



UNITED NATIONS

AFRICAN INSTITUTE FOR ECONOMIC
DEVELOPMENT AND PLANNING
(IDEP)

WORKSHOP ON SCIENCE AND TECHNOLOGY
POLICY DIALOGUE PROCESS IN AFRICA

DAKAR, SENEGAL
27-31 JANUARY 1997

***LINKAGES BETWEEN S&T RESEARCHERS AND
ECONOMIC POLICY - MAKERS, AND
BETWEEN S&T RESEARCH AND ECONOMIC
POLICY-MAKING INSTITUTIONS IN AFRICAN
COUNTRIES***

by
Titus ADEBOYE
ATPS (Nairobi)

LINKAGES BETWEEN S & T RESEARCHERS AND ECONOMIC POLICY MAKERS, AND BETWEEN S & T RESEARCH AND ECONOMIC POLICY MAKING INSTITUTIONS IN AFRICAN COUNTRIES: AN OVERVIEW

Introduction

An overview paper on the linkages between S & T researchers and economic policy makers on the one hand, and between S & T research and economic policy making institutions in African countries on the other hand must start with certain clarifications. Science and Technology (S&T) research in this context refers to S&T policy research, rather than the experimental, hard scientific research carried out in S&T research institutions. It is not intended to examine the experimental work of S&T researchers because their work, at least in Africa, constitutes a very small fraction of what is utilized or required for economic development. Knowing of new knowledge and information (which S&T policy research entails) is more critical for development than generating new knowledge. "Research on technically progressive companies and economies has demonstrated that formal research activity is not a characteristic distinguishing progressive from non-progressive firms (or nations) but openness, the willingness to learn and share information, is" (Sweeney 1995). A recent OECD study reveals that "a small economy does not seem to be heavily handicapped in present-day technological competition, provided it is receptive to discoveries and advances in other countries and organised to make use of them" OECD 1992.

The linkages that seem to be of relevance pertain not only to interpersonal interaction and communication between S&T policy researchers and economic policy makers, but also the extent to which researchers work inform the task of the policy makers in areas such as: increasing policy makers awareness of best technical practices; early identification of advances in knowledge; and the promotion of the utilization of that knowledge. The linkages also relate to organisational and institutional arrangements that foster intensive interaction between S&T policy research institutions on the one hand, and economic planning institutions on the other. These arrangements could result from interlocking membership of both types of institutions by the same individuals or groups. Contract research from policy makers or advisors to S&T policy researchers; participation in conferences, seminars, workshops, round tables, focus group discussions on issues of mutual interest.

An ideal overview paper should typically emanate from empirical research for the purpose of revealing existing linkages. Unfortunately, time and other resource constraints will not allow that kind of comprehensive empirical work. The paper is therefore limited to discussing the linkage experiences of the African Technology Policy Studies network (ATPS). Since its inception as a unified network in January, 1994.

The next section of the paper discusses the 64 research proposals that have been approved for funding by ATPS since inception, showing their current status, thematic focus, and geographical distribution. In section II we provide some background information on how ATPS fosters the research-policy linkage and the extent to which the measures have succeeded or failed. Section III examines the four sets of questions posed by the organisers of this workshop in their invitation letter, namely:

- How can governments be encouraged to formulate technology-led policy, which allows science and technology to play a leading role in promoting socio-economic development?
- How can available resources be allocated for the promotion of science and technology in a preferential manner?
- How can the socio-economic environment be made more accommodative of science and technology policies?
- What sort of institutional arrangements are most appropriate for consultation and review in each country and what are the best-suited modalities for operation?

In section IV, we raise certain pertinent issues which question any pre-occupation with S&T policies unless they are properly situated within chosen visions for the countries, the particular productive niches that their political leaderships have chosen for their economies, and the paths chosen to realise the visions.

I. Science and Technology Policy Research Supported by ATPS 1994 - 1996

In the first three years of ATPS existence, the network has funded technology policy research on four themes: economic policy reforms and technology; technology issues for small and medium enterprises (SME's); social and economic consequences of technological change; and the implications of new and emerging technologies for African development. So far 35 small grants have been made and 29 others have been approved for funding, and work should be starting on them any time now. Table 1 shows the thematic and geographical distribution of the funded and approved projects.

It can be seen that the mandate of ATPS only covers 15 Anglophone African countries including: Botswana, Ethiopia, Ghana, the Gambia, Kenya, Lesotho, Liberia, Malawi, Nigeria, Sierra Leone, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe. Let me hasten to state that as ATPS resources expand and the donor base is increased, it can be expected that more countries will be covered by ATPS activities. Also two countries: Nigeria and Kenya seem dominant. Although this is a reflection of the sheer number of research proposals received from the two countries (~~See Table 2~~), efforts have been intensified to ensure greater participation from other countries. A publication summarizing the main features of the completed and on-going research project is available for interested participants.

To date 15 of these funded research projects have been completed and are at various stages of external review, correction, publication and dissemination. Twenty are still on-going while the 29 projects approved for funding in October, 1996 will be started anytime now.

This is perhaps the appropriate point in time to discuss the sources of ATPS funds. Ironically, S&T policy research initiatives came from concerned Western donors, not African leaders, who should have recognized its value and contribution to economic development. Early initiatives for S&T policy research were pioneered by the Swedish Development Agency SAREC, then by International Development Research Centre (IDRC) Canada, who were later joined by the Carnegie Corporation of New York and the Rockefeller Foundation. It is safe to say that ATPS was IDRC's baby. In the first three years of its operation, it was funded by IDRC, Carnegie and Rockefeller. Recently the Dutch Ministry of Foreign Affairs (DGIS) has joined the donors of ATPS. More foreign donors have indicated interest in funding the network.

However, the lasting sustainability of ATPS or any similar initiative depends on its ability to sufficiently demonstrate its relevance enough to attract indigenous African funding, from Governments and institutions in the continent.

II. Research - Policy Linkage

It is pertinent to highlight the various means by which the ATPS network seeks to ensure linkage between S&T policy researchers and policy-makers and advisors. A central requirement for research proposals to be accepted for evaluation is that they be relevant. That relevance is determined by the interaction of researchers with prospective end-users of the research in the identification and definition of the research problem. It is required that the researchers demonstrate a collaborative effort or discussion with policy

makers in this process. In some cases ATPS research is carried out by people in position to utilize, directly or indirectly, the results of the research. Being a multi-disciplinary network with membership drawn from universities research institutions, government; parastatals and the private sector, several ATPS projects benefit from the cross fertilization of ideas that this variety generates. No ATPS project is funded without presentation to peers in the Annual Workshops organised mainly for screening research proposals. All of the criteria of evaluation are brought to bear on each proposal.

In the course of the research, provision is made for the presentation of interim reports to the multi-disciplinary audience for its contribution to a high quality of research. On completion of the research, a dissemination workshop is organised either individually or nationally to present research findings to all stakeholders involved in a research - other researchers, policy advisors, policy makers, firms and individuals that benefit or use the results of the research. Dissemination is required before a final report is accepted by ATPS for external review and publication. Two such national dissemination workshops have been held in Nigeria and Ghana.

ATPS publication seeks to reach different audiences. Reviewed research reports are published, unabridged as Research Reports and are targeted at other researchers, academics and policy advisors who can both understand and afford the time for technical details and lengthy discourses. For very busy policy advisors, and others who are unable to invest the time for Research Reports, Technology Policy Briefs have been introduced. Usually they do not exceed 20 double-spaced pages, and summarise the main issues, problems, methods and results of the research. For the top leadership in Government and industry ATPS also publishes a four page Executive Summary Series. These series provide, in a nutshell, the research problem and the main findings of the research. Completed research not adjudged publishable as research reports could be put out as working papers. These are photocopies with an omnibus ATPS cover.

An important vehicle for general sensitisation and disseminating network events is the ATPS News, which is a bi-annual newsletter of the network now in its sixth edition. ATPS News seeks to position itself in the unique role of sensitising sub saharan Africa's political leadership about the critical role of S&T in development and the need to explicitly factor S&T into developmental plans, policies and processes. This is attempted by, what amounts to a lead article, which began with the fifth edition of the newsletter.

It will be over ambitious to try to summarize the major findings of ATPS research to date. However participants can choose any one of the three publications of ATPS on any research project depending on the amount of time they can invest and their ultimate interest.

ATPS attempts to foster research policy linkage at several levels - individual project; national and international. Among the vehicles used are: the Annual Workshops which have been discussed earlier; the national dissemination workshops; policy round tables focused on particular issues such as the Uruguay Round Agreement and Technological capability; and an international conference which is still at the planning stage.

III. **Government, Resources, the Environment and Institutional Arrangements in Relation to S&T**

(a) Government and S&T Policy

The organisers of this workshop wanted us to answer the four questions stated in our introduction above. The first question was: "How can government be encouraged to formulate technology-led policy, which allows S&T to play a leading role in promoting socio-economic development?". The question already assumes the obvious, which is African Governments do not formulate or have not formulated technology-led policies which give the leadership role to S&T in development. In contrast, the east and southeast Asian economies, starting from Japan, appeared to give technological development the highest priority. In fact, all other policies seem to have been designed to enhance this central objective of deepening technological capability. The Japanese economy after the Second World War, became a web of complementary activities all geared to the overarching pursuit of technological mastery. Fig I shows how the inter-sectoral relationships were crafted through various crafted agencies and councils. This kind of vertical and horizontal inter-relationship has not been replicated anywhere in Africa, although South Korea, Taiwan and Singapore seem to have followed a similar pattern. We shall discuss this in greater detail when we take up the fourth question.

The issue of how to encourage governments to formulate technology-led policy which allows S&T to play a leading role in promoting socio-economic development in the context of sub-saharan Africa (SSA) must start with sensitization of the highest leadership - presidents, prime ministers and other heads of state regarding the pivotal role of S&T in their bid to defeat poverty, disease, malnutrition, environmental

degradation etc that plague the continent. Unless they see the critical link, they will continue to pay lip service to S&T planning and implementation. A second issue requiring sensitization is the sheer pace of technological development around the globe and the constantly widening gap between countries that are at the forefront of this development and the bulk of the African countries. This widening gap manifests itself in various ways; those who are ahead get further ahead in incomes, in knowhow, in health and quality of life, scientific breakthroughs etc. Those who lag behind lag even further behind, engaging in primary product activities that lock them further into poverty. If the world is surging forward in leaps and bounds Africa is doomed unless it can join this band wagon. A third area of sensitization is raising the S&T awareness of the common man, at all levels, ages and professional calling.

The media of sensitization should not only include the results of empirical and credible research in African economies it should also include exposes of how other progressive countries have done it and the land mark results that they have attained in a very short time.

Beyond sensitization, sub-Saharan African Governments can only be encouraged to factor in S&T into their development planning and implementation if the International Financial Institutions (IFI), who now dictate the macro-economic policies that the Governments must pursue in order to access multilateral resources, give the required pride of place to S&T in these policies. As things stand, there is a historical, and counter-factual approach to macro-economic policy advice that has no place for S&T in development. The package of macro-economic prescriptions that Governments are given include liberalizing and freeing of markets; monetary and fiscal reform, limiting the government sector, and the pursuit of broad macro-economic stability. Science and technology does not feature in any serious discussion of the growth tragedy in which SSA is locked.

In spite of overwhelming empirical evidence that S&T was the most significant factor in the unprecedented development of east and southeast Asian countries, macro-economic prescription to SSA Governments seem to proceed on the ruinous premise that economic transformation can be achieved without explicit attention to technological mastery and the application of S&T in the continent's development effort. While nobody is advocating macro-economic recklessness, it is safe to say that unless SSA governments make technology the centre-piece of their development effort, they will be forever locked in poverty.

The implication of this is that commonly accepted notions must be discarded. There are many, and we can only give a few examples: The injunction that SSA countries pursue neutral policies which provide a "level playing ground to all economic activities" is ruinous. History shows that it matters what activities a country's citizens specialize in. African Governments must pursue specific productive niches in activities that economists refer to as increasing returns activities, in preference to their pre-occupation with primary production, buying and selling, and similar activities which are characterised by diminishing returns. As governments are encouraged to move their economies to increasing returns activities, they will automatically discover that the name of the game in these activities is technology. They must play by the rules in these activities or they are sidelined. A second example of ruinous advice is that market forces must be given free rein in determining productive activities. Countries that have shown remarkable economic transformation have always been those that "managed the market". To say that African Governments have failed in the past is not sufficient to go to the opposite extreme of allowing market forces to determine all productive activities. A more beneficial approach is to seek to raise the competence of these Governments not only to recover their ability to provide the rudimentary role of governance but also to direct their economies into chosen and promising productive niches.

There are many other erroneous prescriptions such outward orientation in preference to import substitution; limiting the size of the government sector; producing goods in accordance with a country's comparative advantage etc.

(b) Allocation of Available Resources to S&T

The second question was "How can available resources be allocated for the promotion of S&T in a preferential manner?" This question is

pertinent for several reasons. SSA governments are cash strapped in the face of several pressing needs: mass poverty, massive unemployment, poor infrastructure, high incidence of killer diseases, malnutrition, poor shelter, and stagnant rates of economic growth generally. We must add to this list of woes the heavy debt burden in which many of these countries find themselves. In the face of these pressing needs, how can the allocation of resources to S&T be justified? It is possible to give preference to the development of S&T as against the most urgent needs that face these countries? The answer is both yes and no. This researcher does not subscribe to larger allocations of available resources to research and development as such because those allocations are unlikely to make any dent on the myriad of problems that face the continent. It is hard to defend large allocations to R&D in a vacuum. In the introduction of this paper we made the point that economic transformation is more the result of ability (and agility to access and utilize existing knowledge than the result of generating new knowledge from R&D. Africa can ill-afford the luxury of joining the R&D competitive game. To that extent, it is hard to argue for the allocation of more resources to science and technology in sub saharan Africa.

However, if governments will begin with a vision of where they want their economies to be in the next 10 to 15 years within the global realities of today, then it becomes defensible to allocate resources to S&T that enable their productive entities to attain the chosen vision and to be effective players within their chosen niche. S&T then becomes the midwife that brings to birth the desired baby of the future. It is also important to realize that S&T does not consist ~~only~~ in research and development. It includes: science, engineering and technological education or human resource development for S&T; the research and development system; the acquisition, adoption, adaptation, diffusion and innovation from borrowed technology ~~etc.~~ It does not consist only in research and development/and the institutions that carry out these activities.

Within this context, SSA governments cannot only allocate more resources to S&T but can also create the incentive for the productive sector to do so. Apart from upgrading the S&T infrastructure in accordance with a common vision and chosen niche, governments can intensify their dialogue with the productive sector ~~enough~~ to ensure that the vision is shared and the chosen productive niche is sufficiently promoted to encourage increased private investment in S&T activities to enable productive entities to attain competitive advantage. Also governments can create awareness of international standards and aid

productive entities to attain them through increased investment in S&T activities. The provision of S&T infrastructural services will help such as: quality certification, S&T consultancy, and promoting technological collaboration.

(c) Socio-economic Environment and S&T Policies

How can the socio-economic environment be made more conducive to science and technology policy? Perhaps the most urgent requirement for this to happen is for those international institutions that control access to multilateral resources worldwide to change their own paradigm of development. It is clear that the world knows enough to be acutely aware that science and technology is the key to economic transformation rather than the various factors that have engaged the attention of these institutions as the engines of growth. ✓

Until this change takes place, any specific initiatives to promote economic transformation via science and technology will be seen as inappropriate or inefficient in the neoclassical paradigm of equilibria and marginal analysis.

All the important productive entities in the economy must be made to share the developmental vision, mission and objectives of the political leadership. They must be made aware of the causal relationship between the vision and S&T policies. The rewards and sanctions in the countries must reflect the priority accorded to S&T development, and they must be rigorously enforced. ✓

Above all governments must encourage production in increasing returns activities at the expense of speculative and other non-directly productive activities by an appropriate system of incentives and sanctions.

The socio-economic environment must be changed to encourage more open dialogue between government on the one hand and the rest of the economy as represented by various interest groups, producers, equipment suppliers, technical extensions, the universities and research institutions. The adversarial posture and the secrecy that characterises relationships in less developed countries must change to one of co-operative inter-dependence.

IV. **Appropriate Institutional Arrangements for Consultation and Review and Operational**

Modalities

In the wake of the crisis that most of sub saharan Africa is going through, many of the institutions and structures for S&T built in pre-crises years seem to have crumbled. There appear to be few institutional arrangements for S&T policy research, formulation, consultation and review. In order to set discussions in this section in proper perspective, we must recognise two distinctive periods in the evolution of S&T in Africa.

- (a) a period of S&T institution-building and international conferences 1970-1987; and second
- (b) a period when neoliberal policies that SSA had to implement led to the neutralization of S&T institutions and effectively outlawed specific S&T initiatives 1982-1996.

Following political independence, many sub saharan African countries pursued with enthusiasm the development of science and technology as vehicles for achieving rapid economic development. During the 1970s, many African nations established national policy mechanisms for science and technology: National Research Councils were set up in Ghana, Mali, Niger and Egypt by the end of the 1970s; Senegal, Burkina Faso, Cameroon, Benin and Nigeria set up Ministeries for Science and Technology; Ethiopia and Tanzania had commissions for Science and Technology; Somalia had an Academy of Science and Arts; while Morocco set up a National Centre for Co-ordinating and Planning Scientific and Technological Research (1976) and Sudan had a National Research Council (1970). Consequently, between the first Conference of African Ministers Responsible for the Application of Science and Technology to Development in 1974 and the second one in Arusha (1987) African countries with science and technology bodies grew from 4 to 28.

Research and development institutions also grew rapidly; institutes specializing in natural science, agricultural, medical, nuclear, industrial and environmental research went from a total of 51 in 1973 to nearly 170 by 1986 (see Thisen, (1993) p.9). They seem to have declined in number since then. These were nearly all government-funded institutes and were predominantly geared to agricultural and primary products research. Several studies showed that the bulk of their research results were never commercialized.

Several international bodies aided the development of S&T policy in Africa. Pioneers in this area were the Swedish Agency for Research Co-operation with Developing Countries (SAREC) which started to support these efforts in Eastern and Southern Africa in 1974; the International Development Research Centre (IDRC), Canada, which started two networks of multi-disciplinary researchers in

Eastern and Southern Africa (1982) and West Africa (1985); the United Nations Educational, Scientific and Cultural Organization (UNESCO), which helped to establish many of the national institutions for S&T, carried out many studies in S&T policy in SSA, and organized CASTAFRICA I, Dakar (1974) and CASTAFRICA II, Arusha (1987). The United Nations Conference on Trade and Development (UNCTAD) through studies on the transfer of technology from developed to developing countries made valuable contributions to S&T policy in SSA. A landmark event was the United Nations Conference on Science and Technology for Development (UNCSTD) which took place in Vienna in 1979.

On the African continent itself, several events have taken place with the aim of bringing S&T to bear on the development of SSA. Apart from the Lagos Plan of Action, there was the S&T protocol of the African Economic Community which required certain actions by member states to ensure that S&T contribute to the solution of SSA's myriad of problems. All these institutional organisation and legal S&T initiatives seem to have yielded very few positive results. The current neoliberal environment does not seem to favour any further institution building. Even at the height of the efforts institutional arrangements did not generate wide consultation, review and the best-suited modalities for S&T operations.

It seems that the secret lies in the involvement of all sectors of the economy in all stages of policy formulation, research implementation and review. Japan represents a country in which most of these conditions were met, or brought about. However policy making of all kinds is made by Government, albeit with wide consultation in a network of agencies, ministries and councils.

The Japanese Experience

Coming directly under the Prime Minister are four Government Ministries: The Ministry of International Trade and Industry (MITI) the Ministry of Posts and Telecommunications, the Ministry of Transport and the Ministry of Education. There are also four technology agencies, two of which come directly under the Prime Minister (the Science and Technology Agency, and the Economic Planning Agency) while the remaining two (Agency of Industrial Science and Technology and the Agency of Natural Resources and Energy) come under MITI, as shown in Figure 1 above.

These ministries and agencies carry-out their S&T policy functions through 16 advisory councils in which other Ministries participate on an ad hoc basis depending on the subject matter of particular policies. Given that Government bureaucrats responsible for S&T policy are generalists with limited tenure in particular ministries, the councils serve to: broaden the knowledge of Ministries, advise the developers of government S&T policies and from time to time deliver reports and drafts bills for long-term policies. Council membership is multidisciplinary, and interministerial. The policy-making process is founded on a system of dual post holdings (DPH) and vertical person sharing (VPS) which allow key individuals to hold positions in two or more councils and the frequency of DPHs and VPS depends on the technical content of the S&T policies.

The two Agencies - Science and Technology Agency and the Economic Planning Agency are almost as powerful as ministries and are far more influential than the other agencies under MITI. What seems to be responsible for success of the Japanese system are:

- (a) There is constant interaction between experts (in councils) and the government officials who service the councils;
- (b) in most cases, those in charge of implementing policies participate actively in the policy formulation exercise;
- (c) the councils are organised like the supervisory ministries, such that there is little distinction between policy-making and implementation; and
- (d) it facilitates smooth communication between policy makers and policy advisors; enables experts to participate in the decision making process - since there is no gap between policy-making and formulation; and allows experts to utilize their knowledge fully.

While one cannot advocate a transplant of the Japanese system into SSA, it is important to devise institutions and modalities that help to reap some if not all of the benefits of the Japanese system.

V. Pertinent Questions

The board objective of the workshop is to examine "ways of strengthening capacity to link science and technology policies with economic policy making". Certain critical questions must be asked in concluding this paper: Do Governments in SSA have technology policies that affect actions in the economy? To what extent do these countries have credible and consistent economic policies? What is the value of technology policies in the present context where the most profitable activities in these economies are not the directly productive ones in which science and technology policies can be brought to bear?

Elaborate answers to these questions could constitute a separate paper. We shall therefore just summarize the evidence. To date, we in ATPS have examined S&T policies of no less than 10 SSA countries. Of these, the most robust and far-reaching seems to be that of South Africa. All the others can be classified as statements of intentions without a clear attainable vision or means of achieving them. In many cases, S&T policy is erroneously equated with R&D and the institutions that carry them out. Most were developed with little or no consultation with the most important stakeholders. In any case, the existing S&T policies do not seem to have any impact on the productive system of the countries. The present World Economic System does not recognize such initiatives.

The present economic policies in most of SSA are classified as structural Adjustment Programmes (SAPs) or similar titles. The basic building block can be put in a nutshell:

(a) Declared aims of SAPs

- . elimination of price distortions
- . allocative efficiency
- . structural change in the economic composition of production.

(b) Tools

- . reduction in government expenditure
- . privatisation and commercialisation of government's productive investment,
- . wage restraint
- . phenomenal depreciation of local currencies
- . liberalization of foreign trade
- . tight money
- . commercialization of public utilities
- . deregulation of financial, product, and other markets
- . removal of subsidies.

(c) Consequences: Negative

- . massive decline in real wages
- . decline in consumption and investment
- . fall in output and GDP per capita
- . concentration of economic power in a few companies and individuals
- . destruction of social, physical and educational infrastructure
- . massive de-industrialisation
- . massive unemployment
- . increased debt burden.

(d) Consequences: Positive

- . forces a change of wasteful habit of living beyond means
- . forces a reduction in the over extension of the public sector
- . reveals the structural rigidities in African economies
- . reveals the bankruptcy of much of African leadership
- . indicates the vast potentials for effective state and private sector intervention.

In short these economic policies have not promoted, nor are capable of promoting long term growth. S&T policies are long-term policies based on vision and niche playing in the present global realities. It seems obvious that there is no basis for harmonising the two sets of policies. There must be a rethinking of the economic policies with static equilibrium, static comparative advantage and marginal analysis. There must be a change of paradigm from those who dictate how Third World Economies are run - IFIs.

Finally, S&T policy dialogue will have no value until Africa can regain its productive capacity and seek ways of refocusing on manufacturing generally and "increasing returns" activities. As long as SSA economies depend on primary production, S&T policies are bound to be irrelevant and the status quo of poverty will persist.

Table 1: Distribution of ATPS Funded Research Projects: 1994-1996

ATPS THEMES	TOTAL	Swaziland	Nigeria	Kenya	Ghana	Sierra Leone	Uganda	Ethiopia	Zimbabwe	Zambia	Botswana
Economic Reform and Technology	11	-	5	3	2	1	-	-	-	-	-
Technology Issues of SMES	19	1	9	3	2	1	1	-	1	-	1
Consequences of Technological Change	28	1	15	8	1	-	1	1	-	1	-
Implications of New Tech for Africa	6	1	4	1	-	-	-	-	-	-	-
Grand Total	64	3	33	15	5	2	2	1	1	1	1