vital role of technology in the social, economic, and cultural benefits of a country. To have control over a hostile environment, subdue it to ones own needs and interests, to control and prevent illnesses, to improve on crops and regulate the weather, to ward off disasters, to lighten man's burden, to improve on medicine, transportation, communication, housing, clothing, agriculture, are among the benefits that man can get from the proper utilization of technology.

For the developing countries, the capacity to utilize the potentialities of modern technology towards the overall benefits varies from one country to another. The state must play the important role of shifting from the reliance on imported technology to the building of indigenous technologies. To simply propose that African states shift from a strategy of import reproduction to that of export - oriented manufacturing (Hawkins, 1986:218) is to ignore both the realities of industrial production in Africa and the limited gains in industrial deepening and technological mastery that have tended to flow from international sub-contracting arrangements. Even the move towards export-oriented processing of raw materials and agricultural commodities is problematic if international price, demand and structural conditions over which African countries have little influence are taken into consideration.

A major point to note in the current crisis is the role that regional trade and technology sharing could play in reducing the cost and improving the efficiency of industry in Africa. The economic development of the African states would certainly benefit if they belong to regional cooperation groupings or to sub regional economic communities.

At independence, the boundaries of sub Saharan African states were set and integration movements that predated the transition period were widely regarded as colonial impositions rather than as tools for regional development where gains from integration were not forth coming rapidly, and where optimism was high that international trade and investment

would provide the resources needed for national development, regional groupings ceased to play more than a pro forma role in subsequent industrial and technological policy-making (Mytelka,1989:77-137).

As the international system has become less inviting than constraining, and the need to stretch scare resources by sharing has grown, rethinking regional corporation must also become a priority as has been done by some African states with the adoption of the New Partnership for Africans Development (NEPAD) in 2001.

NEPAD, which provides a frame work for Africans Development, emphasizes the role of good governance in stimulating economic growth. If NEPAD is to contribute to Africans economic development, it must develop more of its time to addressing fundamental issues related to African's political economy rather than impressing foreign governments, such as those in the G8, with inflated accounts of democratization on the African continent. "… African leaders should realize that the present world order is part of the problem, and not the solution to Africa's unending nightmare…" (Timamy, 2007:XX).

Undue reliance on foreign scientific and technological expertise hinders local innovation and creativity, which are crucial to self -sustained development. A redefinition of science and technology policies is urgently needed. Africa should not circumvent the use of science and technology in the quest for development, but it is crucial that African policy makers determine in whose interests science and technology policies are developed.

References

Bergman, E. D. (1961) "Experiences of Newly Developing Countries" in Ruth Gruber(ed) Science and the New Nations. The proceedings of the international conference on Science in the Advancement of new states at Rehovoth, Israel. Basic books inc, publisher, New York.

Freeman, R. B. and Lindauer, D. L. (1999) "Why Not Africa" National Bureau of economic Research working paper no. 6942.

Hawkins, A. M. (1986) "Can Africa Industrialize" in R. J. Berg and J. S. Whitaker (eds) strategies for African development. Berkely: University of Califonia press.

Kalpage, FSCP (1970). Agricultural production in Developing countries. The need for greater emphasis. Mimeo

Kaplinsky, R (ed) (1978) Reading on the Multinational Corporation in Kenya, Nairobi: Oxford university press.

Lall, S. (1987) Long-Term perspectives on sub Saharan Africa. Draft background paper on industry. World Bank: special office for African Affairs (May).

McCarthy, S. (1994) Africa: The challenge of Transformation. London and New York: I. B. Tauris and Co.

Mytelka, L. K. (1989). The unfulfilled promise of African industrialization. African studies reviews, Vol. 32, no 3.

Timamy, M. H. K. (2007) The Political Economy of Technological Underdevelopment in Africa. Renaissance prospects, global tyranny and organized spoliation. Concept publication (Press Division). Lagos.

Schumacher, E. F. (1973) Small Is Beautiful. Harper and Roy, New York.

U. N. office for the coordination of Humanitarian Affairs, "Equatorial Guinea: US senate probe reveals massive theft of oil revenue" July 16, 2004.

World Bank (2000) Can Africa claim the 21st century? Washington.

World Bank (2002) An Assessment of the private sector in Nigeria. Washington. (September).

Yergin, D. and Stanislaw, J. (1998) Commanding Heights. New York: Simon and Schuster.