

# technology policy study centres in africa

Report on the IDRC/ECA meeting on the creation of centres for  
technology policy studies in Africa, Ile-Ife, Nigeria, 5-10 December 1973



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## Abstract

A meeting was held in Nigeria in response to the interest of some African countries in setting up centres for technology policy research. Papers were presented outlining the role of technology policy and planning in development, and reviewing the experiences of Europe, North America, and Latin America in this area. It was pointed out that the study of technology policy and planning would allow developing countries to achieve an enlarged technological capacity in a short period of time, while still integrating this development with the economic, social, and cultural development goals of their society. A discussion on technology policy and planning in Africa followed the presentation of the papers, and representatives from Tanzania, Ethiopia, Ghana, and Nigeria summarized their country's present level of development in this area. Finally, a list of recommendations was prepared calling for: the establishment of national, multidisciplinary groups to carry out technology policy studies; the presentation of a travelling seminar to assist in the formation of these groups; and the creation of a regional program to encourage cooperation between national groups.

## Résumé

L'intérêt manifesté par un certain nombre de pays africains pour la mise en place de centres de recherches sur les orientations technologiques s'est concrétisé par la tenue d'une réunion spéciale au Nigeria. Les textes présentés ont mis en lumière le rôle joué par l'orientation technologique et la planification sur le plan du développement et passé en revue les expériences européennes, nord-américaines et latino-américaines dans ce domaine. Il en est ressorti que l'étude des orientations technologiques et des planifications permettrait aux pays en voie de développement de disposer rapidement de capacités techniques plus étendues, tout en intégrant ces gains aux objectifs particuliers de développement économique, social et culturel des populations concernées. Les exposés ont été suivis d'échanges de vues sur l'orientation technologique et la planification en Afrique; les représentants de la Tanzanie, de l'Ethiopie, du Ghana et du Nigeria y ont fait le point sur la situation actuelle du développement de leurs pays respectifs dans ce domaine. Les résolutions adoptées recommandent: la constitution de groupes multidisciplinaires nationaux chargés d'effectuer des études sur les orientations technologiques souhaitables; la constitution d'un groupe itinérant de spécialistes qui apporterait son aide à la formation de ces groupes; et la mise en place d'un programme régional encourageant la collaboration entre les groupes nationaux.

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# **The Role of Technology Policy and Planning in Development**

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## **Introduction**

Policy is normally formulated as a guide to behaviour or action and is usually characterized by two major components. First, the objectives to be aimed at or realized by the action need to be defined, and second, a number of considerations or boundary conditions must be observed during the course of action.

Planning should ideally be undertaken after decisions have been made on policy. This enables the process of planning to be guided by clear objectives about both the ends of the action as well as the timing of those ends. Planning is a more complex and extensive activity than defining policy, involving the breakdown of global objectives into more detailed objectives appropriate to the stages of action. The organization and procedures of the action to be undertaken need to be selected and defined; resources must be determined and mobilized; the agents, that is trained manpower in the specifications and amounts necessary for the enterprise, must also be determined; and the strategy for bringing them into action must be established. Finally, all the various stages of action, including the contributions by agents, must be set in a time frame. This is what planning is about.

A good plan will also provide for indicators of achievement at each stage, so that

performance can be monitored and any necessary corrections or interventions can be made at appropriate times during the implementation of the plan.

## **The Role of Technology in Development**

In considering the role of technology policy and planning in development, we need to start with some clear ideas as to the role of technology itself.

Technology can be looked upon as the motor or tool of development. Properly applied and directed, it provides us with the capacity to utilize the resources available in the material world to promote our well-being and security, and it enables us to alter the physical environment to make it more congenial to human society.

It is important to bear in mind that technology is not a recent factor in human development. The history of mankind illustrates abundantly that the ability to develop and use technology has always distinguished man from other members of the animal world, and has been responsible for his survival as well as the development of his civilization. Technology is thus present in every society at all the different stages in the evolution of that society.

However, this is not to say that the development and use of technology has been uniform in all communities. During the course of history, the technology developed by human communities has continuously changed, and the capacity and scope of the technology available at any time has determined the basic nature of human civilization.

When technology was at a stage where man relied on the production and use of stone tools, human communities depended on hunting for their livelihood, and lived in a precarious battle with the environment for survival. Settled communities became possible with the discovery of the technology of agriculture. When two communities came into conflict, either through competition for survival or for the material resources available to sustain economic needs, the community with the best technology of warfare usually emerged victorious. Sometimes, the less technologically capable community perished completely.

The history of technology is the history of the change and progress of human civilization. As that history demonstrates, with temporary setbacks, the development of technology has been continuous, while the focus of this progress has shifted from one community or nation to another. The biggest strides in technological development were made during the last 200 years, and this development was largely based in Europe. During this period, for reasons which I shall mention next, there was a remarkable increase in the capacity of the communities in this part of the world to develop and utilize technology.

Up to the 18th century, technology was primarily craft-based. Knowledge of the properties and behaviour of materials and of the physical world was obtained through the slow process of trial and error, as much aided by accidents of circumstance as by foresight. In such an environment, the progress of technology was slow and painful, and its possession could be kept secret for long periods. However, progress on a different

front gradually began to have an impact on technology. The pursuit of science, the systematic study of the properties and behaviour of the physical world, began to provide insights as to possible new types of technology. By the middle of the 19th century, this trend was already well-established. Increasingly, scientific knowledge enabled existing technologies to be improved and their scope extended, and suggested the possibility of new technologies.

Within our present century, this process has become well-established and has been responsible for an unprecedented technological development in many parts of the world, notably Europe and North America. Through the methodology and procedures of research and experimental development, it has gradually become possible to create technologies to order for different purposes. This has given mankind a control and mastery over the physical world which is quite comprehensive in its scope. The nature of production, of economic, and of social life can now be selected and fashioned by deliberate decision in any modern society that possesses the capacity to create or use the technology it needs.

### **The Promotion of Technological Development**

The elements that make up the technological capability of any community are known. The process and prerequisites for the acquisition of technology by a community can also be determined. In juxtaposition to this, the practically universal technological backwardness of the African countries is responsible for low standards of material living, misery and poor health, and often, as recent events have demonstrated in the drought-stricken areas of the continent, the precariousness of human survival itself.

The question before us in Africa is this — where do we go from here? The knowledge and the possibility of changing the destiny

of our people are within our reach. However, we have to take conscious action to acquire and utilize that knowledge. We must start with a determination of the objectives we wish to promote or achieve through the use of technology. Some objectives can be selected directly in relation to the nature of technology itself and to the prerequisites for acquiring and using it.

Direct objectives will be concerned with the creation or reinforcement of the technological capability in our communities. The subject matter of this category of objectives will include such issues as:

- (1) the content, methods, location and timing of science education in schools;
- (2) the training of scientific and technological manpower;
- (3) the promotion and support of scientific and technological research, and research institutions; and
- (4) the creation or strengthening of scientific and technological service organizations and institutions.

The objectives we select in these areas will determine how much technology will be at our disposal, and when, where, and how effectively we can use it.

The wider group of objectives for technology relate to the purposes for which we wish to use it, namely, social, economic, and sometimes military ends. They will embody our vision of the type of society we are trying to create and the quality of life we want for our people. When this approach is not observed, we become obsessed with technology as an end in itself; instead of technology serving man, we then create the circumstances where man serves technology and is in bondage to it.

Two examples will illustrate this point. The University of Science and Technology in Kumasi has been trying to utilize its technological resources to assist in rural development. Two years ago when I first went there, among

the activities going on was one related to the weaving of kente cloth. There was a unit in the university that was concerned with developing new mechanisms for weaving kente cloth. I felt a little uneasy about their objectives at that time because, when we visited the village that was the focus of their assistance, the villagers did not seem very enthusiastic about all this help that was coming from the university. They were not sure why the university wanted to get involved in kente cloth weaving and design a new machine to do the work, and were somewhat hostile to the idea of introducing improved machinery to do what they were doing by hand.

When I visited Kumasi again last year, we went to the same village. This time I think those who were in charge of the project had taken some trouble to look beyond what we might call the machine aspects of their task. They had become a little wiser. They had carried out some social research and had realized that they were doing much more than mechanizing kente cloth production, and so had modified their objectives. They had realized that the value of kente cloth lay in the fact that it was woven by hand, and that if machinery was introduced to produce kente cloth in large quantities, it would become just as cheap as any other cloth. This would destroy the economic advantages of this village.

The researchers had also realized that while a machine would take much of the drudgery out of kente weaving, it would disrupt what we might call the social status system of the village. The machine would make kente weaving an easy process for any young man to learn, and would displace the need for a long apprenticeship in order to acquire the skill and knowledge to produce the intricate handwoven designs that characterize high-grade kente cloth. Now there is a status system in the village based on this apprenticeship system. The men who can do the most complicated designs are people who have taken several years to acquire their knowledge and skill, and because relatively few





men can weave these high-grade kente designs, it gives them a certain status and economic position in the life of the society. So, many inadvertent changes were set in motion by this very well-meaning effort directed at producing a machine to weave kente cloth.

Perhaps what was needed was not to produce a sophisticated machine as the technologists had done, but something less sophisticated that would still provide a role for the skilled man who has been on the job for many years.

The second example is the Gari Project. I think this project was begun here because a number of engineers and food technologists felt that this provided an attractive opportunity to introduce machinery into production. In Nigeria, gari is a staple food and there is a big market for it. I personally do not think that the technological problems of making gari are considerable, but there are some features of the gari production system that, on further reflection, should make us re-examine the objectives of the Gari Project. The first point is that gari is produced as a rural small-scale industry, and I would say that there is no serious shortage of it. At present, as much of it as is required can be produced by small-scale industry in rural areas.

Introducing machinery will not at the moment increase the amount of gari that is available on the market, since the limitation on production at all times is the supply of cassava. In any case, increasing the supply of gari beyond the demand has no real social value unless there is an export market. I think that this is one of the reasons why it has been difficult to introduce large-scale gari production by machines in Nigeria. In a country where it was not already a rural industry, it might have been easier to change the scale of production. In Gambia, where gari production has been set up as a large-scale industry, it is a new food to them.

The real issue in introducing technology for rural development, as in the case of the gari mechanization project, seems to be the social implications of the changes. If this development implies transferring a small-scale, but widespread, rural industry away from rural areas into urban areas, we may not be doing the right thing. In fact, one of the elements of the stability of the Nigerian food production economy may be that a staple food like gari, which is consumed in urban areas, is produced almost exclusively in rural areas. This is a desirable situation which many developing countries are trying to create artificially.

Perhaps what the technologists should do, as far as gari production is concerned, is to establish the scientific basis for the gari-making processes — what takes place at each stage and what the product, gari, actually is. Is it one product or different kinds of products? I think the reality is that gari is a product with a very wide range of variability, which exists in different types. If the technological parameters of these different varieties can be ascertained and recorded so that they can be produced whenever required on the machine, this would be a valid contribution. The issue of mechanizing gari production may not be a question of industrialization but a question of rural development.

I believe that these examples should be kept in mind so that we remember to ask ourselves, at all stages, what we want to use technology for before we start taking action.

### **Technology Policy and Planning**

The above examples indicate the importance of defining objectives or policies for technology as a guide for rational and consistent action.

When the objectives have been defined, it becomes necessary to determine how to translate them into action. The greatest part of the task of technological development in all African countries is the creation or reinforcement of national technological capability.

This is a multi-component objective which requires action in such disparate areas as education and training, institutional development for research and training, fiscal policy in relation to industry and foreign trade, and legislation on the use and protection of intellectual property.

For continued and steady progress in technological development, it is necessary that action be taken on these many disparate yet contributing subjects to be consistent with the main objective of enhancing national technological capacity. This can only be done through a plan of action that will establish the necessary contributions from different sectors, and will ensure that a time frame is provided for contributions from the separate sectors.

Within the Economic Commission for Africa, this complex question of the promotion of technological capability in African countries has been under study during the past 5 years. The studies have resulted in the preparation of a volume entitled, African Regional Plan of Action for Science and Technology Development.<sup>1</sup> This plan has been scrutinized and approved by various bodies and organs in the UN including the Economic and Social Council. Most important of all, the plan has been reviewed by

the African countries and adopted as a guide to technological development in the region by the Conference of African Ministers concerned with social and economic development in February 1973.

Apart from being a guide to the many problems posed by the objective of developing technological capability, the African Regional Plan enables one to have a realistic appreciation of the complexity of actions necessary to promote technological development. It provides an awareness of the dimensions of the task before us. No regional plan can, of course, take the place of a national plan when action is required at a country level. Hence a further stage of planning will be necessary at the government level of individual African countries in order to derive the full benefits from the African Regional Plan. Because of the multiplicity of fronts on which action is necessary concurrently, it is clear that without a plan, technological development in Africa may be a mirage and may never attain any significant level of progress within our lifetime.

The role of technology in development is that of a tool and an agency. With technology we can fashion the type of society and the quality of life we envisage for our people. The role of technology policy and planning is to enable us to create the necessary technological capability within a realistic time scale, and to apply it as and where necessary in the shaping of human destiny.

<sup>1</sup> African Regional Plan, U.N. Document E/CN.14/L.407.



## Discussion

■ Some participants raised the issue of technological determinism; according to this viewpoint, if a technology is discovered it must be used or will propagate itself somehow. This is inevitable social change which cannot be stopped. In the case of gari, for example, some aspects of its production are physically laborious; village women who are mainly responsible for the production would be pleased to transfer the difficult operations to a machine.

At the same time, cultural transfer between developed and developing countries is being continuously promoted by mass communications media. Hence people will demand the introduction of technologies used elsewhere which they read or learn about through books, the cinema, television, radio and other means. People will not accept a lower level of technology which may be intended through planning.

■ Attention was drawn to the problem of defining development. A yardstick for measuring development is necessary so that the tasks for technology can be accurately set. One of the main factors to be kept in mind in technology policy and planning is that developing countries are trying to do in a few years what took over a century in Europe.

■ Change in society due to technology can be positive or negative. It was felt that technological development is a necessity and only through proper guidance can its effects be controlled. Issues such as the magnitude of change that can be absorbed at each application should be taken into consideration in policymaking and planning.

■ An important question for technology policy is how to get technology that is rural-oriented. Technology has a role in rural development and this could be a large one. However, special care is needed in producing technology for rural development and in introducing it. Technology cannot be satisfactorily introduced in isolation; an integrated approach is necessary which will take into consideration social consequences and minimize social dislocation.

There is also a role for the survival of a few handicraft methods of production. Technology

should not be introduced with a view to displacing all old methods of production.

■ One participant believed that large-scale urbanization is an inevitable process. Delaying the introduction of technology from advanced countries in an effort to arrest it will be futile. He thought that efforts to develop special rural technologies may only retard progress.

■ Technology policy and planning should be preceded by the determination of the specific problems that we wish technology to solve. Most of Africa consists of rural communities whose basic needs must still be met by technology. They require improved housing, more satisfactory supplies of clothing, clean water, sanitation, and so forth. A great deal of attention should be focused on these needs in technological planning.

■ A part of the problem in African countries hitherto is that in planning for development, science and technology have not been taken into consideration in the process. Eventually the absence of this component makes it difficult to implement plans. People who are experienced in what technology can do and how it can be utilized should be brought into planning right at the beginning of the process.

■ Who should concern himself with technology policy? One participant suggested that the social role and consequences of technology are the responsibility of the social scientist. It may be argued that the natural scientist or technologist already has enough on his hands producing technology. His responsibility should end there. The responsibility for what to do with technology should rest with political leaders, and social scientists should worry about consequences.

Most participants felt, however, that this attitude is now outdated. The responsibility for the consequences of using technology has to be shared by all those involved in producing and using it, as well as those deciding the purposes for applying technology. Hence, scientists and technologists must be involved together with social scientists and political leaders in setting the objectives for science and technology. Technology policy and planning is a multidisciplinary activity and should be organized as such.