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**INSTITUTIONAL CAPACITY BUILDING IN SCIENCE
AND TECHNOLOGY POLICY**

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CONTEXT AND ISSUES

1. Science and technology policy institutions (STPIs) are needed in order to realize the vast socio-economic potential of nations through the application of science and technology.
2. In the last 25 years a number of African countries have set up mechanisms (Units, Councils, Divisions, Departments, Commissions, Ministries) for S-T policy making, coordination, advice, execution and promotion of S-T activities, including scientific research and experimental development, information, assessment, standards, property rights and transfer regulations. These mechanisms have been reorganized and rationalized, in most countries, due to financial constraints, a distorted system of resources allocation and political changes and it is widely acknowledged that, generally, they have not been very effective in making science and technology play its full role in socio-economic development.
3. Studies carried out on science and technology policy institutions during the last few years unveiled a number of weaknesses in the organizational structures, goals and functions, composition, linkages, powers and resources (human, material and financial) and have proposed recommendations to improve their performance. These recommendations can also be helpful to guide the process of S-T policy making and pave the way for subregional and regional policies in line with the aspirations of the African Economic Community.
4. What has emerged from these studies is an observation which is common to most African countries that the technology environment in which scientific and technological activities can be nurtured for rapid socio-economic development is absent in the countries.
5. It should be realized that technology is now a marketable commodity which is developed for the purpose of achieving a competitive edge in the international market. What needs to be done in the African countries are: the creation of societies that are scientifically and technologically literate, the nurture of conditions that are favourable to technologically-based entrepreneurs, the re-examination of educational systems in regard to their capacities to produce the requisite scientific and technological skills, the preparation of comprehensive S&T policies and plans, the integration of technological consideration into the national socio-economic development planning process, and the strengthening of technological infrastructure.
6. Successful institutional reforms will depend in the final analysis on the ability of the science and technology policy institutions (STPIs) in the countries where such bodies have been created, or of the scientific community in the countries which have not yet established STPIs, to create and sustain an awareness among decision-makers that the comparable economic advantage of nations resides not in naturally provided factor endowments but largely in the quality and quantity of human intellectual resources. These are expressed through national capability in science and technology and in the decision-makers' will and capacity to develop and harness their national scientific power and technological prowess in order to achieve excellence

SPECIFIC POLICY ORIENTATIONS

Science and technology policy institutions should be strengthened along the following lines:

Creation of STPIs

7. Countries which have yet to create science and technology policy institutions should take action to establish such bodies and, in order for them to have an impact at the national level, ensure that STPIs are nationally recognized as apex policy-making, planning, coordinating and promotional bodies of the governments for all matters connected with the development and effective utilization of science and technology for socio-economic development.

Goals and functions

8. It has been observed that in those countries which have created STPIs the goals and functions of the institutions have been spelt out either explicitly or implicitly. The goals and functions should be articulated explicitly in statutes and be made known to all S&T institutions in each of the countries.

9. The goals of the STPIs seem to reflect the desire of national governments to use science and technology as tools for bringing about socio-economic development. This can be achieved only if measures are taken to integrate scientific and technological considerations in the national development planning process. To achieve this end it is recommended that scientists and technologists should be involved in the planning and execution of national development plans.

Plans and policies

10. The integration of the scientific and technological considerations should be predicated by the availability of well defined national science and technology policies. To achieve success in the implementation of the national S&T policies, the STPIs should prepare comprehensive science and technology plans as an integral part of national development strategy, consistent with overall social and economic development objectives and policies, and should foster the development of the required scientific and technological capabilities.

Roles and accountability channels

11. For the STPIs to carry out their functions effectively, the laws of the S&T institutions over which the functions are to be exercised need to reflect this role. Accountability channels for S&T activities should, therefore, be established with a view to providing a clear hierarchy that serves to guide without any ambiguity the roles of the different S&T institutions.

12. The promotion of science and technology development and utilization is one of the functions of the STPIs. In order to achieve this objective, the STPIs should foster the establishment of national science and technology development centres at strategically selected locations where they can best propel and sustain the technology development and utilization effort.

13. The power structure of subordinate or associate science and technology institutions should be clearly defined in order to avoid role-conflict and to make them well aware that they are accountable to national science and technology policy institutions on matters of S&T policy.

14. Those STPIs which have regulatory functions should be given more comprehensive statutory powers over the S&T institutions they are supposed to regulate.

Popularization of S & T

15. It has been noted that the channels for the dissemination of scientific R&D results are mainly through annual and quarterly reports; newsletters; scientific journals; information storage and retrieval centres; participation at conferences, workshops and seminars; mass media coverage, travel abroad and extension services. The extension services have not, however, been used as an important channel for disseminating scientific and technological innovations. The STPIs should, therefore, institute extension services in those S&T fields where this channel has not been established, and make concerted efforts to inculcate a science culture into the populace so that it may be aware of the importance and impact of technological innovations in their daily lives.

Research base

16. The development and maintenance of a strong research base in any country depend on the quality of science and mathematics teaching achieved in schools, and the creation of opportunities for gifted individuals to pursue research in science as a full-time career. A career structure in which there is a significant degree of security, and a realistic prospect for career development should therefore be established. The quality of science and technology subjects taught should be strengthened and consistent with indigenous research needs.

Commercialization of R & D results

17. One of the constraints affecting the development and utilization of S&T for development is the absence of national mechanisms for the commercialization of scientific and technological R&D results. The STPIs should therefore establish appropriate arrangements for the development and commercialization of technologies endogenously developed, as well as the creation of S&T capabilities required for the diffusion, absorption and upgrading of both the endogenously developed technologies and foreign technologies.

Transfer of S & T

18. What is needed is a "make-some-buy-some-technology" strategy which, if adopted, may help to expedite the process of promoting science and technology development and utilization for a sustainable socio-economic development. This strategy calls for the selection, evaluation, acquisition and transfer of environmentally sound and socially compatible technologies that are supportive of sustainable development and non-threatening to the ecological balance. In the countries where such strategies are non-existent, the STPIs should foster the setting up of technology transfer and assessment centres or units.

Links and interface

19. The STPIs should have their membership drawn from the scientific community, the relevant government departments or ministries, and the private and small-scale sectors. This should serve to encourage an evolution of an interface between researchers, government and the private sector, and to strengthen the link between policy-makers, researchers and users of technology.

20. Effective and viable working arrangements and linkages between the national science and technology policy institutions, sectoral science and technology institutions, government policy-makers, and private and small-scale sectors should be developed.

Monitoring and evaluation

21. National science and technology policy institutions should be conferred with the power and confidence to involve themselves not only in the preparation of science and technology plans and programmes but also in the monitoring and evaluation of all the research projects/programmes conducted in the countries. This should facilitate inter-sectoral linkages.

Information and documentation

22. Networking of information and documentation centres should be established in order to facilitate easy exchange of information.

International cooperation

23. In a more and more interdependent world, it is necessary for the STPIs to link with their counterpart in other developed and developing countries.

24. Since African countries share similar development problems and possess different and in some cases complementary strengths, it may be found beneficial to create the critical mass required to address common problems by exchanging and sharing resources across national boundaries.

Funding

25. In most countries the central governments are the main source of funding for R&D activities and the amounts of funds provided through this source are far below one per cent of GDP. Action should be taken by governments of the countries to raise the level of funding. But the main challenge is for the private sector to raise its level of funding of R & D activities.

26. In addition to the inadequacy of funds, there is also the problem of ensuring that the funds are available on a predictable and sustainable basis. A special Fund for Science and Technology Development should be established in each of the countries. The Fund should be sustained through contributions from government and voluntary donations from aid agencies.

27. In each of the countries, government should enact legislation for the purpose of creating

an enabling environment for the participation of the private sector in the endogenous technological development. Financial, fiscal and institutional incentives are some of the essential ingredients of the enabling environment. Financial incentives take the form of low-interest lending programmes by national banks and government commissioning R&D activities to private sector while fiscal incentives take the form of tax deductions on companies involved in local R&D activities, accelerated depreciation on R&D investment and reduction on capital tax of venture capital companies. Institutional incentives foster inter alia, the setting-up of National R&D Corporations that are used to finance the generation of technologies for industrial application and to commercialize R&D results.

28. The science and technology policy institutions should establish engineering and technological units and make concerted efforts to commercialize their generated products so as to expand their source of funds.

29. Funds should be allocated to establish access to facilities abroad for outstanding researchers in fields which will provide long-term benefits to national science and technology.