



**UNITED NATIONS
ECONOMIC COMMISSION FOR AFRICA**



ORIGINAL: English
ECA/NRD/STS/ 2(a) Malawi/94e

Report of the Round Table
on the
**Science and Technology Protocol
of the African Economic Community**

Mangochi, Malawi

21 - 25 November 1994



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1- OPENING

The opening session started with introductory remarks from the Coordinator of the Organizing Committee who thanked the Deputy Minister of Education, ECA and OAU for effective collaborative effort that had made that meeting take place. He also introduced the invited guests, organizing committee and the delegates from various countries as well as those from regional and international organizations present at that meeting. After introductory remarks the Coordinator mentioned some critical problems in science and technology affecting the African region and requested the meeting to address some of the pressing issues for the inclusion in the draft Protocol.

Statement on behalf of ECA

Mr. Soodursun Jugessur, Chief of the Science and Technology Section of ECA read the opening statement on behalf of the Executive Secretary of the United Nations Economic Commission for Africa, Mr. Layashi Yaker. He extended a warm welcome to all the participants of the Roundtable, and expressed his utmost appreciation to the Malawian authorities and co-organizer of the meeting for their relentless efforts to make it a success. He also thanked the Carnegie Corporation of New York for their financial and professional contribution to the meeting.

The representative from ECA stated that the main objective of the roundtable was to review, improve and design a strategy of implementation of the draft Science and Technology Protocol of the African Economic Community. He said that the Treaty was already in force since May 1993, including, Articles 51 and 52, which deal specifically with science and technology. The draft Protocol which will come formally into force after its ratification by the Permanent Steering Committee of the Organization of the African Unity, is the instrument of application of the Treaty in the field of science and technology. ECA, as part of the joint OAU-ECA-ADB secretariat, is charged with important responsibilities in the implementation of the Treaty and its Protocols. Regional cooperation in science and technology is also part of ECA's mandate and programme of work. For these reasons, ECA is very keen to promote and strengthen cooperation, coordination, harmonization and integration of science and technology in the region, in line with the Treaty, and contribute to the clarification, finalization and implementation of the Protocol.

The representative from ECA pointed out that one of the difficulties in dealing with science and technology stems from its cross sectoral character. For this reason, science and technology should pervade all sectors of the economy and society and be conspicuous in most of the Protocols which form an integral part of the Treaty. These Protocols, such as the ones covering human resources, - education, training and culture, - transport and communications, - energy and natural resources, - industry, - agriculture, should not be silent on the contribution of science and technology to these sectors or these areas of development. Unfortunately they have not been drafted with science and technology capacity building in

mind. Consequently, the Protocol on Science and Technology should be as comprehensive as possible and be formulated in such a way as to provide support to a wide variety of sectors and development effort.

The speaker remarked that the draft Protocol does not advocate sweeping policy reforms in crucial areas such as money, trade, investment and venture capital, taxation, subsidies, intellectual property regimes and immigration, to name but a few, that could contribute to an enabling environment which could make science and technology play its strategic role in development. In spite of efforts by ECA to bring the economic aspects of science and technology to the forefront of the Protocol, its drafting is not as explicit on the needed policy reforms as ECA would like it to be. The speaker argued that without deep policy reforms in a variety of fields, science and technology will continue to play only a marginal role in the socio-economic development of Africa. So he invited the participants to concentrate on these reforms which have a bearing on the contribution of science and technology to development and that are absolutely necessary to lift Africa out of poverty.

The representative from ECA concluded by stating that there are numerous constraints to scientific and technological capacity building -political, cultural, human, institutional, legal, economic- but that these constraints can be overcome with the right set of policies and strategies. The amazing successes of some Asian countries in this respect indicate that this is possible.

Statement on behalf of OAU

In his opening statement, the representative of the Secretary General of the Organization of African Unity conveyed to the meeting best wishes and greetings from H.E Dr. Salim A. Salim, OAU Secretary General and he thanked the Malawi Government and the UNECA for hosting and organizing such important and timely meeting. The Representative referred, further, to the Treaty establishing the African Economic Community, and he indicated that the Treaty entered into force last May 1994, following its ratification by more than 2/3 of OAU Member States. He added that the Protocols when adopted will be annexed to the 'Treaty' and form a part of it; so he appealed to the participants to carefully give their inputs for the improvement of the draft text at the meeting. He informed the Round Table members that their comments and points of view shall be examined carefully within the Secretariat of the OAU prior to the consideration of the draft Protocol by the OAU Permanent Steering Committee. Then the OAU Council of Ministers would endorse and adopt the Protocol.

The OAU delegate assured the participants that application of science and technology for Development is currently one of the priorities of the OAU with a view to improving the daily life of the African citizen and helping him in solving the pressing problems facing the African communities. He elaborated on the previous documents adopted for the same purpose and he emphasized the fact that the 'Treaty' was not only signed by the leaders but was also ratified by the legislative authorities in 36 Member States up-to-date. He added that, it is now

the role of experts to implement all what was stipulated in these documents for realizing a sustainable socio-economic development in the continent. Finally, he reaffirmed the fact that Africa is rich in natural and human resources, and what we need badly now, is to draw the necessary plans to utilize these resources to the maximum.

Statement on behalf of the Malawi Government

The Deputy Minister, Ms. C. Chipembere, opened her speech by welcoming the foreign delegates and encouraged them to visit as many places as possible during the time they were in Malawi. She pointed out that science and technology are widely accepted as the best instruments for human progress. She reminded the delegates of the role science and technology played in making a success of the Marshall Plan for Europe. She also reminded the delegates of the role science and technology played in transforming Japan from a war devastated country to an industrial giant. The Deputy Minister compared African countries now with the European countries after the second world war and concluded that Africa needs a Marshall Plan of its own which should focus on the application of science and technology in solving its economic and social problems. It was in this connection that she saw the Science and Technology Protocol of the African Economic Community as of great importance. The Deputy Minister also saw the Protocol as part of a plan that could save Africa from the economic and social ruin that it was in and called for its urgent implementation. In conclusion, the Deputy Minister of Education said her Ministry was looking forward to the recommendations the meeting would make because it was preparing for the review of the Malawi secondary school curriculum and the recommendations would help her Ministry when making improvements to the curriculum.

2- PRESENTATION OF DELEGATES AND ELECTION OF BUREAU

The delegates introduced themselves including the countries/organizations that they represent. It was clear that all delegates are involved with the application/management/diffusion etc of science and technology and therefore capable of contributing to the science and technology Protocol.

ECA Secretariat presided over the election of the Bureau. The following nominations were made and adopted.

Conference Chairperson	:	Uganda Dr Z.M. Nyiira
1st Vice Chairperson	:	Botswana Mr J.B.S. Diphaha
2nd Vice Chairperson	:	Zimbabwe

Rapporteur General :

Dr E. Mpandi-Khosa

Malawi

Dr E. Fabiano and
Prof. G.M. Mhango

Rapporteurs :

Madagascar

Prof. F. Augustine

Ethiopia

Ms A. Belay

3- ISSUES IN THE IMPLEMENTATION OF THE PROTOCOL (PRESENTATION OF ECA)

A representative from ECA, Mr Jacques Louis Hamel, introduced this agenda item. He first said that the Treaty establishing the African Economic Community was part of a global trend towards the building of larger economic zones and that the realization of the Community will undoubtedly reduce the fragmentation of the continent and contribute to its prosperity. However, Africa lags many years behind other continents in terms of economic, scientific and technological integration and the process of integration must be accelerated. The Treaty and its Protocols offer an instrument and a political commitment to achieve this objective.

The speaker asked how many participants were familiar with the Treaty and its articles 51 and 52 which deal specifically with science and technology issues. These articles should be used as starting points for promoting cooperation and coordination in the field of science and technology, for harmonization and integration of science and technology policies and programmes on the continent, and for regional capacity building in science and technology in general. The speaker went on commenting each item of article 51 and how it relates to the draft Protocol. He pointed out the usual bias in the concept of science and technology, that is that science and technology in policy documents, including in the draft Protocol, is construed too narrowly as meaning mainly scientific research. He also pointed out that the economic aspects of science and technology were neglected and that the draft Protocol should be improved in this respect.

The speaker remarked that the draft Protocol, in its present form, is not much different in its spirit from other regional policy documents in science and technology adopted by the highest political authorities, such as the science and technology chapter of the Lagos Plan of Action, CASTAFRICA I and II and the declarations of the Pan African Union of Science and Technology. The draft document displays the same strengths: it calls for cooperation, coordination, establishment or strengthening of infrastructure, institutions and programs, harmonization of laws and policies and political commitment to science and technology. The

draft document also displays the same weaknesses: it is rather silent on the economic reforms that are necessary for science and technology to play its full and strategic role in development. These concern supportive or conducive trade, investment, licensing, joint venture, credit, venture capital, immigration, intellectual property protection and technology transfer laws and regulations within the context of a stable, private, liberal and open economy.

The speaker pursued by specifying areas of cooperation which should be strengthened, including policy institutions building, policy formulation, information and documentation, training and harmonization of laws and regulations which affect the contribution and performance of science and technology. The speaker indicated that coordination should be strengthened in the field of R & D effort and international negotiation related to science and technology. Regional integration can also be supported by revitalizing professional and intergovernmental institutions in science and technology.

Summary of discussions

It is important to note that science and technology is multidisciplinary and therefore there is need for scientists to work with people in other disciplines such as business. It is also necessary to acquire broad training in science and technology. It was also highlighted that time frame to achieve outlined objectives is important. That is why according to OAU, the Treaty establishing the African Community is different from other Treaties. The modalities for establishing the African Community is outlined in article 6.

It was indicated that a Treaty affecting many countries must remain general while the instruments for development of science and technology both at national, sub-regional and regional levels are carefully developed and their implementation carefully monitored for further integration. Deliberate policy reforms can increase the production and consumption of a technology.

4- IMPROVEMENT TO THE DRAFT PROTOCOL AND POLICY REFORMS REQUIRED FOR ITS IMPLEMENTATION: A REGIONAL PERSPECTIVE

Ms Abeba Belay, a consultant from Ethiopia introduced her paper entitled: "Improvement to the draft Protocol and policy reforms required for its implementation: a regional perspective". She started her presentation by a brief assessment of science and technology situation in Africa. In connection with this, efforts, achievements and problems in science and technology development in Africa were shortly outlined.

With this background, the presenter directly discussed the amendments and inclusions to the Protocol. The suggestions and comments proposed took into consideration, the need for specific and action oriented Protocol, setting of priorities and the inclusions of articles on financial commitment of the member states' and establishment of a special organ responsible for the implementation of the Protocol.

In view of these general comments and inclusions, the speaker suggested specific amendments pertained to the reshaping of the priority areas in such a way as to reflect the objectives of the Protocol, consolidation of provisions under article 5,6,7 into one article as article 4 to avoid redundancy and maintain clarity.

The presenter, then outlined urgent measures to be taken at the regional level with specific reference to the establishment of a regional machinery to monitor and coordinate the implementation of the Protocol, formulation and implementation of subregional and regional science and technology policies, strengthening of science and technology, cooperation in science and technology, strengthening of existing specialized regional science and technology institutions and establishing new ones, firm political will and commitment, establishment of African Science and Technology Fund Development for reforms in macropolicies, science and technology manpower development and setting of priorities.

In this connection, the presenter also mentioned some of the priority policy reforms towards the achievement of the objectives of the Protocol. These include, investment policy, fiscal policies, monitoring policies, foreign trade policy, immigration policies and education policies.

Finally, a programme of actions and strategies were proposed stressing the following points: establishment and strengthening of national, subregional science and technology machineries, formulation and implementation of national, subregional and regional science and technology policies, strengthening and establishing of science and technology infrastructure, strengthening of science and technology education, application/commercialization of R&D results, encouragement to the private sectors, harmonization of national, subregional and regional technology, transfer policies, and intellectual property laws, popularization of science and technology, mobilization of sufficient financial resources and conducting of scientific and technological potential survey in all member states.

Summary of discussions

In this paper, quite a number of points were raised. There was some indication that Member States contribute far less than 0.4% of GNP; this affects science and technology activities. There is also lack of sharing of science and technology resources which include both human and equipment.

It was indicated that African Governments should commit themselves to science and technology through:

- (i) action oriented science and technology policies and
- (ii) identification of priority areas which are specific and in line with regional development plans.

The need for promotion of self sustained development was also discussed - but it was agreed that science and technology must be industry driven. Development of Regional Centres of Excellence was discussed and recommended. However, these centres would require significant resources which are now lacking in the region.

5- IMPROVEMENT TO THE DRAFT PROTOCOL AND POLICY REFORMS REQUIRED FOR ITS IMPLEMENTATION: A NATIONAL PERSPECTIVE

Dr. E. Fabiano of Malawi gave background information on the efforts made in Africa and Malawi to promote science and technology as well as R and D and the problems that have been met. It was stated that the problems include lack of and inability to implement science and technology policies due to insufficient consultation at sectoral level on policy issues on science and technology. Lack of strong and influential bodies to advise government, lack of commitment by government to allocate a specific percentage of the development budget to science and technology activities, insufficient competent and motivated manpower, insufficient material resources, inadequate popularization of science and technology, inability to transfer technologies developed to the entrepreneurs and the lack of a comprehensive information network have contributed to the slow pace at which Malawi is implementing its policy on science and technology.

The speaker then outlined what policy reforms are required in Malawi for the country to conform to the objectives of the Protocol. Strategies to overcome some of the constraints identified have been given in broad terms. The proposed policy reforms involve reversing situations as contained in the above paragraph so that science and technology activities are enhanced. Similarly, the strategies, although general, indicate how the policy reforms can be implemented.

6- IMPROVEMENT TO THE DRAFT PROTOCOL AND POLICY REFORMS REQUIRED FOR ITS IMPLEMENTATION: A SECTORAL PERSPECTIVE

Prof. Mjojo, consultant, said that Africa should have to apply strategic planning and management methods to transform its member States into regional and global players in the application of Science, Engineering and Technology (SET) for development. With the multiplicity of technological choices available to Africa rapidly increasing, the opportunities for applying Science, Engineering and Technology to transform life prospects of her people have never been so great. Sadly, either Africa is totally ignorant of these technological opportunities, or does not have the management capacity by which technologies can be transferred and disseminated.

Africa must move with utmost urgency to build national capacities to manage technology transformations in member States in order to improve her market share in all sectors of consumer technology, and to take full advantage of the 2020 vision realities. The

2020 vision realities refer to business transformation strategies that seek the most optimum path for securing a winning position on the globe by the year 2020 when information technology ages. Information technology shall dominate economies of all winning nations by the turn of the century. The majority of African states have not even begun to consider implications of these developments. On the time-frame of technological transformations in the USA, the present stage of development of Africa corresponds to the mid-1800's. On the other hand, the same development stage corresponds to the first half of the present century on the Japanese technology time-frame.

Drastic measures are needed if Africa is not to deteriorate into anarchy due to ever creeping poverty. Measures recommended include heavy investments in secondary and tertiary education to improve the production of a well-trained work-force in SET, emphasis on process innovation as opposed to product innovation in R & D, launching of a programme of workshops in technology management, creation of cabinet committees on SET to be chaired by Heads of State, creation of strong Ministries of SET that are designed to exercise functional authority over all Ministries, and promoting access to personal computers in order to encourage computer literacy in member States. The latter recommendation is designed to promote the transition to an information economy in Africa.

Summary of discussions

It was observed that the presentation by Professor Mjojo emphasized what needs to be done if the African Community is to develop. There needs to be a science and technology revolution.

The suggestion for member States to establish Ministries of Science and Technology and the Environment was seen as setting up a structure which has to struggle for funds with other Ministries unless special arrangements are made so that the Ministry of Science and Technology and the Environment is accepted by the Ministries to be a priority and its line of operation with other Ministries is horizontal rather than vertical.

There was agreement that market demand stimulates both science and technology and R & D. On the other hand Africa is failing to utilize world technologies and market opportunities that would help to improve the well being of its populations.

In trying to cooperate with other international organizations such as OECD, member States should establish regulations on intellectual property laws and procedures designed to benefit them.

7- NATIONAL / REGIONAL/ SECTORAL PRESENTATIONS

Ethiopia

In view of the whole gamut of the spirit of the amended draft Science & Technology Protocol, Ethiopia has so far made a considerable effort in terms of formulation of science & technology policy, establishing of S&T support science and S&T cooperation.

The Transitional Government of Ethiopia has approved the revised national science and technology policy on December 1993. In addition sectoral science and technology policies have been formulated for priority sectors, namely agriculture, industry, health and water resources, energy and mining.

Substantial effort has also been made to establish and strengthen the S&T Information and Documentation Centre, engineering design and tools enterprise, patent and technology transfer depots, S&T popularization and national scientific equipment centre.

Ethiopia has also appreciated and expressed her interest in pursuing the inter-state cooperation, harmonization of policies and integration of programs among member States in various occasions.

Policy statements on science and technology should be responsive and pro-active.

There is a spirit of commitment to support science and technology through establishment of a science and technology policy with associated infrastructural framework to implement the objectives of the science and technology policy.

The establishment of structures to provide funding and material resources as well as training and other awards will assist in the effective implementation of both the national science and technology policy and the Protocol.

Botswana

Although Botswana is not benefiting fully from technology transfer (including the knowledge base) from South Africa, it is benefiting from using the technology and it is attracting investments in industrial technologies.

It was recommended that member States should put in place legislation to promote science and technology.

Since R&D requires multidisciplinary expertise to be successful, governments should put in place appropriate structures to promote this.

A needs assessment of industries and consumers is important before meaningful science and technology is implemented.

ECA and OAU should assist countries that are in the process of developing or have not yet developed their science and technology policies.

The following have been identified as key elements of a S&T Policy for Botswana.

- a. Policy Planning and Legislation
- b. Research and Development
- c. Commercialization of R&D
- d. Technology Support Services
- e. Human Resource Development
- f. International Collaboration
- g. Centres of Excellence
- h. Technology Information Systems

There are various aspects of S&T that will require special attention. These are:

- a. Technology Forecasting
- b. Techno-Economic Evaluation
- c. Intellectual Property and Patents
- d. Technology Management

These will be dealt with under the different S&T elements listed above.

Specific S&T Objectives.

In Botswana, the specific objectives of the proposed S&T policy will be in support of the industrialization process with the private sector playing a key role. A detailed exposition of these S&T elements will be presented in six chapters of the proposed national policy document as follows:-

- 1 This is an introductory chapter. It will discuss the terminology and definitions of commonly used words and phrases on S&T. This Chapter will also trace work on S&T policy over the last 12 years.
- 2 The worldwide survey of S&T practices will be presented in this chapter. The main aim of this chapter will be to demonstrate how S&T has been successfully used elsewhere, and how, with appropriate adjustment, relevant strategies can be developed for Botswana.
- 3 Chapter 3 will be concerned with Botswana's public sector policies. The objective is to determine to what extent these policies are supportive of S&T.
- 4 Chapter 4 will be a detailed description of the Botswana's economy, including the development of a mathematical model with S&T as an independent variable.

5 With the benefit of the preceding chapters, the case for a S&T policy for Botswana will be developed in chapter 5. It is here that the final form of the S&T policy will emerge.

6 The exact policy formulation will be presented in this chapter. Thus chapter 6 will constitute the final S&T policy document to be presented to Parliament for approval and implementation.

It is planned to mount a series of seminars, involving all the stakeholders, to explain and discuss the S&T proposals.

Congo

The delegate from the Republic of the Congo appreciated the arrangements made for the Roundtable and urged the delegates to formulate clear recommendations and proposals to African countries and international aid donors to sensitize them to the importance of science and technology to ensure the development of the continent. The Congolese delegation would like to contribute to this round table by analyzing the present situation and the perspectives for the development of a national science and technology system whose preoccupations are largely related to those of the Protocol under discussion. On the other hand, the Congolese delegation felt that the question of harmonizing the status of staff involved in carrying out science and technology activities has not been given the due attention it deserves, which is indeed prejudicial.

There is need for science and technology to be action oriented if it is to promote socio-economic development.

There is need to establish international, national and sectoral structures that will promote science and technology.

Gabon

There is need to develop human resources to implement whatever science and technology activities are planned.

There is also need for OAU and ECA to influence politicians in the African Economic Community to support science and technology.

The problem associated with failure to implement science and technology policies as presented by Malawi were accepted as general problems affecting most countries in Africa.

Like Malawi, governments in other countries are being requested to provide the necessary human, material and financial resources for institutions to implement science and technology policies and their objectives.

Both industry and the public sector should take their rightful role in science and technology activities and R & D work.

It is important that the needs of industry as well as the needs of consumers should be established and priorities decided upon before large expenditures on R & D work are carried out.

The importance of intellectual property laws and practices should be well understood by R & D institutions and individual workers before technology transfer within or from outside the country is carried out.

There is need for developing or expanding expertise in technology management and commercialization.

Uganda

In Uganda the science and technology promotion and development institutional framework comprises the Uganda National Council for Science and Technology which provides guidance and direction for the national research and development system (Universities and national research institutions), the private sector and science and technology product delivery system. The Council is a facilitator, providing not only guidance and direction but also coordinating national science and technology development efforts and advising government and the public on all matters concerning science and technology in line with national development aims.

A national science and technology policy was formulated. It is being implemented through two approaches. The Cabinet was requested to enact it, and at the same time, the components of the policy are being incorporated in the national development plan directly for adoption and implementation by sector institutions.

Whereas research still enjoys significant emphasis especially in agriculture and medicine, Uganda's priority is adaptive research as well as copy technology and the transfer of technology through investment capital and liberalization policies.

The Council has strengthened linkages with national research institutions through the Consultative Forum on Science and Technology and the Network of National Research Institutions, with the private sector through collaboration with the Uganda Manufacturers Association and Small Scale Industries Association. The two latter institutions belong to and have great influence on entrepreneurs.

The Council is working on a strategy to initiate a continuing Parliamentary Consultative Forum to mobilize support for science and technology.

It is envisaged that the Science and Technology Protocol of the African Economic Community will be implemented under the institutional framework of the Uganda National Council for Science and Technology, a statutory body which government established to advise itself on matters of science and technology and for promotion and development of science and technology. The Council therefore, is expected to be responsible for the implementation of the Protocol through the strengthening of science and technology capabilities, promotion of cooperation in-country and beyond in the acquisition and application of science and technology and the harmonization of intellectual and industrial property laws, practices and procedures, as well as the development of cooperative programmes which foster the impact of science and technology on Africa's economic and social well being.

The shift in emphasis from research to application of science and technology is likely to address the immediate needs of science driven, technology based social and economic development.

The industrial sector is crucial in influencing the implementation of R&D results. Therefore, the industrial sector must be fully involved during R & D work in academic and public research institutions.

Zimbabwe

1. In brief, the Scientific and Industrial Research and Development Center (SIRDC) will strengthen scientific and technological capabilities of Zimbabwe by undertaking R & D activities on projects designed to develop expertise in different technologies for both the private and public sectors, and to develop high quality prototypes and processes.
2. The SIRDC will promote cooperation in the acquisition and assimilation of science and technology and its adaption to local conditions by provision of technical advice and support to small scale farmers, resource poor individuals, cottage industry operators, informal sector and emerging industrial entrepreneurs wishing to launch productive enterprises.
3. It will harmonise intellectual property laws and practices particularly in the BRI where it will generate expertise to contribute to sound national and international biosafety and legal procedures on issues related to biotechnology.
4. The SIRDC will develop a wide range of collaborative research projects with other universities and institutes particularly the University of Zimbabwe. It will serve as a referral and consultancy centre for technical information to individuals and organizations seeking such assistance. In this way it will fulfil the last objective of the Protocol, that of strengthening the scientific and technological institutions.

The approach being adopted by the SIRDC to undertake R & D activities on projects designed to develop expertise in different technologies for both the private and public sector is worth emulating.

Acquisition and assimilation of science and technology and its adaptation to local conditions is an important element for technological advancement of a country.

Collaboration between academic and research institutions in both science and technology as well as R & D work is crucial to take full advantage of the human and material resources available in the country.

Cameroon

A brief account was given of the measures taken by the Ministry of Scientific and Technical Research (MINREST) and her predecessors in Cameroon in the direction of implementing the stipulations of the draft Protocol by the African Economic Community on science and technology. The account reveals that Cameroon has gone a long way towards the expectations (stated in the Protocol) of the African Economic Community. However, a sub-regional/regional outlook, although formalized in (professional networking/associations, conferences abroad, etc) is highly facilitated by government. Moves towards regionalization are directed by economic factors (pooling of facilities and efforts, sharing of facilities and results, avoidance of duplication, cost effectiveness) and have a tendency to be donor-driven. Efforts must be made to have priorities and regionalization initiated by member States.

PanAfrican Union of Science and Technology (PUST)

- I. The intervention by the Secretary General of the PanAfrican Union of Science and Technology started with three general remarks:
 - i. Most of the presentations on science and technology in Africa rarely bring new elements. Today's presentations repeat those of the 70's.
 - ii. Many Science Institutions in Africa suffer because of lack of financial support.
 - iii. The cooperation in science and technology in Africa is possible for Africa to develop. Africa must develop a true culture of cooperation.
- II. As far as the Protocol in Science and Technology is concerned, one would have wished that it concentrates on:
 - i. Concrete actions to be undertaken on short, medium and long term.

- ii. Means to implement financial and human.
- iii. The follow-up to these activities; create adequate mechanisms in the Protocol, define the role of OAU, ECA, ADB, NGOs, Industries etc ...

In the framework of these activities, PUST has:

- i. prepared a document related to the scientific and technological planning at national level;
- ii. drawn-up a compendium on technologies related to food self-sufficiency;
- iii. Funded about twenty research topics on food self-sufficiency, biotechnologies, energy, new and renewable.

As far as the future actions are concerned, PUST and OAU will organize a regional seminar in Cairo (Egypt) on the biotechnology in Africa, in 1995.

The PUST has envisaged to organize a symposium during which the African scientists will involve themselves in the logistics of the institution of the African Common Market.

African Intellectual Property Organization (AIPO)

The African Intellectual Property Organization (AIPO) supports the ideas of the Protocol in Science and Technology for the African Region.

If the present trends persist, trends which are characterized by sharp financial crisis and lack of commitment on the part of African States, it would be difficult for a single country to fund the implementation of the development policies in the fields as varied as technology, research, industry, energy, transport, agriculture, metallurgy etc.....

The AIPO thinks that the Intellectual Property Offices should propose a system of intellectual property for the whole continent. It also thinks that the continent should have a common position and use the existing potentialities notably in subject of intellectual property each time Africa makes her voice heard.

On the other hand, each African body and country should have precise actions to take in each of the priority areas in the development of the continent.

African Technology Policy Studies (ATPS)

The African Technology Policy Studies network, ATPS is a body of interdisciplinary researchers in fifteen Anglophone African countries. Network membership includes scientists in all the physical sciences, engineers in all engineering fields, social scientists, anthropologists, historians and business managements specialists. ATPS is the successor to two earlier networks that have been carrying out science and technology policy research since 1982. In the twelve years of research over 80 studies have been funded by two donors - International Development Research Center, IDRC and Carnegie Corporation of New York. The Rockefeller Foundation has joined these two donors in ATPS which started operation in January, 1994.

The contribution of ATPS towards the implementation of the Protocol on science and technology of the African Economic Community is in the area of providing empirical evidence through research results to guide the formulation and implementation of S&T policy. Over the years various studies have indicated certain directions for S&T policy on the African continent. While it is difficult to be exhaustive, the broad conclusions that are indicated are: that technological development in Africa has to be demand-driven; that research and development activities have not been linked with the productive system in Africa, and only when this link is forged can the activities be demand-driven; that the private sector has not been the principal focus of S&T activities, which it should be in order for technological progress to be made; that the institutional arrangements for S&T need to be more clearly articulated in order to provide the basis for a demand-driven technological development; and that the policy making paradigm needs to be changed so that all the major players are included in the process: government, private sector, researchers and those who bear the consequences and benefits of policies.

Summary of discussions (AIPO, ATPS AND PUST)

There is need for more scientific and technological cooperation on the African continent so that member States can begin to be more practical than is the case now.

It is important that science and technology activities should take into consideration the tax payer who is also the consumer of services and products.

These organizations have expertise that should be tapped from time to time.

The organizations can assist with funding, seeking funds and have access to other expertise that may be needed by member States.

There is need for these organizations to organize regular meetings for the benefit of individuals as well as institutions involved S & T activities or R & D work.

8- RECOMMENDATIONS FOR THE IMPROVEMENT AND THE IMPLEMENTATION OF THE DRAFT PROTOCOL

The Conference discussed all papers from the consultants including those presented at national levels from countries present as well as those from regional, international organizations. The conference also discussed article by article the Protocol in order to facilitate possible amendments and additions where necessary.

After long discussions, the conference recommended the following:

- a) The OAU is to take into consideration the proposed amendments and additions included to improve the spirit and wording of the draft Protocol.
- b) Since some member States in the region do not have science and technology policy, UNECA should provide or seek resources to help countries formulate science and technology policy in countries where these do not exist in order to facilitate the implementation of the Protocol.
- c) Where there is need for technology negotiation, Governments should involve as far as possible Intellectual Property Organizations in the region in order to benefit from their expertise in this field.
- d) Accepting that technology is dynamic, governments should periodically review their science and technology policies taking into account the science and technology Protocol. The review should be sectoral, national and regional taking into account pressing needs.
- e) Governments should establish a national science and technology fund. This fund is for the execution of science and technology programmes. Part of this fund should be contributed for regional activities and institutions.
- f) Trade policies should be formulated to be more supportive to science and technology capacity building. Immigration policies should guarantee the free movement of scientists, engineers, technologists and business people by granting them passport with the minimal formalities, abolishing exist visas where they still exist and granting entry visas at airports.
- g) At national level, governments should have institutional framework to provide guidance and direction on matters affecting science and technology. There should be harmonization of economic and science and technology policies conducive to science and technology.
- h) Members states are urged to formulate and harmonize sound subregional science and technology policies.
- i) The OAU in cooperation with ECA and other regional organizations is urged to assist in the establishment of national, subregional and regional data banks to enable the region to

benefit from information sharing and also access international science and technology information network.

- j) The OAU and ECA should encourage member states to develop their science and technology centres. Some of these should be identified as regional centres and for which resources should be mobilized with a view of developing them into centres of excellence.
- k) Member States should be encouraged to:
 - i) develop a science and technology culture
 - ii) review the school curricula by increasing the science and technology content
 - iii) encourage girls and women to take science and technology subjects.
- l) Member States should formulate and put into place forward and outward looking, comprehensive, integrated and competitive science and technology policies.
- m) Member States should promote private sector, market oriented and open science and technology systems.
- n) Member states should implement investment taxation policies encouraging:
 - i) research and development in small medium and large scale enterprises
 - ii) the links between universities, research centres and industry
 - iii) venture capital funds for financing technological development
 - iv) diffusion of the key or strategic technologies through accelerated depreciation and other means.
- o) Member states should ensure that science and technology is market driven.
- p) Member states need to invest heavily in secondary and tertiary education to unprecedented levels with emphasis on human resource development in SET. Efforts should be made towards electronic tutoring that could be adopted as supplementary teaching strategy to overcome the severe shortage of teachers and textbooks in SET, and adequate laboratory equipment should be provided. The educational system in member States should improve the scientific and technical work-force potential from the continents's average of 3,451 (in 1985) to at least 30,000 per million by the year 2020. The status of the teacher as the primary driver of SET should be elevated.

q) Member States should promote information technology through the acquisition of computers and launch extensive computer literacy programmes in their countries. Personal computer loan schemes must be implemented to reach the target of at least one-tenth of population having access to a computer by the year 2000. Import duties for personal computers on such schemes should be removed.

r) Every member state should create a cabinet committee on SET to be chaired by the Head of State or Prime Minister. This should ensure adequate political and financial support in all sectors that are affected by science and technology.

9- DISCUSSION OF PROTOCOL ON SCIENCE AND TECHNOLOGY

The Roundtable discussed the Protocol, item by item, and made recommendations to the OAU that the amendments and additions given below should be considered for incorporation during the finalization of the Protocol.

Preamble

Last paragraph

Agreed on the amendment as follows:

Convinced that harmonization of policies, coordination of efforts and cooperation among African countries in the application of science and technology is fundamental and a prerequisite to achieving sustainable development.

Article 2

Objectives

Under (a), include part (iv) which emphasizes the importance of sharing of human and material resources and information

subarticle (c) and (d) are not objectives by themselves and are proposed to be eliminated;

objectives should be stated as simple as possible to be understood by everybody.

Article 3

Policy areas

subarticle (f) is suggested to be struckout and incorporated in article 5;

subarticle (g) is replaced to read as 'Integration and harmonization of science and technology policies into economic policies'.

Article 4

Cooperation in intellectual property matters

Member countries commit themselves to:

- (a) harmonise the laws and procedures in intellectual property matters with a view to promoting the inventive activity in the actualization of research results in the community;
- (b) entrust the creation of an appropriate intellectual property system to specialized institutions in this area on the continent;
- (c) call upon the competencies of African intellectual property institutions at the time when Africa's voice should be heard on the international scene on matters involving intellectual property;
- (d) Strengthen sub-regional and regional intellectual property institutions with a view to increasing their capacity for the storage and diffusion of information on intellectual property.

Article 6

It is suggested to merge subarticle (a) and (b) to read as follows:

strengthen national, regional and continental institutions and centres concerned with science and technology with a view to enhancing their capacity and capability on science and technology and the application of research results to solving Africa's economic and social problems to improve the quality of life of their population, particularly that of the rural population;

Subarticle (c) and (d) are proposed to be transferred to article 7.

Article 7

Heading to be amended as 'science and technology training and information'.

Article 8

Adopted as it exists

Article 9

Heading should be amended as 'monitoring and implementation' and amended to read as follows:

The council shall set up appropriate mechanism for monitoring and implementation and issue regulations to facilitate the implementation of the Protocol at national, subregional and regional levels.

10- EXAMINATION AND ADOPTION OF THE REPORT

The draft report was presented by the rapporteurs and was adopted with amendments. The amended draft Protocol is available separately.

11- CLOSURE OF MEETING

The chairman and the representatives of ECA and OAU closed the meeting after thanking all participants, the consultants, the rapporteurs, the interpreters and the personnel of the secretariat, including the translators.

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