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## planning in the STPI countries

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# Science and Technology for Development:

# Planning in the STPI Countries



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# Contents

# 6. Science and Technology Policy and Planning in the Arab Republic of Egypt

Adel A. Sabet

## National Science Policy

The great achievements in S&T, especially during the first half of the 20th century, have led governments to be much more conscious of the important role of scientific research and technological progress, their deep implications for national development plans, and their cultural and social effects on the lives of people in all parts of the world.

Development can be described as the product of two interrelated processes: growth and change. Both depend on the application of S&T and the beneficial use of their continued achievements. In economic growth S&T contributes basically to an improvement in productivity, both quantitative and qualitative. Yet, the most important effect of S&T lies in the change element. Accordingly, when governments draw up a national science policy they aim to influence all sorts of activities in which S&T achievements are or can potentially be used to accelerate national development and its social, economic, and cultural goals.

A national science policy comprises various legal and executive measures that the state carries out to organize and develop the national S&T potential, to promote technological innovation, and to use such innovations in the best interests of the country's development and international prestige. It must be taken as an important political decision by the government and as an integral part of the overall policy of the country.

The developing countries need to lay down bases for their national science policy in the light of their limited resources and scientific and managerial capabilities. In fact, they have no choice but to plan their scientific activities in order to reach their short- and long-term targets. Their need for a national science policy is founded on the following factors:

- The increasing link between S&T research and the socioeconomic activities.
- The complex problems stemming from the rapid development of modern S&T.
- The large requirement for human and financial resources for S&T activities, which needs state support.
- The limited potential for R&D, which demands the establishment of national objectives and priorities.
- The growing role of international cooperation in S&T.

In Egypt, there has never been a national science policy and the awareness of the need for such a policy is very limited, though it is growing. Many official statements have explicitly emphasized the importance of science and the convenience of building a modern state based on science. The constitution refers to this, and since the 1952 revolution various statements from heads of state, prime ministers, political organizations, and parliamentary committees have expressed this conviction in one way or another. This has frequently been through official action, with the provision of moral and material support to scientific activities and organizations, and to the scientific community. However, a state proclamation or act on national science policy is very much desired.

In the absence of such a proclamation or act a number of policymaking bodies have been created over the last 25 years. They started with the first National Research Council, which began to function about the end of 1948; the Science Council was formed in 1956, the Ministry of Scientific Research in 1961, the Council for the Promotion of Scientific Research in 1964, the Council for Scientific Research (superseding the ministry) in 1965, the ministry again in 1968, the Academy of Scientific Research and Technology in 1971, and the Ministry of Scientific Research and Atomic Energy in 1975 (probably with the academy structure retained for national planning and coordination).

In addition to the effect of so many changes in the national policymaking bodies, several factors have deeply hampered their effectiveness, mainly:

- Instability and rapid changes in policy strategies and tactics.
- Inadequacy of the infrastructure, especially in the first stages, in terms of qualified personnel, applied research, laboratories, and supporting services.
- Shortage of funds most of the time, especially in terms of foreign exchange.
- Limitation of executive functions in some instances, and failure of evaluation and follow-up practices.
- Dominance of the "university ideology," whether in policy planning or evaluation, which stamped most of the research activity with academic attitudes; the real needs of the development plans were largely ignored.
- Isolation of the scientific community, with minimum linkage required between the research and applied sectors, which inevitably widened the gap between them.
- Separation between the sectors of research and socioeconomic planning at the national level.
- Shortage of managerial capabilities.

## S&T Planning

Science policy is not an end in itself; it is a strategy for national action in the field of science and should serve a twofold purpose: the development of science and scientific capabilities, and the use of scientific activities for the benefit of development.

Because planning is a function of policy, there should be two kinds of integrated plans: a plan for science itself and a plan that uses science for development. In fact, the basing of the development plan upon science may be rightly argued.

Two important attempts at S&T planning have taken place in Egypt and will be briefly reviewed. They deserve more intensive study, however.

*The Science Council Effort (1958–60)*

The general atmosphere in Egypt after 1956 and the Suez War led to acceptance of the idea of planning in science in 1958, though with great opposition. However, the Science Council finally adopted a 5-year (1960–64) plan for scientific research that coincided with the first plan for national development. It had three main aims: to survey and assess the potential of existing resources; to recruit personnel for present and future development; and to draw up effective programs for meeting immediate and long-term needs, while depending mainly on state projects for national development.

Actual preparation started in 1958, when the objectives and contents of a scientific research plan for the country were defined as follows:

- Encouragement of basic or academic research as an important part of the plan.
- Selection of research topics entirely on the basis of individual initiative, with encouragement given free from all ties or restrictions.
- Procurement of appropriate financial support for the purchase of equipment, for assistance to libraries, and for scientists to attend international conferences or to study abroad.
- Applied research in the plan should help the national economy, directly or indirectly, and should solve social problems in fields such as health and education.

The work was divided into six sections: mathematical and physical sciences; chemistry and chemical industry; geology and mining; engineering and engineering industries; agricultural and biological sciences; and medical sciences.

The technical secretariat of the Science Council prepared detailed reports based on available data concerning personnel, institutions, laboratories, and topics of current research. It also prepared reports on various agricultural and industrial projects in the state development plan, indicating topics of research studies (or scientific content) associated with these projects. A total of 117 topics bearing on the national economy and on scientific progress were selected, and 170 experts were commissioned to write detailed reports on relevant work being carried out in Egypt and the possible practical application of the results; institutions engaged in such activities or for which the studies would be of interest; scientific personnel having experience in the subject, including proposals for recruitment, improvement of qualifications, training abroad for new subjects, and foreign experts needed; present laboratory and library facilities, and requirements for supporting or establishing new ones; world trends and possible means of using new advances, and lists of relevant

world institutions for possible contact; and problems affecting the various fields of the national economy that needed a solution.

After coordination of the reports 58 planning conferences, attended by about 3 000 scientists, were held.

The following comprehensive preliminary reports were finally drafted:

- A general introduction to the present situation and an estimate of funds needed to finance the suggested projects.
- A list of research topics to be dealt with, in order of priority.
- A program for postgraduate scholarships and fellowships for studies and training at home and abroad.
- Proposals for invitations to foreign experts.
- An estimate of funds required for developing existing research laboratories and setting up new ones.
- General recommendations.

The total budgetary estimates for the science plan amounted to £19 673 250 (at the official rate then £1 = U.S. $2.35). About £8.5 million was finally approved in addition to about £3 million for a scholarship training program.

The plan called for action on a broad scope and envisaged the reform and strengthening of the scientific infrastructure through material support for existing laboratories and qualified personnel and for their expansion. But it was too broad and too ambitious, with a definite, though initially unintended, bias toward basic research, and it overlooked the practical procedures of handling urgent problems of production and services. The Science Council lacked executive power, which widened the gap between planning on the one hand and implementation and follow-up on the other. The experiment did not live long: in January 1963 a reorganization of the science structure (that had started with the establishment of the Ministry of Scientific Research in 1961) involved new policy trends.

*The Academy Effort (1972)*

One of the main responsibilities of the Academy of Scientific Research and Technology was the design, coordination, and financing of research projects related to national problems, and the following up of their execution. The academy's council entrusted its 14 specialized research councils — with representatives from the research community as producers of science, and from the production and services sectors as users of scientific results and technological progress — to identify important problems facing the national socioeconomic plans for which concerted research effort was needed to find practical solutions. A number of criteria were discussed for identification and for making priority decisions. Proposals were received from the Council of Ministers and from different government ministries, for ministers concerned attended many meetings of the specialized councils, explaining the respective policies and problems encountered by the production and services organizations represented in the councils, by research institutes, and by individual scientists. All were studied at length by the councils and their special subject committees, and at the annual specialized councils' conferences and the general annual conference of the academy in 1972–73. Two main

types of problems were distinguished: national problems, which would concern the entire country, especially those related to the country's economic development; and problems of a particular sector or subsector.

More than 70 important national research projects that would take an estimated 3 to 5 years were finally endorsed and recommended to be sponsored and financed by the academy. In 1974 £1.8 million was allocated in the academy budget for these projects (and was spent). In 1975 £1.2 million was also earmarked in the same way.

Each project was studied in detail and executed on the basis of a contractual system. A contract was signed between three parties: the academy, the principal investigator of the project team, and the main research organization in which most of the work was to be carried out. Progress reports were to be regularly submitted for examination by the pertinent subject committee. Material and other incentives were provided. Implementation procedures were freed from much of the bureaucratic burden. Additions to these projects were studied by the specialized councils and at their conferences, and by the academy's governing council, which also ensured continuity and flexibility.

Accordingly, a program of research was worked out mainly as a practical plan of action aiming at solving some important and urgent problems that cut directly across national development plans. However, the academy's council had approved the allocation of about 20% of the available funds to strengthen the base of science, especially in new and interdisciplinary areas.

Research institutes affiliated with the academy were also asked to reorient their activities and set up their programs to serve the respective sectors of application, a process that succeeded in some sectors and is still under way in others.

For the research institutes under construction a new policy was laid down that was based on active cooperation between the academy and the pertinent applied sector, whether in the field of industry (e.g., metallurgy and petroleum) or in the field of health (e.g., schistosomiasis), as a joint venture with respect to policy planning, management, and finance.

At the same time, the academy prepared inventories on existing scientific potential (scientific manpower, expensive scientific instruments, and libraries and their periodical acquisitions); designed plans and measures to strengthen and modernize the work of the National Information and Documentation Centre and its central science library, as well as the work of the Scientific Instruments Centre; examined the status of the research community, mainly to allow for valid norms and evaluation measures to encourage the orientation to applied and developmental work; intensified scientific relations on bilateral, regional, and international levels, with a specific bearing toward assisting the implementation of research programs and the intensification of the scientific infrastructure; and established a science policy studies unit.

Within the short life of the academy (3 years) one can observe a number of basic positive features:

- Concentration on the principle of participation, as indicated in the composition of all academy groups (equal proportions of producers and users of science) involved in planning and the setting up of criteria as well as in research.

- Concentration on the principle of links between the research community and the applied sectors, whether in designing research programs or constructing research institutions as joint ventures, or in seeking other means of ensuring and strengthening such bonds.
- Recognition of the social function of science. For the first time in the history of science organization in Egypt, the social sciences were included in the activities of the academy as the principal policymaking body in the country.
- Recognition of the principle of planning coordination as a function of the national science policy and as an approach that should be subjected to scientific study.

## Final Remarks

The integration in Egypt of national planning in scientific and other areas is still far from being reached. This is a very conspicuous negative aspect, though the reasons may be mostly external to the academy. A crucial issue is the relation between scientific research and the application of modern technology. One of the prevailing trends of thought is that an orientation toward applied research may be the solution. This is certainly true for advanced countries, where science has deep roots and traditions, and where industry, as with other sectors, has grown in the presence of science and, in most countries, as a result of its achievements. Yet in less-developed countries the situation is different, and it may be necessary to reverse the pyramid of development. It may even be argued that we have introduced many industrial plants, but not industry.

For a developing country to become industrialized, technology almost always has to be imported. Without touching on the complex question of transfer of technology, it seems that the only way to introduce technology into such a country and to build up indigenous S&T capabilities is to ensure from the outset the full participation of local scientists, engineers, economists, and so forth in the importation of that technology. Participation should start with the preliminary plans and continue through feasibility studies, choice of technologies, contractual bargaining, adaptation techniques, design, construction, experimentation, and operations. After such intensive training and experience have been acquired, research activities can be developed inside the particular plant and outside it in the concerned research institutes; these activities would start with adaptive and developmental work, and progress to applied and oriented basic areas. This is the real challenge facing not only the main policymaking body of the country but also the government and the nation as a whole: to implant technological capabilities and reduce technological dependence.