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1.0 ORGANIZATION OF CONFERENCE AND WORKSHOP

VENUE, DATE OF CONFERENCE AND WORKSHOP

The 2003 Annual Conference and Workshop of an autonomous African Technology Policy Studies Network (ATPS) was held at the Sun Hotel in Maseru, Lesotho, from November 10 to 15, 2003.

SUPPORT FOR THE CONFERENCE AND WORKSHOP

The 2003 Conference and Workshop was organized by ATPS and hosted by Lesotho's Ministry of Communication, Science and Technology.

THEME OF CONFERENCE AND WORKSHOP

The theme of 2003 ATPS Conference and Workshop was "Science and Technology and Food Security in Africa."

OBJECTIVES OF THE CONFERENCE AND WORKSHOP

The objectives of the conference and workshop were:

1. To bring African perspectives to bear on the perennial problems of food insecurity in Africa.
2. To discuss ways in which science and technology policy could contribute to enhance food security in Africa.
3. To share knowledge, experiences and expertise on science and technology policy initiatives in Africa and beyond, with a view to improving food security in Africa.
4. To appraise African scientists of the scientific, technological and biotechnology initiatives in other countries with a view to drawing useful lessons in reducing food insecurity in the African continent.
5. To review proposals for research by scientists on science and technology policy.
6. To bring ATPS chapter co-ordinators together to discuss and review their activities of the year, the progress made and the plans for the year, and to brief the Secretariat on the problems encountered.
7. To hold the ATPS Annual General Meeting.
8. To conduct a writing skills and research methodology workshop for participants.

Workshop and Conference Process and Methodology

The first two days of the meeting were devoted to plenary presentations by experts in various fields of science and technology and food security. The next two days were devoted to presentation and review of research proposals in the areas of agricultural policy; information and communication policy; technology transfer; trade and industry; intellectual property rights; gender ; small and medium enterprises; and technology policy issues. A research methodology training and writing workshop was held on the fourth day. The ATPS Annual General Meeting was held on the fifth day of the workshop and the National Co-ordinators Meeting held on the sixth day. In addition to the plenary presentations and review of proposals, an exhibition was mounted on various biotechnology initiatives in Lesotho and other countries. The exhibitions included traditional medicine and publications on science and technology policy.

There was also an exhibition by chapters on their activities, won by Ethiopia.



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2.0 Conference and Workshop: An Executive Summary

African scientists, experts, policymakers, civil society organizations and representatives of international organizations from over 24 African countries met in Maseru, Lesotho, between October 10 and 15, 2003 to deliberate on the perennial and persistent food insecurity problem in sub-Saharan Africa and to provide African perspectives towards a holistic approach to finding solutions to the problem, including the use of relevant tools of science and technology.

The following points summarize the deliberations and agreements at the conference:

1. Participants noted with satisfaction that this conference was not only timely but more importantly the only one among many on this critical issue with a deliberate, strong African perspectives;
2. The conference acknowledged that sub-Saharan Africa is the only continent experiencing chronic food insecurity, largely because of the dependence on rain-fed agriculture, in spite of the great advances in the agricultural science and technology;
3. The conference noted that food insecurity in Africa is as a result of several failures: the failure of the international and national agricultural research systems; domestic policy failure, especially regarding science and technology; institutional weakness and market failures as well as the failure to locate the food security problem within an economy-wide innovation system;
4. The conference argued for the exploration of a new way of measuring the performance of both the international and national agricultural research systems. The new way would incorporate incentives that require scientists to look beyond the laboratories and experimental systems,
5. requiring more interaction with social scientists, ultimately to better appreciate policy imperatives and the requirements for moving from science to innovation;
6. Participants expressed concern that there are weak links or virtually none between the international agricultural research systems and the national systems and urged for stronger partnership and collaboration between the two in a manner that minimizes the differences in status and the condescending attitude of the international systems as generators of knowledge and the national systems as mere extension agents;
7. Participants compared the experience of Asia with that of Africa and noted that one significant difference in the success of Asia's green revolution was the critical investment in water prior to the green revolution policies. Such investment is lacking in Africa where access to water resources and irrigation technology is still limited. This is an issue that is compounded by significant differences in ecological, environmental and socio-cultural endowments within and across African countries that make application of research results across countries very costly. In this respect, the conference noted that scientists exaggerate the universality of agricultural science, often minimizing the costs of transferring or adapting research knowledge from one ecological zone to another, and thus leading to frequent adoption failures;



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8. The conference discussed the importance of new technology, and in particular, how biosciences can be used to improve food security in Africa. It was noted that, in general, bioscience research relating to livestock is expensive and under-funded. Participants lauded the idea of establishing centers of excellence where facilities and resources can be shared by many countries. These centers would in turn serve as hubs for the much needed public-private sector partnership both in the extension services and in the investment for technology uptake. Again, the conference emphasized that African researchers and institutions should have key roles in the design and implementation of programs associated with these centers of excellence;
9. The conference noted with dismay that although Africa is largely agrarian, the poverty reduction strategy papers (PRSP) already prepared in several African countries have assigned no role to agricultural science and technology and the policy imperatives associated with this;
10. Participants reiterated that technology-led development is a leader-driven endeavor and that African leaders must show greater interest and take charge of the process that deploys science and technology to solve food insecurity in Africa, and ensure that agricultural technological capabilities are built and that African scientists are significantly utilized in this process;
11. Participants observed that food insecurity in Africa is concern to African governments and the international community but that donor dependence cannot lead to a sustainable solution;
12. In their concluding remarks, the conference participants noted that Africans and African institutions should be strengthened to find a lasting solution to food insecurity because they better understand the African farmer, her cultural and environmental setting and the institutional requirements for the transfer knowledge to the farmer; and
13. The discussions of the conference were further guided by several commissioned thematic papers on some of the key issues that affect agricultural performance in sub-Saharan Africa: 1) WTO and the future of Africa's agriculture; 2) From Science to Production: Transferring Knowledge to the Rural Farmer- What works and What Doesn't; 3) Integrating Indigenous and Scientific Knowledge for Improved Food Security in Africa; 4) The Biotechnology Revolution and Its implications for Food Security in Africa; 5) Agricultural Biotechnology and its implications for Food Security: Lessons from Asia and Latin America; 6) Harnessing Information and Communication Technologies for Improved Agricultural Performance in Africa; 7) Gender Dimensions of the Current Agricultural Performance in Africa; 8) Why has Africa Fallen Short of Building Dynamic Agro-processing Capabilities: Constraints, Options and Prospects?; and 9) Markets, Institutions and Agricultural Performance in Africa.

The World Trade Organization (WTO) and the Future of Africa's Agriculture

14. The conference noted that generally trade liberalization potentially could benefit Africa's agricultural performance by opening markets. Yet, WTO as an institution lacks complete transparency in its process and embodies in its structure, a great deal of power asymmetry in representation between members. The conference, therefore, noted that the key to effective participation in WTO lies in capacity building of negotiators, and in Africa using its best people in the negotiating process. Africa must be fully engaged in the negotiations on the removal of agricultural subsidies by industrialized countries as well as in shaping the WTO's development agenda;
15. It was agreed that while this regime is important, there are other key factors that affect the performance of agricultural commodities in the external market such as investment in water and rural infrastructure, production techniques, standards and access to technology;

From Science to Production: Transferring Knowledge to the Rural African Farmers

16. The conference noted that the key to the transfer of knowledge to farmers lies in understanding the African farmer, her environment, economic and socio-cultural circumstances. The participants noted that some of the bottlenecks to successful transfer of technology include inappropriate packaging of technology and information, lack of participation by recipients in the knowledge

generation process; abrupt or lack of funding continuity; inefficient or inappropriate markets and institutions;

17. Participants also discussed successful transfer experiences in Eritrea involving the National Agricultural Research and Extension Systems (NARES) and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the sorghum project in Nigeria and the East African Uji Mix. It was agreed that lessons from successful transfers will be documented in order to fully appreciate the players and institutions involved and how these experiences can inform a national systems of innovation approach to food security;

Integrating Indigenous and Scientific Knowledge for Improved Food Security

18. The conference noted that scientific knowledge is validated based on experiments while indigenous knowledge could be tacit and is validated based on experience. The participants agreed that knowledge partnership is important, integrating both, and leading to innovation that capitalizes on the strength of both. Indigenous technological knowledge (ITK) is affordable, adaptable, and sustainable for the most part, and provides for non-formal agricultural education. It therefore strengthens farmers' confidence and capacity to solve problems;
19. The participants noted that an experiment carried out in Kenya showed that some ITK methods were as effective as scientific methods. The integration of both saw farmers making informed decisions on crop management and production options while enabling researchers to forge stronger links with the farmers, cultivate their confidence and established a stronger basis for further experimentation and integration of both methods. The participants further noted that incentives must be put in place to encourage scientists to work with farmers and to link their work to ITK in an institutional framework that recognizes the strengths of both knowledge generating processes;

The Biotechnology Revolution and its Implication for Food Security in Africa

20. The conference acknowledged the potential benefits of biotechnology in attaining food security but noted that the danger lies in the absence of capacity in Africa to make sophisticated choices, analyze and localize the benefits as well as the capacity to manage the attendant risks; hence the need for investment in research and training. In most of Africa, the policy framework for evaluating and domesticating biotechnology is lacking. The conference noted that this should be the first order of priority;
21. Participants noted that biotechnology is misunderstood in Africa leading to misinformation, confusion, generalization and simplistic assumptions. The conference noted that Africa should examine the whole spectrum from tissue culture to Genetically Modified Organisms (GMOs). They also noted that strong incentives should be provided to encourage the formation of strategic alliances and the participation of the various key players in this field. These alliances would be useful in influencing, for the benefit of Africa, the global governance regimes that are emerging, requiring flexible enforcement of intellectual property rights and responsive regulatory policies that address the needs of Africa;

Harnessing Information and Communication Technologies (ICTs) for Improved Agricultural Performance in Africa

22. The conference noted that ICTs could be used as strong tools to improve the performance of agriculture in Africa through improved training, speedy access to marketing information, extension services, and meteorological information. Participants noted examples of agricultural skills formation among rural women using telecentres and the use of ICT to educate, successfully, rural women on sustainable use of natural resources in food production;



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23. The participants also noted that the benefits of ICTs to the rural farmer need to be further interrogated to avoid “oversell”. Locating telecenters in rural areas does not translate into access and benefits. Of critical importance is the information content, its relevance to the needs of the farmers and the integration of their socio-cultural relevance in the packaging and delivery of the information;

Gender Dimensions of Current Agricultural Performance in Africa

24. The conference noted that women play significant roles in Africa’s agriculture. The participants observed that in order to understand the gender dimension of Africa’s agriculture, one must examine it in the context of the role of women in Africa’s development, and the factors that militate against their leadership role in the economy in all its facets. Women are the producers and laborers on the farm but the institutions that support agriculture are led by men. This state of affairs is compounded by having extension services that are not sensitive to women’s learning behavior and to other constraints that confront women in an African society;
25. The participants recognized that the HIV/AIDS scourge with higher incidence among women would affect adversely the performance of the agricultural sector, the nutritional status of women and children, and increase overall gender inequity. This suggests a strong need to examine the issues more holistically rather than sectorally;
26. The conference noted that the challenge in attaining gender equity was to deepen democracy in Africa, including democratization of access to technology, integrate women’s concerns in the political discourse, and ensure greater participation by women with men and women working in partnership to address developmental goals such as food security;

Why has Africa Fallen Short of Building Dynamic Agro-Processing Capabilities: Constraints, Options and Prospects?

27. The participants noted that a dynamic agro-processing capability was essential in improving the performance of agriculture in Africa and for overall improvement in food security. Agro-processing introduces dynamism in agriculture through technological linkages, improved learning and organization in the supply chain and the inevitable increase in the income of farmers. The conference noted that robust economic and technology policies that engender this structural shift, from the production of raw materials to its processing, and a strong implementation culture could be the key to Africa’s growth and development;
28. The conference noted that, unfortunately, past and present economic policies of governments in the region failed to recognize that technology arising from new knowledge was the engine of growth. The participants noted that some of the economic policies were anti-technology and anti-innovation. Thus, the structural shift that could have boosted the agro-processing industry failed to materialize as a result;
29. Participants noted that to build a strong agro-processing capability, economic and technology policy must be integrated; trade and production have to be linked; technological capability building, technology transfer and domestic content must be emphasized for all firms particularly multinationals. A country with a national system of innovation approach would be better able to overcome the constraints and stimulate better economic performance;

Markets, Institutions and Agricultural Performance in Africa

30. The conference noted that African farmers face problems of transaction costs, missing markets, poor infrastructure, and other institutional constraints that limit the benefits from engaging in agricultural production;
31. The participants further noted that these issues were not adequately recognized in the design and implementation of the structural adjustment or current liberalization programs. There were



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renewed debates around the wisdom of abolishing marketing boards in Africa and how it could have denied farmers a source of new knowledge, credit guarantee, quality control, price stability and rural infrastructure. The conference agreed that the previous assumptions that the private sector would fill any necessary vacuum created by the demise of the marketing boards have failed to materialize. As well, the huge supply response from higher farm-gate prices never materialized; and

The conference noted that indigenous approach to developing market and market information are essential for enhanced agricultural sector performance. Such collective and concerted efforts among farmers, agro-processors, and governments must target the re-establishment of grades and standards, provision of market information, access to credit, reconfiguration of agricultural support institutions and rural infrastructural development.



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3.0 CONFERENCE AND WORKSHOP OPENING CEREMONY

The official opening of the conference and workshop was conducted by Lesotho's Minister for Communications, Science and Technology, Dr. 'Mamphono Khaketla, who set the right mood for the meeting by demonstrating the government's support for the conference and the recommendations expected from it. The minister challenged the conference to address food insecurity, arguing that food security does not refer only to production, but also to ways of preserving food for local and regional use. She further challenged the scientists to research into indigenous and current systems of food production, storage and preservation and meet the challenges of today.

Dr. Khaketla underscored the central role of science and technology in driving modern economies and thus called for a change of attitude towards science subjects in schools with a view to strengthening their teaching. She further called for support for research and development to turn knowledge into goods and services. "We need to re-tap our indigenous technology capabilities of food production for food storage and preservation practice." She praised a paper presented by ATPS' Khalil-Timamy and Osita Ogbu at a Nepad meeting in Johannesburg in which, she said, the writers decried the romanticising of science and technology by African governments who also pay lip service to the discipline.

Dr. Khaketla also warned that the challenges raised by ATPS should also be addressed at the regional and global level involving such organisations as the African Union, NEPAD, the Commonwealth, UNCTAD and the UN Commission for Science and Technology. The conference, she said, should come up with a solution on how science and technology can be utilized to satisfy the urgent economic needs of the region.

The Minister welcomed participants to Lesotho, saying her ministry was greatly honoured to co-host the meeting. Lesotho would use the outputs of the conference to improve the country's food security, she said, expressing hope that ATPS member countries would immensely benefit from the Maseru meeting.

Statement by Principal Secretary, Ministry of Communications, Science and Technology

The Principal Secretary in the Ministry of Communications, Science and Technology, Mr. T. 'Mokela, said Lesotho was greatly honoured to host ATPS' Third Annual Conference and Workshop. Lesotho, he said, was pleased to share the experiences gained from the meeting in building sound science and technology policies for the country. The theme for the conference was most appropriate, he observed, as the event had come at a time when most of sub-Saharan Africa was reeling from the effects of prolonged periods of drought.

Mr. 'Mokela said science and technology policies were needed to manage disasters in Africa. Efforts towards improving the lot in Africa should be collaborative, he said, emphasizing the need for partnerships on the continent.

Statement by the ATPS Chairman

Professor Norah Olembo, the ATPS chairperson, rang an optimistic note by urging African countries to embrace science and technology to launch a green revolution. China and India could now feed their vast populations after exploiting the benefits of science and technology, she said, calling on Africa to do the same.

Prof. Olembo said an estimated 14.5 million people required emergency food aid in southern Africa. In the Horn of Africa, an estimated 12-14 million people risked food insecurity. The chairman said the solution to Africa's food insecurity lay in science and technology policy research and called on African countries to develop capacities leading to improved food security.

The agricultural sector, on which 70 percent of Africans depend, should be strengthened through science and technology research, she said, if the continent is to advance. She noted that ATPS had launched a capacity building programme for parliamentarians to enable them formulate policies and enact legislation that integrate science and technology policies into national development programmes.

She paid special tribute to the ATPS Lesotho National Chapter and the Ministry of Communications, Science and Technology for organizing the conference and workshop.

Opening Remarks by ATPS Executive Director

Dr. Osita Ogbu, the ATPS Executive Director, reiterated his network's commitment to appraising African leaders of the centrality of science and technology policy in the development agenda. He said the network had examined most development strategies and poverty reduction papers in Africa and explained their futility in the absence of sound science and technology policies.

On a more positive note, he said, African leaders had begun to pay attention to scientists and specifically to African scientists, thus giving hope to Africa's renaissance. Still, Africa was beset with poverty, epitomized in food insecurity and disease. Dr. Ogbu said it was extremely disheartening to see Africans dying of hunger and curable diseases at a time when others were exploring new planets and inventing new technologies.

Dr. Ogbu said ATPS, whose mandate was to guide African countries on science and technology policy issues, had recognized that science has a context. Science and technology must be integrated in culture for meaningful development to be achieved. He said ATPS' role was to raise the consciousness of African scientists, leaders and development partners and to push the African perspective into discourse on the international scene in order to find sound solutions to food insecurity.

He called on participants to pay special attention to the presentations from experts and to critique them with a view to forging a scientific and technological ethos for the continent. Dr. Ogbu was optimistic that the mounting of the meeting was a clear signal of a break with the past where the continent solely depended on foreigners for knowledge and ideas.

Africa could solve its problems in the spirit of NEPAD, by encouraging the development of partnerships that recognize the abundance of African intellectuals and capacity.

The Executive Director lauded the Government of Lesotho for co-hosting the conference and workshop. He noted the network had conducted a workshop for legislators in the kingdom. He acknowledged the representation of regional and international organizations and thanked the organizations and national governments that had paid their way to the conference. Some of the organizations included the International Development Research Centre (IDRC), the International Livestock Research Institute (ILRI), the United Nations Economic Commission of Africa (UNECA), the Federal Ministry of Science and Technology of Nigeria and the United Nations University Institute for New Technology (UNU/INTECH).



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Vote of Thanks

Dr. Osita Ogbu passed a vote of thanks after the statement from Dr. Khaketla. He said the minister's speech demonstrated ATPS was succeeding in efforts to have decision makers view science and technology as the engine of development in any country. A clear testimony to the minister's seriousness on the issues was the fact that she had read closely ATPS' contribution to the NEPAD meeting in Johannesburg in November, which she had referred to in her address.

Further positive indication of the government's commitment to embracing science and technology policy was Lesotho's hosting of a workshop for parliamentarians conducted by ATPS. The Executive Director also noted the minister's emphasis on the need to strengthen science and mathematics teaching at all levels of education, saying ATPS had also taken the challenge and was poised to help African governments improve teaching of the subjects by providing the necessary policy guidance.

Dr. Ogbu observed the Johannesburg NEPAD meeting had stressed the importance of research and development and expressed satisfaction that new ways of financing the initiative were being sought. He emphasized that use of new technologies would contribute to eradication of poverty on the continent.



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The Keynote by the Director-General, ILRI

The keynote address was delivered by Dr. Tom Randolph on behalf of the Director-General of the International Livestock Research Institute, Dr. Carlos Seré. He said ILRI was keen to share experiences and support experiments that would contribute to new ways of fighting food insecurity on the continent. Africa, he said, had made considerable achievements in science and technology for agriculture and cited the NERICA rice case as an example. However, food security on the continent was threatened by the emergence and spread of HIV/Aids.

The paper, titled "Innovation in Research to Improve Food Security in Africa: ILRI's Perspective" observed Africa had made impressive achievements in science and technology, particularly in agriculture. However, there had been a continuing deterioration of food security that was precipitated by emerging threats, including HIV/Aids and climatic change. ILRI's mandate, it was pointed out, is to reduce poverty and make sustainable development possible through livestock-related research.

The institute has already adopted a strategy aimed at making its research activities contribute to poverty reduction.

The speaker said ILRI was poised to meet the new challenges through a new institutional strategy, institutional experiments, emerging principles and the institute's ILRI had moved from its traditional approach that was, generally, successful in generating research solutions for defined problems but failed in offering solutions with impact and embraced an outcome-oriented research approach that aimed at innovation outcomes. The new approach viewed research as one input into an innovation system, with the researchers' responsibility extended to encompass outcome. The new approach also appreciates the role of end-users and others in the innovation system. It starts at the end-point, leading to a demand-driven agenda.

The new strategy has implications on how research is organized. It deals with identifying research priorities, defining the research agenda, organizing research terms, and forming new partnership arrangements.

Participants learnt that the new strategy – Experimenting with Institutions Innovations – must rethink the role of research with the outcome in mind. Using a livelihoods approach, ILRI had identified three principal livestock-supported "pathways out of poverty." Participants were told the three opportunities the institute had taken to improve livelihood outcomes were:

- Securing the assets of the poor – thus reducing their vulnerability and permitting accumulation of investment
- Sustainably improving the productivity of production systems of the poor – driven mainly by choice of technology.

- Improving market opportunities for the poor – driven by combination of institutional and technological improvements.

The institute is also innovating on themes and teams to enhance internal structure and agenda to ensure disciplinary programmes replaced by research themes are defined by targeted outcomes, and to facilitate dynamic team composition dependent on needs.

The institute is also innovating on collective priority setting at national, regional and international levels besides involvement in internalising an innovation systems approach that promotes partnerships, emphasizes knowledge management and allows stakeholder partnership analysis.

Another innovation is on joint programmes, for instance between ILRI and IFPRI that allows sharing of resources, synergies focused on a common outcome. An example is how livestock biotechnology may best be used for development. The institute has also been innovating on public private partnerships to enhance vaccine development and diagnostics. ILRI also has a biosciences initiative, an innovation aimed at researching into ways in which livestock livelihoods make a larger contribution to human and environmental well-being.

The revised research agenda innovation assesses the human-health impacts that were previously not considered part of the research mandate.

Participants learnt that making research outcome-oriented and transforming the research system into an innovation system requires fundamental change of culture in a research institute and a research system. It also requires the spirit of experimentation. It also became clear that it is inevitable for science and technology to be used by African researchers to solve African problems. But the speaker noted the new paradigm was threatened by:

- Africa's continued brain drain.
- Funding instability.

Issues Arising from Dr. Sere's Presentation

The National Co-ordinator for Ethiopia observed that in the past, agricultural initiatives in Africa had tended to be linear, arguing it was important to put indigenous knowledge on board. He argued that the contribution of indigenous knowledge to eradication of hunger on the continent was missing from the presentation. The co-ordinator submitted that there was a change of attitude among experts and decision makers that now focused on the importance of indigenous knowledge in the fight against the problems bedevilling Africa. He also sought to know how ILRI proposed to deal with the problem of the brain drain on the continent.

A delegate from Lesotho cautioned the presenter to be more careful with the definition of "innovation", observing that the paper had made many references to "innovation" without being clear on the meaning.

A participant from Ethiopia argued that the focus of science and technology tended to be looking for local solutions rather than outcomes. From Swaziland, a participant sought clarity on the type of instruments to facilitate sustained collaboration among institutions in Africa fighting hunger. He further submitted that extension is responsible for service delivery once scientists have finished their work but had tended to be ignored.

A Kenyan delegate said farmers had well-established systems in that country's rural areas. However, he expressed fear that failure to integrate such systems in the overall development process would condemn them to failure. He also wanted clarification on how the biosciences would address the problem of the brain drain but noted that NEPAD had an elaborate programme where governments had failed. In NEPAD, he said, one could see a structure but back at home a system of supporting scientists was lacking.

Another participant observed that livestock population on the continent had been dwindling and ILRI's budget had drastically fallen to US\$ 26 million at a time when 70 percent of the continent's population kept livestock. He submitted that the budget was too small to adequately respond to the mandate of ILRI. Still, he sought to know how the institute planned to share its facilities with prospective collaborators and who would drive the collaborative agenda.



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The speaker further said farmers are first and foremost entrepreneurs and sought to be educated on the innovative farming approaches that would make their work successful.

The ATPS Chairman, Prof. Norah Olembo, faulted the presentation for failing to show how ILRI planned to tackle livestock diseases, which, she said, continued to hamper livestock production on the continent.

Responses to Issues Emerging from the Presentation

1. Dr. Randolph said ILRI did not only focus on farmers but also on indigenous knowledge.
2. ILRI also was keen to have a lot of work done locally rather than outside, particularly in the field of biotechnology. A lot of initiatives could be addressed communally, he said.
3. On the definition of “innovation”, Dr. Randolph submitted he was unclear of the “subtle differences.”
4. On the differences between “solutions” and output-oriented research, Dr. Randolph said ILRI had previously not laid emphasis on outcomes. Their work, however, was now people-oriented.
5. Dr. Randolph said there was need to adopt participation approaches to monitoring and evaluation and to link up with other partners for tangible progress to be achieved.
6. On the centrality of extension work in the eradication of hunger, he pointed out that the service had largely “evaporated” in most of Africa except southern Africa where it was still government supported. But he stressed the need to involve other stakeholders in finding sustainable solutions to food security.
7. On biosciences and how they could be used to improve farming, Dr. Randolph said the discipline requires huge investments, which poor countries could ill afford. The idea of launching “centres of excellence”, he said, was laudable and a certain step in ameliorating hunger and poverty. Such centres would allow the sharing of resources and facilities and create a meeting point for the private and public sectors.
8. On the ILRI budget vis-à-vis its mandate, Dr. Randolph conceded that livestock research was under-funded and donors were aware of the fact. He submitted, however, that the matter was “less threatening” and that ILRI was coming up with “new innovations” to address the matter.
9. On the submission that CGIAR had had little impact in Africa and whether it had not done things the wrong way, Dr. Randolph said most players in the field had indeed done things the wrong way, probably as a consequence of reduced budgets. What was required, he said, was that organisations innovate.
10. Dr. Randolph said ILRI had not abandoned the tackling of diseases but said long-term plans for vaccines against various diseases were lacking. “The challenge is enormous,” Dr. Randolph declared. “We are looking for support, private partnership to harness resources to carry out the work.”
11. Dr. Ogbu said on the collaborative front, it is important to understand the consultative process that links scientists to ILRI.
12. Dr. Ogbu said failure of three ILRI projects was a major lesson for the institute. The organization had taken up the challenges ahead, he said, and ATPS should find ways of working with the institute.
13. Prof. Oliver Saasa, an ATPS Board member, said one must go beyond food security when discussing science and technology and examine the impacts – the extent to which outcomes affect the poor.



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4.0 CONFERENCE PLENARY PRESENTATIONS

1. DR. ABLASSÉ OUEDRAOGO

THE FUTURE OF AFRICAN AGRICULTURE IN THE CONTEXT OF WTO AGRICULTURAL NEGOTIATIONS.

This presentation was delivered by Dr. Ablassé Ouedraogo, a former Deputy Director-General of the World Trade Organization (WTO). The presenter discussed the possible impact of WTO negotiations on food security in African countries and the possible effects on the competitiveness of African agricultural products on foreign markets.

He noted that food security is a major pre-occupation for African countries and that it is vital for Africa to be able to maintain a certain level of agricultural production to reduce the worsening food situation.

Farmers' access to adequate income would help to protect large populations against malnutrition, he said, and called for a tariff protection to stem massive importation of subsidy products.

He noted that 25 African LDCs are members of WTO. If they secure the WTO tariff facility, he said, they would make an important step towards guaranteeing their food security.

African countries, which naturally will not enjoy tariff reduction exemption, he said, are battling for recognition of the notion of "strategic products" or "specific products" which would enable them to apply for very low tariff reductions to their sensitive imports. With regard to non-tariff measures, he said, African countries should grant farmers assistance to improve yields.

On competitiveness, the presenter said the issue could not be confined to the dismantling of tariffs, to quantitative restrictions or to subsidies in foreign markets. Such measures could have both positive and negative effects.

Competitiveness of African agricultural products should be analysed from the perspective of greater opening of markets, particularly in developed countries, which would result in tariff reductions that the latter would apply. The important issue, however, is whether the tariff reductions by developed countries benefit African countries.

The speaker contended that food security and competitiveness of African countries' agricultural commodities on the external market do not depend exclusively on relations with the developed world or international organizations. Many other factors, which are considered peripheral, matter a great deal. These include issues that affect investment, production techniques and access to technology, among others.

Dr. Ouedraogo also said the long-term fluctuation and downswing of African commodity prices have had negative effects in Africa's agricultural development. However, he stressed that the future of African agriculture would depend on the results of the on-going WTO negotiations. He strongly proposed that African countries get involved in the negotiations to create a framework that would reflect their own concerns.



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DISCUSSION OF DR. OUEDRAOGO'S PRESENTATION

Dr. Mohamed Khalil-Timamy was the discussant of the presentation. He noted the paper clearly showed Africa faced enormous problems relating to food security. The presentation, he said, had reminded him of Karl Marx's statement "Men had first to eat before they could build civilization".

Dr. Khalil noted the paper had succinctly addressed issues of food production and export markets and the need to revamp local production. He recalled Dr. Julius Nyerere's call in Rome for an initiative to maintain stocks during high production seasons to be used as security during low seasons. The problem of infrastructure had been well addressed, he noted, saying without sound infrastructure, distribution and marketing of Africa's products would be difficult to achieve.

ISSUES ARISING FROM DR. OUEDRAOGO'S PRESENTATION

A Nigerian participant observed that WTO issues were extremely complex and thus required top-notch professionals to represent Africa. He called on ATPS to seriously consider taking up capacity building for negotiators in WTO meetings to ensure African interests were adequately taken care of. At present, he lamented, the quality of negotiators for Africa was greatly wanting.

A Zambian delegate wondered if there were programmes for capacity building to address the quality of negotiations at WTO fora. He also stressed the need to step up food production and exports on the continent and decried Africa's over-reliance on non-traditional food crops. The delegate strongly disagreed that Africa is poor, arguing that the true position is that the continent had not exploited its potential.

A Kenyan delegate wondered what countries would do in the absence of support while a Nigerian wondered what role WTO should play in governance and what role regional institutions could play in changing institutional attitudes and beliefs.

Dr. Ogbu said there had been a gap between expectation and reality in WTO negotiations and outcomes. The true position, however, was that WTO treaties are binding to all. Despite this reality, arm-twisting in WTO issues was a reality, he said, and wondered whether countries outside the WTO ambit like Ethiopia, suffered in any way.

Dr. Victor Konde raised issue with the transparency of WTO fora, seeking to find out who is invited to the organization's meetings and who is not. He also sought to find out why the Cancun WTO meeting flopped and why tariffs on Africa's exports kept going up.

DR. OUEDRAOGO'S RESPONSE TO ISSUES RAISED

1. Dr. Ouedraogo explained that WTO is an international organization dealing with the rules of trade. To become a member, a country had to meet certain conditions. He further explained that it was not a UN organization. Responding to resentments expressed against the organization, the presenter said those authorised to make decisions were members. To belong to an organization one had to abide by its rules. If an organization was bad, the buck should rest with member countries. He said experts were encouraging Ethiopia into joining WTO.
2. On WTO's transparency, the speaker said before Seattle, WTO tended to call the developed countries to meetings and use the less developed to rubber-stamp the organization's decisions. The reason, he posited, was that developed countries knew their rights.
3. On the quality of negotiations at WTO meetings, Dr. Ouedraogo said Africa is extremely weak on that score. "We took ministers to Gabon to learn about WTO... We tried to bring WTO to Africa," the speaker said. "At the time, there were 19 Africans out of a staff of 500 working at WTO. When I left, there were only 50 Africans."
4. On capacity building, the speaker said WTO had begun to address development issues. He cautioned against wholesale condemnation of the organization, saying what it needed was improvement. "Because of the increasing number of members, getting a consensus on issues is difficult."



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5. He conceded Cancum was a failure. But he added the flop occurred when Africa had registered the highest number of members. However, Africa had no negotiations strategists, not because it lacked such personnel, but because it always failed in identifying and using the right calibre. He said the only positive thing for Africa was that the continent had a representation. Africa wanted agricultural issues discussed at Cancum but developed countries wanted other issues discussed.
6. The speaker conceded that Africa needed to seriously give thought to the calibre of its negotiators. He added that out of 50 independent countries, 16 countries have no ambassadorial representation.
7. The discussant for the paper, Dr. Khalil said WTO and related organisations are instruments of international disenfranchisement.

2. PROF. A. BABATUNDE OBIANA

FROM SCIENCE TO PRODUCTION – TRANSFERRING KNOWLEDGE TO THE RURAL AFRICAN FARMERS: WHAT WORKS AND WHAT DOESN'T

This presentation was delivered by Professor A. Babatunde Obilana, Principal Scientist (Breeding) at the International Crops Research Institute for Semi-Arid Tropics (ICRISAT). The presenter discussed food security issues in sub-Saharan Africa and gave the FAO definition of food security as existing “when all people at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”. He gave the components of food security as physical access to food at all levels including household and community levels; economic access to food at all levels; food sufficiency; physiological access to food for biological growth, development and a healthy environment; risk of loss of access to food; human rights in terms of food delivery, policies and politics.

The speaker also discussed the methodologies of measuring food security and the appropriate technologies to alleviate food insecurity. Such technologies include agro biodiversity, production and harvesting, post-harvest and processing, adding value, utilization and commercialisation, markets, information and communications, and policy initiative.

Prof. Obilana also discussed Africa’s popular but under-utilized crops before addressing the issue of partnerships and knowledge transfer. Major partners include collaborators in science and technology, development, private and public sectors, and stakeholders and beneficiaries. He further discussed transfer of technology, showing the role of markets, institutions, policy and an enabling environment in adoption and sustenance of technology exchange before listing appropriate technological practices.

The speaker also gave several case studies of biotechnology success including Eritrea’s crop improvement project between the country’s NARES and ICRISAT, Nigeria’s Sorghum project and eastern Africa’s Uji Mix Project. He said bottlenecks in technology transfer practices arose from dissemination of inappropriate technology and information, poor technology transfer management, forced technology transfer, policy changes by multinational food industries and delays in decision-making by principal investigators. Bottlenecks, he pointed out, also arose from abrupt cutting of funding, lack of commitment to projects, application of inappropriate technologies and lack of realization of the benefits of technology transfer.

Discussing partnerships and realms of knowledge transfer, Prof Obilana identified the levels of participation in research and development activities and the sharing of experiences. The four major groups that must be involved in partnerships and knowledge transfer are science and technology partners, development partners, public and private sector partners, stakeholders, and beneficiaries.



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The presenter said for success and impact in technology transfer specific practical processes must be adhered to.

These are:

- Preliminary discussions, exchange of visits and follow-up correspondence on intentions for collaboration.
- Preliminary meetings of core team members should follow.
- Follow-up planning meetings to confirm collaboration, identify project, available technologies for exchange, team members, agreed objectives and expected outputs.
- Joint workplanning to agree on team members, responsibilities, methodologies, timing, location of collaborative projects, research (and development) activities, sources of funds and budget, and inputs from each team or stakeholder.
- Joint implementation of agreed workplans including reporting, documentation and publication, benefits allocation and sharing.
- Assistance with project proposal writing, brokering between NARS and the private sector.
- Training, education, and provision of books, pamphlets, handouts, flyers, papers, academic documents, and practical handbooks.
- Networking and preparation of network documentation, putting in place network implementation process and coordination.
- Respect for team members' opinions and perceived or real needs.
- Identification, upfront, of team members or each stakeholder's benefits for agreed outputs resulting from the technology transfer and exchange activities.
- Trust, from all collaborators, which must be developed and built into the process.

He used case studies to show what in technology transfer terms works and what does not and why. In the case of Eritrea's sorghum and pearl millet improvement project, NARES and ICRISAT released four improved varieties to the farmers. These were rapidly adopted and adequate quantities of good quality seeds were produced, through technology transfer processes with research, extension and seed farmers. The project was a success because:

- Sorghum and millet crops account for a significant 58 percent of Eritrea's total agricultural crop production.
- Appropriate varieties of the crops were developed by ICRISAT breeders, collaboratively tested and verified in the country with the national scientists and farmers, through a systematic technology transfer approach.
- Financial and institutional policy support were available from donors and the government.
- Technical and catalytic support were provided in the country and outside by ICRISAT, through its regional and international influence.
- There was dire need to replenish seed and food sources of thousands of farmers lost during the war.

In a second case that worked well sorghum replaced barley in malting, beverage and brewing industries in Nigeria following that country's release of sorghum variety SK 5912 that had been improved by the Institute for Agricultural Research (IAR.) Samaru, Nigeria. IAR's Dr A.B. Obilana (presently with ICRISAT), spearheaded the efforts to screen and evaluate SK 5912 along with some 500 other accessions, for grain quality traits. By 1982, the collaborative efforts to evaluate suitable varieties of Nigerian sorghum had expanded to include other partners in industry.

The shift to sorghum was successful for the reasons given in the first case. It also succeeded because of:

- The availability of technology (tested and verified R&D for using sorghum malt to brew lager beer).
- Very strong government policy for change in export and import policies and raw material substitution.



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- The presence of a large demand (in the large Nigerian population) and industrial manufacturing supply base (in the form of more than 10 very large brewing and food processing companies)
- Commitment of R&D scientists and researchers with their technology transfer skills
- Effective networking among research scientists (breeders, food technologists), brewers, brewery outlets, marketing agents, farmers and seed producers, and government
- The expected benefits envisaged by farmers and producers for increased production, and other stakeholders in the malt brewery industry chain are materializing.
- The potential of spillover of the technology for use in the food industry is being achieved.

He also discussed the case of Uji Mix whose technology transfer, he contended, was going to work. Uji Mixes, sorghum and finger millet-based porridge products, are most widespread in East and Central Africa, around the Lake Zone (especially Kenya, Uganda, Rwanda, Burundi and Northern Tanzania). The products, thin porridges mainly for breakfast, sometimes fortified with soya and soured with lemon or lime juice, are available and accessible in supermarkets and communal markets across the supply chain from village to peri-urban and urban areas. The technologies for processing, packaging and marketing were effectively transferred by both research and industry, with farmer knowledge. He said the technology transfer would work because:

- Appropriate technology is available and the products are on the market shelves.
- Better types of machines to improve quality of product are being sourced.
- Information on improved sorghum and finger millet varieties to improve quality and consistency of products are now being provided from research.
- Discussions are on-going on how to expand the farmers milling industry and on how to sustain it for quality, quantity and consistency.

Prof Obilana also identified the bottlenecks in technology transfer and the problems that hinder realization of expected outputs. These include:

- Dissemination of inappropriate technology information.
- Lack of technology transfer management.
- Imposed technology transfer.
- Policy change and policy bypass by multinational manufacturing food and feed industries, including private seed companies and related stakeholders.
- Delays in decision making by principal investigators or donors.
- Abrupt cut off of funds, and funding shortages.
- Lack of commitment to the technology transfer and exchange.
- Unavailability of appropriate technologies.
- Lack of clarity on the benefits to stakeholders.

The presenter proposed policy actions that would enable the resource- poor farmer participate in technology transfer successfully:

- Removal of institutional mandates which militate against the achievement of full participatory and partnership approaches. Such modifications should include staff recognition and remuneration for time and skill in partnership development, in addition to normal responsibilities.
- Creation of enabling environment in form of strategies to bring together farmers, researchers, developers, government functionaries and parliamentarians, for planning and implementation of technology and knowledge transfer.
- Putting in place strong policy research, training and development in the area of technology transfer for food security agendas.
- Putting in place a policy strategy to highlight and promote identified success stories on what has worked through effective and appropriate technology transfer. In the same vein, the strategy should note and document what technology transfer approaches have not worked, so that they can be improved or changed.



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- Facilitating and encouraging the development and use of new technology transfer approaches. The facilitation and establishment of national technology policy studies institutions and departments with the assistance of the African Technology Policy Studies Network, is in the right direction. It is a most desirable intervention in the national and regional efforts to improve technology and knowledge transfer approaches with farmers and stakeholders, for achieving food security in sub-Saharan Africa.
- Putting in place policy initiatives that encourage the broker- catalyst bridge-promoter paradigm in nation and regional training and research-for-development programmes. Such initiatives should strengthen and also support, strongly, the growing information and communication technology (ICT) in SSA, especially at the community and farmer levels, where capacities are low, and still in their infancy.
- Encouraging strong policy support and recognition of technology transfer skills and commitment.



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3. MARTIN KIMANI

INTEGRATING INDIGENOUS AND SCIENTIFIC KNOWLEDGE FOR IMPROVED FOOD SECURITY

The presentation was delivered by Mr. Martin Kimani of the Centre for Agriculture and Biosciences (CABI). The speaker said scientific knowledge is validated and based on experiments, while indigenous knowledge is validated but based on experience. Both types of knowledge, he proposed, should be appreciated through knowledge partnerships, with innovation capitalizing on both. He gave a rationale for use of indigenous technological knowledge arguing it provides a firm opportunity for positive change, is environmentally sound, conserves natural resources and is socially desirable. ITK is also economically affordable, is adaptable, sustainable and provides for non-formal agricultural education. It is also dynamic and creative and it strengthens farmers' confidence and capacity to solve problems.

The speaker said ITK could be applied in organic farming, integrated production of pest management and in participatory technology development. It is also applicable to conservation and sustainable use of agro biodiversity, water conservation, storage and agro forestry.

The presenter cited experiments carried out in Kenya showing some ITK methods were as effective as scientific methods. From the experiments, he said, farmers were able to make informed decisions on crop management and production options while the researchers gained direct links with the farmers and had established a firm ground for expansion of their work.

ISSUES EMERGING FROM MR. KIMANI'S PRESENTATION

A delegate complained that the presenter tended to place scientific knowledge above indigenous knowledge, arguing the hegemony of scientific knowledge was today questionable. He lamented the paper's tendency to show farmers' knowledge had been tested in a scientific paradigm.

Another delegate wondered what future ITK had while yet another argued what was termed as indigenous knowledge may have been adopted from other places.

Further questions arose as to why farmers were discouraged from use of fertilizers during colonial times owing to their harmful effects on sustainable farming but were today being encouraged, and how people with indigenous knowledge would be identified. It also was argued that the reasons why certain things would work in the realm of indigenous knowledge and others did not work should be interrogated. Transfer of indigenous knowledge was also found to be tricky because it is culture and location-specific while reliance on ITK for food security was questioned.

RESPONSE TO MR. KIMANI'S PRESENTATION

1. The speaker emphasized the importance of understanding that not everything ITK works, as much as not everything that is scientific works.
2. He further proposed that incentives be given to encourage scientists to work with farmers. He proposed the setting up of institutional framework to link scientists with farmers.

4. PROF. MAFA SEJANAMANE

LESOTHO'S INITIATIVES TOWARDS FOOD SECURITY: A SITUATION ANALYSIS

Prof. Mafa Sejanamane of the Department of Political and Administrative Studies at the National University of Lesotho delivered the presentation decrying the country's worsening food security situation. The paper painted a gloomy picture of Lesotho's efforts to end hunger in the country, blaming government's indecisiveness in working out an efficient food management and production programme, the dependence of donors in virtually every national initiative, and the spread of the HIV/Aids scourge. The paper demonstrated that donors were largely responsible for the shaping of government policy in Lesotho, thus complicating any real and homegrown efforts at solving the worsening food situation in the country. Still, for almost 30 years the speaker said, no elaborate policies addressing agricultural policy had been formulated and even when a move towards self-sufficiency in food security came in the 1980s, the strategy was soon to fail, following a blockage by South Africa. The strategy was abandoned soon afterwards.

The presenter acknowledged, however, that the government had in 2003 begun to address food insecurity much more seriously, as shown by its policy documents, *Subsidies in Agriculture Sector: Policy Statement and Implementation Framework, Agricultural Sector Strategy and Market Liberalization*.

COMMENTS FROM THE PRESENTATION'S DISCUSSANT

Prof. Babatunde Obilana was the discussant for the paper. He lamented that Lesotho's food insecurity situation had remained that way for many years but acknowledged the fact that some of its problems emanated from the fact that it was both land and country-locked. The country had extended gullies and hills, making exploitation of the land difficult. "Lesotho is in Limbo," he said. The discussant said he had visited Lesotho many times in the past but the story seemed to be the same - gloom - owing to a state of looming hunger and starvation. The country has a population of 2.5 million people, with only one-third of it being habitable.

ISSUES EMERGING FROM THE PRESENTATION

A delegate submitted that Lesotho had in the past fed its own people and South Africa and wondered what could have gone wrong.

The Chairman of the ATPS, Prof. Norah Olembo, proposed the use of subsidies to farmers to improve agriculture and production, and application of organic farming whenever the possibility arose.

A delegate from Lesotho said the country's definition of development was wanting. In addition, he said, there was a tendency to "romanticise" what the government should do, advising that the private sector, which he said had often been "rebuffed" from the development agenda, be put on board. Corruption must also be ended if progress is to be realized.

Dr. Ogbu observed that there was a link between food production and the incidence of HIV/Aids in Lesotho.



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Prof. Oliver Saasa brought out the irony in food security. In Zambia, for example, people living in urban areas had greater food security than those living and producing food in the rural areas. He called for intensification of farming where smaller pieces of land would produce greater yields. “This calls for innovation,” he said.

PROF. SEJANAMANE’S RESPONSE

1. The Government of Lesotho has been considering use of water, a primary resource in the country, to help address food insecurity.
2. There have been many efforts by the government to improve water and food situation but all in vain. He said the problem arose from a lack of focus.

5. DR. VICTOR KONDE

THE BIOTECHNOLOGY REVOLUTION AND ITS IMPLICATION FOR FOOD SECURITY IN AFRICA

Dr. Victor Konde of the United Nations Centre for Trade and Development (UNCTAD) gave an African perspective to the problem of biotechnology evolution and food security on the continent. He said biotechnology presents opportunities and challenges to Africa: it promises to meet food security needs, improve production and incomes for farmers on the continent, but limited international markets, a weak scientific base, poor development strategies and investment are a threat to its impact.

The presenter said all technologies have benefits and opportunities that have to be harnessed, and risks to be managed. GMOs present farmers with the ability to overcome weeds, pests and diseases that cause huge losses annually in ways never imagined before. However, few African countries, he said, have enthusiastically embraced the technology to build industries, health services and agricultural sector. There are even fewer that have developed clear strategies to ensure they become global participants.

In addition, he said, budgets to universities and research institutions have continued to decline in most of Africa and donor support for basic and applied research have declined as the focus has shifted to experimental development. This has affected manpower training, research activities and conditions of service that have been the mainstay of biotechnology industry development.

But he emphasized that biotechnology holds many opportunities for developing countries and Africa in particular. However, Africa will need to develop its manpower base, stimulate industrial participation and donors to develop a biotechnology sector. It should provide incentives that encourage formation of strategic alliances and participation of various players.

The wider adoption of biotechnology will be influenced by the global governance regimes that are emerging. Flexible enforcement of intellectual property rights and responsive regulatory policies may be needed to help Africa benefit from biotechnology. Similarly, partnerships and alliances will have to be formed between those with resources and those with the technologies if the poor have to benefit.

Dr. Konde regretted that at a time when some countries are suffering from “global obesity”, Africa is suffering from malnutrition. Those in developed countries and large cities in poor countries may afford to be sentimental about food but the majority of Africans just need food, he stressed. Padmashree Gehl Sampath:



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AGRICULTURAL BIOTECHNOLOGY AND ITS IMPLICATIONS FOR FOOD SECURITY

This paper was delivered by Prof. Banji Oyeyinka on behalf of the author, Dr. Padmashree Gehl Sampath of the United Nations University Institute of Technology. The author analysed the conditions under which agricultural biotechnology can help increase food security in Africa, focusing on the potential impacts of GM technology and transgenic crops. He said biotechnology has advantages and disadvantages and has complex linkages with bio safety, food safety, intellectual property protection, farmers' rights, access to genetic resources and benefit sharing.

He said the advantages of biotechnology included increased yields owing to use of herbicide tolerant and insect resistant varieties. It also led to a reduction in the use of fertilizers and pesticides while promoting conservation of natural resources. However, biotechnology can also lead to environmental damage. Its adoption and use may also be costly to farmers, he said, as users may be led to buy specific types of pesticides and farm equipment. It may also lead to promotion of monocultures that lead to a neglect of traditional varieties, the creation of invasive weeds and a reduction of biological diversity.

The author pointed out that research into GM technologies is largely governed by the TRIPS Agreement that makes intellectual property protection of such varieties obligatory. He noted, however, that countries could rely on the provisions of the Convention on Biological Diversity and the Cartagena Protocol to enact restrictions that take into account environmental and development dimensions.

There are positive and negative costs and benefits of agricultural biotechnology. The fundamental question, he said, is how Africa can use biotechnology to increase food security and agricultural competitiveness and how such technology can be used to gear up research and the capacity for it on the continent.

The author stressed that Africa's real chance of attaining food security lies in the ability to increase GM varieties that cater to local needs. The GM varieties should focus on nutritional value, resistance to biotic stresses, resistance to insects and tolerance to herbicides. He spoke of the need to invest in "varieties of importance" to Africa, the need to develop local research and capacity and planning for bio safety laws.

COMMENTS FROM THE PAPER'S DISCUSSANT

Dr. Musa Dube was the discussant for the presentation. He said the paper raised two main points that had already emerged in the conference: The need for governments to support science and technology projects and the impact of HIV/Aids on efforts to promote food security on the continent. He was, however, emphatic that biotechnology could contribute to solving the problems. The crucial question, he submitted, was whether Africa could join the biotechnology competition. The question could be answered in the affirmative or negative, he argued, saying each country needed to weigh its options as some were in deep economic trouble.

Dr. Dube suggested the paper needed to make a clear distinction between biotechnology and GMOs. The bottom-line, he argued, was to ensure the products of research reached the common man.

ISSUES EMERGING FROM THE PRESENTATION

Prof. Obilana of ICRISAT remarked that most of the examples of food crops cited in the presentation such as rice were non-indigenous. This was despite the fact that the continent had a rich variety of indigenous crops including sorghum and millet. He said Africa needed to exploit its comparative advantage to compete with other nations. He added that there had been important food research networks working in Africa that remained unknown in spite of the commendable work they had carried out. A millet and sorghum project had come up with exemplary results, and trained 98 PhD fellows between 1988 and 2003.

He noted Lesotho had accepted GMOs as a policy, adding that biotechnology would be the next development engine after ICTs.



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Prof. Melvin Ayogu argued scientists should not be shy about wanting complex and detailed papers. He said the onus is on ATPS to simplify them by packaging them in policy briefs that should be easy for anyone to read.

A delegate from Ethiopia asked why participants were being given the impression GMOs were good for Africa while they were rejected in other countries. A Kenyan stressed the need to put the dignity of Africans to the fore even as people were urged to adopt GMOs. She said African countries were flooded with GMOs and eat the product of various biotechnologies not because they wanted to but because they are poor.

Dr. Wellington Otieno of Foodlink Resources (Kenya) advised participants to ensure they always understood the rules of the game in the campaign for GMOs, saying certain pest controllers were ecology-specific.

Dr. Margaret Karembu of Kenya cautioned delegates to clearly delineate biotechnology from GMOs, saying the latter was a speck in the wider spectrum of biotechnology. There are other probably more important areas, including tissue culture, that need to be given consideration, particularly because of their extraordinary benefits. She called for the empowerment of communities to reap the benefits of biotechnology.

A delegate from Swaziland assured participants that there were adequate controls to ensure GMOs were brought as close as possible to other conventional foods, but called for a recognition of local resources, observing some of the foods imported into Africa could be grown locally. There also was need to dispel the wrong attitudes people had on certain foods. Yellow maize, for example, is rich in nutrients but majority of the people in southern Africa, he said, have a strong distaste for it.

Prof. Banji Oyeyinka conceded that a lot more research needed to be carried out on GMOs.

6. Z. M. NYIIRA

HARNESSING INFORMATION AND COMMUNICATION TECHNOLOGIES FOR IMPROVED AGRICULTURAL PERFORMANCE IN AFRICA

The presenter, Dr Zerubabel M. Nyiira of the Uganda National Council for Science and Technology, traced the development of the ICT sector in Africa and focused on its ability to improve agriculture. ICTs, he said, could improve agriculture by improving training and education, integrating information and communication technologies in extension programmes, addressing food security problems and supporting marketing of agricultural commodities. They could also be used to address agricultural meteorology, and to engender networking of agricultural communities.

The presenter also discussed the impact of ICTs in agriculture and cited a number of successful experiences in their application. These include the opening of telecentres, CD Rom for development of agricultural production and skills among rural women, electronic delivery of agricultural information for rural communities and economic empowerment of women farmers. Other successful experiences were a special programme seeking agricultural markets and sustainable use of natural resources in food production.

DISCUSSION OF THE PRESENTATION

The paper's discussant was Prof. Melvin Ayogu who commended the presenter for creating awareness that would enable participants to interrogate the benefits of ICTs. He also praised the presentation for demonstrating the need to go further and research into the subject. But he warned there always was a tendency to "oversell" ICTs, thus making it appear as if ICTs were panacea to the problems that beleaguer Africa. There also was the tendency to view ICTs as the absolute cynosure for development on the continent. Anyone interested in productivity and development in Africa, he contended, would want to know how agricultural yield was measured and, therefore, how



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ICTs would be useful in the computation and analysis of that output. He stressed that it is important to, in the long run, see the trade-off, precipitated by adoption of ICTs.

Prof Ayogu also called for a proper delineation of IT and ICT, observing that the former in the realm of information and the latter in communication. Such delineation would clarify issues and dispel the thinking that IT and ICTs were one and the same thing.

The discussant also cautioned on sourcing, packaging and dissemination of information, saying the commodity had a “brittleness” that made it extremely perishable, thus quickly losing its importance. That quality of information had impacts on intellectual property rights, he argued. He wondered what incentives there were for “created” information and linked this to Africa’s worry about lack of rain when such countries as Israel that experienced more severe weather conditions were not worried.

Prof Ayogu said the methods of transfer of technology should be given serious consideration and gave the example of information cafes that have been opened in many parts of Africa whose value to the farmer he doubted. “What value are such cafes to the farmer? Could the farmer, in fact, be losing?”

He further raised the need to authenticate information obtained from the Internet, arguing such information was not really free.

ISSUES EMERGING FROM THE PRESENTATION

A delegate proposed that the impact of the projects cited in the presentation be assessed regularly. It was suggested that ATPS facilitates documentation on the projects. A Nigerian delegate wondered how rural communities would benefit from ICTs considering the high rate of illiteracy. A delegate from Mozambique cautioned against a top-bottom approach while dealing with farmers. And a delegate from Lesotho stressed the importance of focus and specialization in particular commodities.

Denmark, Ireland and Finland, he said, had specialized on unique commodities and were doing extremely well. He also spoke of the need to enforce controls in production work in order to minimize pest risks, among others. Another delegate from Lesotho complained that those who create ICTs are in the US from where they form companies to replicate their products in Africa.

Dr. Ogbu cautioned delegates to view ICTs and biotechnology as a means to an end. Of paramount importance is identifying information relevant to solving Africa’s problems. He stressed the need to exploit the African experience and build on what others do not know. Africa needed to make a transition but it is critical to understand the background for it, he stressed.

7. ROSE KINGAMKONO AND J. STEPHEN

GENDER DIMENSIONS OF THE CURRENT AGRICULTURAL PERFORMANCE IN AFRICA

The paper by Dr. Rose R. Kingamkono and Dr. J. Stephen was delivered by Ms. Bitrina Diyamett of the Tanzania Commission for Science and Technology.

The authors said the productive and reproductive role of women makes them vulnerable to malnutrition, putting them in persistently poor health. Female illiteracy and political, psychological and socio-economic dis-empowerment and denial of fundamental human rights are barriers to quality life with a negative socio-economic development not only of the women themselves but also their families.

Considering the enormous cost of gender inequalities to the whole family and nation at large, they argued, it is imperative that deliberate efforts should be taken to reduce them if not eliminate them completely. Such a move in Africa will go a long way in increasing agricultural productivity. Integration of gender in policies and making development resources available to women promises great returns to families and entire economies.



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Gaps in involvement of all segments of African societies in agricultural production need to be addressed holistically if the agricultural sector is to grow and solve problems of food insecurity. Men and women have to work in partnership in political, socio-economic developmental projects at all levels. Functional nutrition and other information systems at all levels have to be established or strengthened. Partnership between the public sector, NGOs, private sector and UN agencies has to be strengthened.

If the vision for the 21st century is to succeed, it needs to draw on the massive insights, experiences, understandings and commitments of those committed to improved nutrition, gender equity and poverty alleviation. Challenges have to be clearly identified and opportunities fully exploited. A new enthusiasm is needed, the authors stressed.

Accelerated public investments are needed to facilitate the attainment of food self-sufficiency and an increase in the levels of food security must be featured in the national and regional priorities. The investments need to be supported by an enabling policy environment. This includes trade, macro and micro sectoral policies that do not discriminate against agriculture but provides incentives for productivity increases in food and agricultural production. These policies should also provide appropriate incentives for sustainable management of natural resources.

Policies should be designed as a function of particular conditions prevailing in Africa and taking into account its particular scientific and technological capabilities. Purposeful measure could also be considered like initially elevating one segment of society thought to be disadvantageous to where the other segment is and then taking them both wholly.



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DISCUSSION OF THE PRESENTATION

Ms. Charlotte Wonani, a lecturer at the Department of Development Studies of the University of Zambia and ATPS Zambia National Co-ordinator, was the discussant. She said small-scale farmers were generally marginalized in areas where there was large-scale farming. Institutional failure also affected agricultural output, she said, arguing there were institutions in support of male farmers but were greatly wanting. The challenge, Ms. Wonani said, was to reposition women in the agricultural sector and view them as decision and policy makers not as labourers and mere farm workers.

Further, she said women in agriculture were either infected or affected by HIV/Aids and that loss through the disease was affecting development in Africa. Technology needed to be looked at holistically with a view to developing labour-saving technologies that support women. Women should also be enlightened on their rights and support service provided to facilitate their work.

ISSUES EMERGING FROM THE PRESENTATION

A delegate contended that women are different from men and they also communicate differently. Unless this is appreciated, he said, problems in solving food security would linger on. In addition, he said, women are workers, labourers and men are the decision makers, he stressed, arguing that running away from the fact would complicate matters.

Another delegate argued the comments being made on gender and women's role in agriculture are "static" and that they had been discussed exhaustively in the 1980s.

Dr. Ogbu clarified how gender issues had evolved since the 1970s. At the beginning, attempts were made to address "women in development", later "women and development", and more recently, "gender and development". Each had an accompanying methodological dimension.

It was also pointed out that steps had been taken in some countries to enable women to make a mark in agriculture. In Nigeria, for example, some programmes enabled women to obtain credit. The challenge, it was pointed out, was to deepen democracy in Africa, integrating women's concern. Africa, it was pointed out, must re-examine itself to find out why it is poor in spite of its enormous resources.

A speaker insisted delegates must distinguish between the elite woman and "the woman who suffers".

8. WELLINGTON A. OTIENO AND ADA MWANGOLA

WHY AFRICA HAS FALLEN SHORT OF BUILDING DYNAMIC AGRO-PROCESSING CAPABILITIES: CONSTRAINTS, OPTIONS AND PROSPECTS

The paper was prepared by Dr. Wellington A. Otiemo of Foodlink Resources Institute and Ms. Ada Mwangola of Oxfam (Kenya). The paper examined the objectives of food processing in agriculture-led development strategy, the performance of the agro-processing sub sector and the factors constraining agro-processing industries in Africa. Such factors include inadequate agricultural, industrial and economic policy; weak integration of agriculture, manufacturing and trade; mistakes in the setting up of enterprises; technological inadequacies and poor demand stimulation.

They also include inability to adapt to sophistication of international market; lack of integration of large and small enterprise; poor infrastructure; debt service burden and import dependency of industry. The presenter also highlighted the strategic policy directions for the future, arguing that to meet the challenges of agro-processing, clear mechanisms should be set up focusing on supply of raw materials, technology, product diversification and markets.

He said the bulk of processed food in domestic market is produced by micro enterprises in the informal sector in sub-Saharan Africa but lamented the neglect of the sector by governments.

DISCUSSION OF THE PRESENTATION

Prof. Banji Oyeyinka led the discussion of the presentation. He said the traditional sector is innovation driven, knowledge and technology based. The sector is the fastest growing, he said, adding it carried the wrong tag as it was often revolutionized, especially in the developed world. Institutional support in Africa is weak, he said, giving the example of a general lack of legislation on biotechnology in most countries.

Some institutions have also become inappropriate with changing times, he said, while others have been destroyed by certain forces, particularly the structural adjustment programmes.

ISSUES EMERGING FROM THE PRESENTATION

Governance must be given greater consideration as it hampers development on the continent, it was argued. Corruption must be expunged from all sectors if constraints to development are to be ended. It was pointed out that as a consequence of globalization, uprooted industries were mushrooming in Africa to exploit the liberalized environment without supporting local development efforts and products.

Majority of them import raw materials from outside even when such products are available locally. It was recommended that agro-processing policy in Africa be community based. A delegate took issue with African intellectuals and experts, saying they tended to relish making recommendations and sit back expecting change to automatically occur. Another said Africans tended to live on hope that all would be well without taking the necessary measures to correct the situation. There were no plans to deal with possible droughts or poor harvests, for example.

It was also argued that Africa had many options but needed to consider its comparative advantages. University education in Africa was faulted for being promotion based. There was little, if any, demand driven research at African universities and there was apparently no one responsible for the research outputs of those institutions. It was proposed that networks encourage governments to strengthen links between industries and universities. Delegates agreed agro-processing is key to Africa's food security but stressed that governance is fundamental. Many industries in Africa had collapsed because of corruption. A delegate said subsidies make it difficult for agro-industries to thrive.



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9. JULIUS H. MANGISONI

MARKETS, INSTITUTIONS AND AGRICULTURAL PERFORMANCE IN AFRICA

This paper was delivered by Dr. Julius Mangisoni of the Rural Development Department at the University of Malawi. The paper attempted to show the linkage among markets, institutions and agricultural performance in Africa. It demonstrated that African farmers face problems of transaction costs, missing markets, agricultural risk, and institutional constraints that limit the benefits they realize from agricultural production.

Further, due to the limited success of the structural adjustment programmes, the paper recommended that Africans should be in charge of their own development programmes. In such programmes, much emphasis should be placed on market development to address the problem of limited market access.

The presenter observed that poverty is a serious problem in Africa leading to food insecurity and poor nutrition. At the same time, smallholder farmers have limited access to markets for their various agricultural products due to transaction costs, poor infrastructure, agricultural risk, missing markets and institutional constraints. Some of the problems such as missing markets have been aggravated by the withdrawal of marketing boards from remote areas, a move necessitated by market liberalization. Since the structural adjustment programmes have not succeeded in Africa, the presenter recommended that the direction taken by NEPAD to let Africans take the lead in designing their own programmes be supported. He further recommended that regional initiatives such as SADC, COMESA and ECOWAS should launch a campaign to persuade Africans to substitute African products for foreign products.

For market development, he said, collective action among farmers, agro-processing to add value, development of grades and standards, infrastructure development, and market information should be top priority in every African county.

DISCUSSION OF THE PRESENTATION

The discussion was led by Prof. C. Madukwe who called for serious consideration of cultural risks, saying they had tremendous impact on policy. He said the main challenge was to examine institutions whose weakness was attributable to poverty on the continent.

The discussant said the subsystems in agriculture were not well understood, adding that research must be based on farmers' problems if any meaningful progress was to be achieved.

ISSUES EMERGING FROM THE PRESENTATION

It was noted there is need to differentiate between food poverty and income poverty. A delegate underscored the importance of collective action, saying cooperatives could serve a critical role in addressing farmers' problems were it not for the governance problems that beleaguer them.

Another delegate proposed the involvement of the private sector in addressing issues of agricultural performance. It also was suggested that the pricing of commodities be stabilized and that governments identify crops that should be marketed by boards and those that should be marketed by the private sector.



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10. SHELLEMIA O. KEYA

RESEARCH PRIORITY AREAS FOR AFRICA TO ATTAIN SUSTAINABLE FOOD SECURITY

Prof. S. O. Keya, formerly Executive Secretary TAC/iSC of the CGIAR, FAO, Rome, delivered the presentation. He examined the challenges of sustainable agriculture production that translate into lack of technological change, lack of produce incentives, poor infrastructure and neglect of small-scale farmers by agriculture research. He said priority areas for research are driven by food security, export earnings, cash income, raw materials for industry, rural employment, sustainability concerns and poverty reduction.

The presenter said research priorities for the continent are often donor-driven. The research is also generally short-term, resulting in priority distortion. In addition, such priorities have no reference to each other. He cited national priorities such as tea and coffee research in Kenya but argued the development of agricultural sector in Africa was severely hampered by the slow rate of appropriate technology generation, transfer and adoption by farmers.

At the sub-regional level, he said ASARECA had identified five high priority areas – improving the genetic material to increasing productivity, increasing productivity of livestock production systems, adding value to agricultural produce through post-harvest management, resource management, enhancing efficiency of support institutions, and strengthening of ICT. Other examples of the sub-regional level include tobacco and sugar research in Zimbabwe, while at the regional level FARA had developed a vision of African Agricultural Research and Development.

He said policy research is needed to guide decision makers on the necessary incentives to promote technology adoption and productivity. There is also need to improve cash crop production and competitiveness, to strengthen peri-urban agricultural systems, to improve grain legumes programme, and develop sustainable irrigated agriculture in the Sahel. There is also need to improve banana and plantain production for food and income, root and tuber crops for food and for poverty alleviation and integrated cereal production systems for increased food security.

The speaker also emphasized the need to improve management of natural resources and production systems, conservation and sustainable utilisation of plant and animal genetic resources, improvement of livestock research for food and income, and the strengthening of ICT.

At the international level, the speaker said CGIAR priorities are guided by the *Vision and Strategy* adopted in 2000 setting out seven broad guidelines for strategic planning – three of which are poverty and hunger reduction, a regional approach to research planning and implementation, and the forging of partnerships with the private sector and universities.

At the level of the African Union, he said, governments should strengthen agricultural research through technology transfer, promotion of centres of excellence, appropriate institutional reforms, and adoption of new approaches including impact assessment. Prof. Keya also discussed recent developments influencing African research priorities. These include Nepad's efforts in promotion of ICT and agriculture to meet the Millennium Development Goals by 2015 and FAO's Study on Products.

RESEARCH PRIORITIES

Prof. Keya identified various research priorities for the continent as follows:

Priorities at Sub-Regional Level by ASARECA

- Improving genetic material.
- Increasing the productivity of livestock production systems.
- Adding value to agricultural produce through post-harvest processing, storage, and quality control.
- Promoting soil fertility, water management and conservation
- Enhancing efficiency of institutions supporting agricultural production systems.
- Strengthening ICT.



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Priorities at Sub-Regional Level CORAF/WE CARD

- Promoting agricultural policy.
- Improving cash crop production and competitiveness.
- Strengthening peri-urban agricultural systems.
- Grain legume improvement programme.
- Development of sustainable irrigated agriculture in the Sahel.
- Banana and plantain production for food and income.
- Root and Tuber crops for food security and poverty alleviation.
- Integrated cereal production systems for increased food security.
- Management of natural resources and production systems.
- Conservation and sustainable utilization of plant and animal genetic resources.
- Livestock research for improved food security and income generation.
- Strengthening ICT

SACCAR'S for Strategic Areas

- Improved coordination and integration of regional research and training.
- Partnership in agricultural research and training.
- Improved information and communication system in support of research.
- Review of institutional framework.

CGISR Priority Formulation 2003

Findings of the Africa Panel

Germplasm Collection, Conservation, and Characterization

1. Ex-situ Conservation
 - Storage protocols for neglected and endangered species.
 - Conservation of crop wild relatives.
 - Identification of important "orphan" food crops.
 - Forage grasses and forage legumes.
 - Annual and perennial crops for marginal environment.
 - Pharmaceutical crops.
2. In-situ Conservation
 - Conservation of wild relatives.
 - Crops systems for marginal environment
 - Valuation of *in situ* and on-farm conservation.
3. Livestock
 - Investigation of the genetics of resistance to diseases.
4. Forestry
 - Community forest management in the semi-arid areas.
6. Microbes and insects
 - Characterization of, and enhanced access to, genetic resources.
8. Other
 - Study of gene flows.

Germplasm Improvement

Cereals

- Screening of traditional *O. glaberrima*.
- Comparative genetics of host plant.

Roots and tubers

- Improve resistance to aflatoxin.
- Develop clean and efficient germplasm.

High value and cash crops

- Improve resistance to aflatoxin.

Livestock

- The genetics of indigenous livestock breeds.

Other

- Use of wild species and other exotic genetics resources.
- Use of insect and insect pathogens as sources of biopesticides.
- Investigation of soil and root health diseases.

A biotic stress

- Drought: comparative genetics of drought tolerance.

Sustainable Production Systems and Natural Resources Management

- Crop production systems
- Livestock production systems
- Agroforestry systems
- Urban and peri-urban systems

Policy and Socio-Economic Research

- Markets.
- Institutions in support.
- Post-harvest.
- Policy and institutions.
- Rural livelihood.
- Determinants of poverty.
- Research impact assessment.
- Outreach to policymakers.

Strengthening NARS and Other Rural Institutions

- Training and capacity for NARS
- Empowerment of farmers, their organizations, and communities
- Public-private partnerships
- South-south collaboration
- Rural and AKIS
- Other, for example financial sustainability in NARS.

Cross-Cutting Themes

- Information platforms
- Impact assessment

DISCUSSION OF THE PRESENTATION

The discussant was Dr. Alex Tindimubona who said the paper had listed far too many priorities, thus making it difficult to see what was the priority. "When everything is a priority, then nothing is a priority," he said. Dr. Tindimubona said Africa must set its own priorities. He recalled a meeting in Africa at which the extermination of "weeds" which happened to be traditional food for Africans was discussed by foreigners. "Our food was targeted for chemical and biological warfare," he said, calling on Africa to have donors from their own countries and governments to set agenda for the continent. The discussant proposed a positive, forward-looking approach that does not heckle Africa on how it has failed, but that which seeks opportunities and options for the continent to be better.

He said ATPS should take up the challenge and lead the way. Africa's agenda, he added, must be based on "strategic thrusts" such as the African Green Revolution, Nepad and its CAADP and the Millennium Development Goals. He said ATPS had the comparative advantage to add value, arguing the network had gone "the farthest" in engaging policy-makers through parliamentary fora.



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ISSUES EMERGING FROM THE PRESENTATION

A delegate contended that for Africa to launch into biotechnology, it must start with genome contiguity maps. It also was suggested that governments in Africa must emerge as new donors for effective progress. A delegate said Africa hardly understood itself, the farmer and its poverty. It also was claimed the conference was discussing science and technology in “very abstract” terms. “We are not showing the framework in which things should happen,” a speaker lamented.



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5.0 Review of Conference

Dr. Osita Ogbu invited Mr. Paul Dufour of IDRC to give his impressions of the first two days of the conference. Mr. Dufour said three things had caught his attention at the conference:

- ATPS' initiative in promotion of science and technology policy and the network's commitment to ensuring decision-makers and researchers in Africa understand each other.
- ATPS' thrust in influencing the development agenda on the continent particularly through dissemination of ideas.
- The need for continued support of science and technology policy initiatives spearheaded by ATPS because of their centrality to the development process.

Mr. Dufour recalled the science and technology policy dialogue forum organized in June for Parliamentarians in Lesotho, saying that was a major step forward in the network's efforts to augment development in Africa. He said his work in Ottawa involved the development of new technologies, adding IDRC had already supported gnomics research in various countries.

Giving her impressions on the conference, Prof. Olembo regretted that despite numerous discussions and studies, Africa was growing more hungry. "Where's the missing link?" she asked, observing that other continents had food security and were developing. She proposed a more effective system of information dissemination to alleviate the problems the continent faced.

"We have all along been prioritising. It is now time to implement," she said. Dr. Alex Tindimubona delivered a goodwill message from UNECA, saying his organization placed great value to what ATPS was doing. He said UNECA was expert and process driven and that it was keen to learn from ATPS. "Our organisation deals in sustainable development, and food security is key to what we do. So we share experiences," he declared. UNECA was in the process of developing the idea of the African Green Revolution, he said, and called on ATPS to be a partner. He said ATPS' leading role in articulating the African perspective was demonstrated by the number of publications on continental issues to its credit. Dr. Tindimubona said UNECA would sponsor five people attending the Lesotho conference to the Kampala Green Revolution meeting.

THE WORKSHOP

The third and fourth days were devoted to a review of research proposals submitted to ATPS for possible funding. The proposals fell into one of three groups. Group A - Agricultural Technology Policy; Group B - Information and Communication Technology Policy; and Group C - Technology Transfer, Trade and Industry, IPRS, Gender and SME Technology Policy Issues. The following research proposals were submitted for review.



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GROUP A: AGRICULTURAL TECHNOLOGY POLICY

1. "The policy of reducing the importation of rice: enhancing national capacity for rice self-sufficiency in Ghana" by *Paul Kofi, A. Dartey and D. Awunyo*
2. "The influence of modern technologies on indigenous knowledge in farming systems of Morogoro District, Tanzania" by *Adolf F. Makauki and Josephat Itika*
3. "Assessing the status of food biotechnology in Swaziland and Nigeria" by *F .M Badejo and L.O. Sanni*
4. "Biotechnology systems of innovation: A study of institutions and policies in Cameroon" by *Violet Bumah and Alfred Ngwa*
5. "Socio-economic effects of improved post-harvest technologies in maize production in Kaprochwa District of Uganda" by *Paul Mwebaze and Edward Kato*
6. "Selecting appropriate value adding technologies for diversifying utilization of tissue-culture derived bananas in East Africa" by *Margaret Karembu, S. Wakhusana and J. Namaganda*
7. "The impact of biogas technology in Lesotho: Facts and challenges" by *Elliot Lefa Thamae, Muso Raliselo and TS'ehlo Moshe*
8. "Small-scale irrigation schemes in Swaziland and their role in poverty alleviation: Implications for policy formulation" by *Absalom Manyatsi and Patrick Khumalo*
9. "Effects of institutional and policy reforms in Uganda's forest sector on the saw milling technology and opportunities for improvement" by *Joseph Obura and Paul Mugambi*
10. "Biotechnological innovations in soil fertility management for women farmers: the key to improving small-holder agriculture in Ghana" by *S. Agyenim Boateng, S. Boadi and J. Haleegoah*
11. "Towards a national strategy for enhancing the adoption of improved varieties of maize for food security in Ghana" by *Christopher Kwame Ayim*
12. "Technology and marketing problems of small scale dairy enterprises in Kenya" by *Gidraph Nduati and Winifred Karugu*
13. "A study of the effectiveness of farm technologies delivery systems on small scale farming in South-West Nigeria" by *Abel Babalola Ogunwale*

GROUP B: INFORMATION AND COMMUNICATION TECHNOLOGY POLICY

1. "The Information and Communication (ICT) sector in Nigeria: A case study of the computer hardware industry sub-sector" by *O. A. Bamiro, B. A. Durojaiye, and A. I. Onueme*
2. "A study of the effect of computerization on the performance of government institutions in Sierra Leone" by *Abu Kamara*
3. "Social dimensions of information technology (IT) in Kenya: With reference to policy implications on the social structure" by *Mumbi Machera*
4. "Investigation of Lesotho's ICT readiness and formulation of ICT policy framework" by *Teferi Kebede and Ntsibane Ntlatlapa*
5. "What kind of technology is needed for effective teaching and learning in the primary schools of Lesotho" by *Sophia Majara*
6. "A study of the effects of electronic banking on the performance of selected commercial banks in Sierra Leone" by *Sarah F. Bendu*
7. "Information and communication technologies (ICTs) in Cameroon: Changes and prospects for the future" by *John Suh Che*
8. "The technological capabilities of the banking industry in Nigeria: Implications for learning and training" by *Nnenna J. Enwere*
9. "Has the new and emerging information technology improved efficiency in the banking sector in Ethiopia?" by *Tassew Belachew and Abdurahman Ame*
10. "Determination of the support required to promote, adopt and apply ICTs in Swaziland: Implications for policy formulation" by *M. D. Dlamini and Musa A. Dube*



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11. "Effects of telecenters on agricultural technology transfer in Uganda" by *James Kakooza and Dave Khayangayanga*
12. "A study on ICT for Rural development in Ethiopia" by *Berhanu Denu*
13. "E-Government in Mozambique: A study of policy, procedures, regulations and norms for its successful implementation" by *Augusto F. Nunes and Zauria Saifodine*

GROUP C: TECHNOLOGY TRANSFER, TRADE & INDUSTRY, IPRS, GENDER AND SME TECHNOLOGY POLICY ISSUES

1. "Assessment of technological capabilities in the industrial small and medium scale enterprises sector in Zambia" by *William Mbuta and William Musonda*
2. "Trade liberalization and production in Uganda: A case of manufacturing sector" by *Nichodemus Rudaheranwa and Ashie Mukungu*
3. "Technology accumulation and development in small and medium enterprises (SMEs): A case study of agro-allied sub-sector of Nigeria's economy" by *D. A. Okongwu*
4. "Local retirements for effective technology transfer and diffusion in Zambia: Options, constraints and prospects" by *Lipalile Mufana and Mutombo Namuunda*
5. "The leather industry of Ethiopia: An investigation of supply constraints and firms technological capabilities" by *Abreham Gebeyenu and Dejene Aredo*
6. "Are there significant technology and productivity spill-overs from multi-national corporations in sub-Saharan Africa? A cross-country study of Ghana, Kenya, Tanzania, Zambia and Zimbabwe" by *Samuel Bwalya and Peter Sampa*
7. "The technology factor in solid waste management in Nigeria" by *A. J. Kamuyi*
8. "Utilization of the patent system by R&D institutions in Tanzania" by *Georges Shemdoe*
9. "Promoting female participation in Science and Technology for development and poverty alleviation in Cameroon" by *John W. Forje*
10. "Evaluation of technology and policy framework for the promotion of small and medium scale Kenyan leather goods manufacturing" by *B. O. F. Odongo*
11. "A study of licensing and foreign technology implications for technology transfer in industries in Nigeria" by *E. O. Essien and K. Hassan*
12. "Foreign direct investment (FDI), technology transfer and poverty reduction in Botswana" by *Donatilla Kaino*
13. "Technology requirements of metal working micro-and small enterprises in Zimbabwe" by *Charles Halimana*



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6.0 Research Methodology and Training

INTRODUCTION TO TECHNOLOGY POLICY

This session was conducted by Dr. Mohamed Khalil. He stressed the centrality of technology in virtually everything people did, showing that science belonged to the realm of “why?” while technology belonged to that of “how”. Failure by African governments to see science and technology as the engine of development had led to economic stagnation, he said. Developed countries placed engineers at the pedestal of development programmes while African governments were still stuck with classical economists in ministries that made key decisions affecting development.

The absence of a focused and independent science and technology policy had led to hilarious failure in most national projects across the continent, Dr. Khalil said, and cited Chinese and Kenyan science and technology project experiences to elaborate his point. In 1986, China entered a contract with GEC Alsthorn of France to have the company:

- Manufacture four 300 mw turbine generator units
- Transfer the design technology to local Chinese corporations
- Deliver documentation and drawings of the project to the Chinese
- Gradually increase domestic content in the co-production of heavy power generating equipment

China, he said, had set up the necessary institutional structures for the work. The Ministry of Energy was charged with formulation of policy, planning and implementation of the project while the China National Technical Import Corporation (CNTIC) was charged with the regulation and screening of capital equipment flows. The China International Water and Electric Corporation (CWE) was charged with planning, construction and management of the power sector and the Beijing Heavy Electrical Machinery Works (BZD) with the manufacture of turbo generators. China ensured the local content ratio was increased as the project progressed and monitored the development closely, ensuring Chinese interests were always at the fore. The country also placed a high premium on training, thus making sure local personnel gained knowledge on how to manufacture the 300-mw turbo generators.

In contrast, Dr Khalil said, Kenya in 1979 signed an agreement with a Canadian counterpart for installation of a 220KV transmission line between Kamburu in Central Province and Mombasa in Coast Province. In the case of Kenya, Canada would provide consulting and technical engineers besides providing other services for the project. The Canadian content, not Kenyan, was to be maximized during implementation of the project, and the Canadian executing agency ACRES would ensure maximum opportunity went to Canadian firms when bids were called.

Virtually all decision making and implementation relating to the project was to be done by ACRES including evaluation, procurement, co-ordination and tendering. The Kenya Power and Lighting Company’s involvement was peripheral and KPLC’s capacity was hardly used. The lesson to be drawn from the Kenyan case is that the country had no technological agenda and that the country had ceded overwhelming control of a parastatal to foreigners.

RESEARCH METHODOLOGY ISSUES

The session was conducted by Prof. Banji Oyeyinka who clearly outlined the steps in putting together a research proposal. He underscored the importance of formulating the research question saying such a question should address pertinent problems in Africa. The research question should also capture the major problem of the study. Some of the questions to ask when formulating the research question include: What problems am I supposed to find solutions to? How is this important for policy development? The Speaker also emphasized the need to formulate a clear hypothesis and to have clarity on the broad and specific objectives. Literature review is also critical and must examine what has to be done in the area of study, look at what arguments have been advanced and seek to contribute new knowledge into the debate. The methods of research and the instruments to be used should also be carefully worked out. A budget and complementary activities should also be clearly spelt out.

THE CHALLENGES OF PUBLISHING RESEARCH: TOWARD BETTER PRESENTATION OF PAPERS

The improved writing and packaging skills session was conducted by Mr. Magayu K. Magayu, a lecturer in journalism at the University of Nairobi. The paper was aimed at pointing out the more common mistakes made by researchers when writing research outputs for publication. It also discussed the problems relating to presentation of such papers. The problems discussed ranged from spelling to punctuation, from figures to heads, from tables to expressions and grammar.

The presenter emphasized that the role of an editor is to make the copy digestible to the readers. He said it was the responsibility of the writer to ensure work intended for publication was as complete, as clean and as thorough as possible. The editor may help improve on the work but there is a limit as to how far he can go. "The onus is on the writer to ensure copy for publication is clean," he said.

UNESCO PRESENTATION ON TECHNOLOGY AND POVERTY ERADICATION

The Unesco presentation titled "Technology and Poverty Eradication" (TAPE) was prepared by Dr Adalgot Komba of the University of Dar es Salaam, Tanzania; Mr Mohamed Jalloh of the Ministry of Education, Science and Technology, Sierra Leone; and the presenter, Dr Peggy Oti-Boateng, the Director of the Technology Consultancy Centre, Kwame Nkrumah University of Science and Technology Kumasi, Ghana. The paper detailed the outcomes of two regional workshops organized by Unesco with the aim of identifying policies, strategies and actions that enable promotion of technology for poverty reduction. The regional meeting held in Kumasi, Ghana, on February 21-22 sought to benefit from the experiences of technology policy researchers by:

- Sharing their experiences in the use of science and technology for poverty reduction.
- Identifying science and technology related gaps in poverty reduction strategies developed by various African countries.
- Collating ideas on the use of science and technology for poverty reduction in Africa.
- Discussing with development partners the financing of science and technology activities for poverty reduction.

THE THEMATIC AREAS GUIDING THE KUMASI WORKSHOP WERE:

- Knowledge networks for poverty reduction.
- Technology systems for poverty reduction.
- Technological dimensions of poverty reduction strategies in Africa.
- Increasing contribution of science and technology in poverty reduction strategies in Africa.

The objectives of the Arusha workshop, held on September 9-11, 2003 were to:

- Tease out the lessons learnt, development challenges and good practices from Africa and around the world where technologies have been successfully promoted for enterprise development.



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- Identify policy issues and strategies for technology diffusion to determine how micro finance institutions could support acquisition by clients and promote partnerships between the developers and the users of technology.

The thematic areas for the workshop were:

- Global and regional experiences in small-scale technology development for poverty reduction.
- Case studies of technologies that work for the poor.
- Policy issues in technology development and diffusion.
- Financing and policy issues.

The workshops were organized in the backdrop of the recognition that appropriate technology is the main instrument in poverty reduction among the poor as it empowers them by expanding choices in their lives. It also has become increasingly clear that technology can increase production and income and allow growth of an enterprise while introduction of improved technologies into micro-finance schemes can transform them from subsistence to micro-enterprises. There is also the recognition that the role of technology has not been fully appreciated and technologies that have been developed have not been successfully transferred. It is also recognized there are problems of technology transfer, diffusion and adoption. In addition most poverty reduction strategic plans have technology as a cross-cutting issue.

The Lesotho workshop was informed that technologies for poverty reduction must add value, be gender friendly and have capacity to improve people's lives. They must involve all stakeholders, be demand-driven and build upon traditional and indigenous knowledge. Technology transfer mechanisms and centres should be in place for effective adoption and provision of credit facilities to promote such transfer. The need to create linkages for technology transfer and innovation was also brought out clearly as was the need for awareness creation, advocacy and training. Governments were viewed as key in addressing the missing links but the private sector was singled out as critical to the development of technologies beneficial to the poor. The paper recommended strengthening of institutions that carry out research, particularly universities, and the promotion of networking with such development partners as Unesco, ATPS and the World Bank.

ISSUES EMERGING FROM THE PRESENTATION

Prof. Norah Olembo, the Chairman of ATPS, said formation of communication linkages would help solve Africa's problems relating to science and technology. Time to act is now, she said, and African governments must be lobbied to understand the importance of science and technology. She called on the "top cream" of scientists on the continent to lead in agitating African governments to embrace science and technology. ATPS was requested to strategize on how this would be carried out. It was proposed that a strategy paper be prepared detailing the course of action.

Prof. Matsela of Lesotho welcomed the formulation of a strategy paper but cautioned on the difficulty of scientific language. He said it was important to reach people at the grassroots and called for a translation of the strategy document to ensure it was understood by everyone.

A delegate said there was a tendency to approach things the wrong way. The first step, he said, should be transfer of already existing technologies and an assessment of Africa's approach to science and technology. There's need to press governments on the continent to create enabling environments for science and technology development, he said.

Mr. Benson Zwizwai of Zimbabwe faulted Africa's placement of too much premium to finance. He observed that even projects that were well funded had problems. Drawing from the experience of a Zimbabwean project, he said, its philosophy was to bring all involved together, to ensure they networked and supported each other particularly in areas such as marketing and training.



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Another delegate called for the involvement of herbal practitioners, saying traditional healers had an important contribution to make in the field of science and technology as well as in biotechnology. It also was suggested that Africa would begin to develop only after it had started exporting technology.

Prof. Banji faulted the presentation, saying it was fraught with contradictions.

Mr. Squire of Sierra Leone described technology as something one uses to do one's work better, saying what Africa needed was technology it could use. Prof. Bamiro of Nigeria while acknowledging strategic plans are difficult to formulate said such plans would be useful because they would enable Africa to re-examine its own environment and therefore allow those involved to see the "interconnectedness" of the science and technology issues.

Nnenna J. Enwere of Nigeria was more positive. Africa needed no excuse to remain poor, the delegate said, and challenged ATPS to send scientists to the grassroots where training would start and put the continent on the development rail.

Another speaker called for the "well-formulated" document that must be sent to all heads of state, to Nepad, UNESCO and UN detailing Africa's path to science and technology development. However, another delegate said their greatest encumbrance to science and technology adoption in Africa is infrastructure. "Either there are no roads, water or electricity," he said. "So how can we do what we want to do?" he posed. "We need to be practical in approach."

Part of the problem in Africa, one delegate said, was that African governments relied heavily on technocrats who advise wrongly. A way should be found to ensure governments are given correct advice.

A speaker proposed that academics go into areas that did not require government permission, arguing that working with the authorities might take 10 – 15 years before certain recommendations are implemented.

On transfer and access to credit, a delegate proposed the strengthening of ministries of information to cover rural areas with personnel knowledgeable in issues of science and technology. Further, he called for granting of affordable loans as commercial banks charged high interest rates.

Dr. Osita Ogbu called for an African perspective in the presentations. Prof. Olembo supported the putting together of a strategy document to be sent to relevant organizations, including Nepad and the African Union, showing the way forward for science and technology in Africa.



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7.0 Presentation of the ATPS Strategic Plan

Prof. Melvin Ayogu presented the ATPS strategic plan, the fifth phase of the network's programme. He said people had begun to see the linkages between use of knowledge and ICTs in the economy.

Dr. Ogbu, ATPS Executive Director, said the network had already launched into phase five but observed that the organization had not developed a strategic plan before. Those in the network, he said, were already converted and their duty was to advocate for science and technology. A review of the network had been conducted, he said, and noted the proposed project was fairly ambitious. It would raise the organization's budget from \$1.5 million to \$2.5 million in a year. As a result, he pointed out, money would have to be raised from all possible sources, particularly at the local level. He called on national chapters to rededicate their efforts to raise money to support the network's activities from their own countries.

ISSUES EMERGING FROM THE PRESENTATION

The following suggestions were made by members following presentation of the ATPS strategic plan.

1. That efforts be made to raise money at the national level to support the network.
2. That ATPS embark on zero-budgeting.
3. That friendly governments be approached to support the network's activities. Nigeria was cited as one country that had offered support to the organization in the past.
4. That solvency is key to the network's success and must, therefore, be guaranteed.
5. That industry be brought on board to help ameliorate some of the financial problems the network was experiencing.
6. That ATPS considers running consultancies for governments using its rich repertoire of scientists and use a percentage of the proceeds to support its work.
7. That the nurturing of entrepreneurial skills be brought out clearly as a task ATPS would effectively undertake under the curriculum review aspect to enhance the linkage between research and industry.
8. That legislators and other decision-makers be integrated into ATPS as members in order to give it the necessary support.
9. That ATPS be open to corporate membership in order to enjoy support of public and private organizations.



**MASERU
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8.0 Presentation of ATPS Achievement Awards

Dr. Osita Ogbu, the ATPS Executive Director, said the network had launched the ATPS Achievement Awards that would each year go to the national chapters that emerged as the best in promoting the objectives of the organization. The winners of the 2003 Awards were as follows:

1. Best Exhibition Award – ATPS Tanzania Chapter
2. Outstanding Effort Award – ATPS Ethiopia Chapter
3. Outstanding Advocacy for Africa Science Day – ATPS Ghana Chapter
4. Best Overall Chapter – ATPS Lesotho Chapter.

9.0 The National Co-ordinators Meeting

The National Co-ordinators Meeting was chaired by Dr. Osita Ogbu, the Executive Director of ATPS. He introduced co-ordinators of newly opened chapters – Mozambique, Burkina Faso, Benin, Mali and Senegal. Namibia and South Africa, who attended the meeting as observers were also introduced. The co-ordinators from the new chapters gave brief profiles of themselves. The Executive Director advised them to take the science and technology policy component seriously to ensure there were links between researchers and policy makers.

The meeting went through the minutes of the previous co-ordinators' meeting held in Abuja, Nigeria, on November 15, 2003.

Members expressed the view that there was need for chapters to communicate more amongst themselves. Dr. Ogbu proposed that national chapters employ e-mail more, arguing it was the easiest means of communication.

It was pointed out that grants offered by the networks for research should be used within the stipulated period. Some beneficiaries took too long to complete their research or to account for the grants, leading to cancellation of subsequent payments.

Co-ordinators sought to be told who had won research awards at the conclusion of the ATPS review workshops so that they could inform researchers back at home immediately. The Executive Director cautioned that the issue should be handled carefully as it could lead to serious disappointments if grants were not eventually paid out for one reason or the other. He reasoned that the safest way was to ensure a contract had been signed by ATPS and the researcher.

REPORTS FROM THE CHAPTERS

The chapters represented gave an account of their achievements and challenges.

LESOTHO

1. The Parliamentarians Round Table was held in June 2003. The meeting should have been held in January but was postponed owing to the commitments of parliamentarians. The Round Table was a great success.
2. Peer review of research proposals were carried out. However, there had been delays in submission of proposals.
3. The chapter intended to mount awareness creation workshops but funding was a stumbling block.
4. Involvement of government into ATPS activities was a challenge. There also were problems involving NGOs and the private sector.
5. The chapter expressed appreciation for support given by ATPS to a senior journalist to travel to Uganda for a training workshop. The journalist had been sensitised on science and technology issues and was now covering them more effectively in the country's media.
6. Lesotho had formulated a science and technology policy document and the national chapter wanted to enlist support of ATPS in reviewing and implementing it.

UGANDA

1. Registration of the national chapter was in progress.
2. Priority was being given to establishment of partnerships with, for example, the Curriculum Development Centre and the Uganda Academy of Sciences.
3. The chapter had had meetings with the network on ICTs.
4. The chapter had organized a successful Science Revival Day but it was suggested greater involvement by the government was required.
5. The chapter was receiving requests for popularisation of science and technology issues.
6. The chapter had held research seminars.
7. The chapter had not managed to hold any round tables on policy dialogue.
8. The chapter had had no impact on the constitutional review commission as it had not established an entry point.
9. The chapter plans to run essay competitions to promote science and technology.

CAMEROON

1. The national chapter is now officially registered.
2. The chapter had participated in its country's University Technology Week.
3. Membership had been extended and the register was now complete.
4. The chapter was optimistic it would receive funding for its activities.
5. Office space had been identified and the chapter would be paying approximately \$ 75 per month in rent.

NIGERIA

1. Registration of the chapter had been slow and a lawyer had been contacted to help.
2. A Round Table planned for last year had not been held and plans were under way to mount one by the end of December 2003.
3. Africa Science Day had been celebrated and government officials had graced the occasion thereby making cooperation with them in the realm of science and technology possible.
4. Training policy makers and legislators had been conducted and the initiative had received good media coverage.
5. The chapter had recorded good progress on proposal writing and research.
6. Four major activities had been held including a workshop in Lagos to promote science and technology for development and a methodology workshop.



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7. The chapter was now stable with the division of labour and delegation of responsibilities.
8. A Round Table on globalization had been held.
9. The chapter plans to have a meeting to discuss the setting up of centres of excellence.
10. The chapter also plans to mount a parliamentary round table and an initiative to work at the state's level.

TANZANIA

1. The Africa Science Day was commemorated successfully. It included an exhibition and a conference.
2. A methodology workshop was successfully held.
3. A Parliamentarians' conference had been planned to take place in October but did not take place.
4. More lobbying of government is required.
5. The co-ordinator works for a government ministry while majority of members are from the university. She tends to run into problems pushing agenda that others might consider to be in their own docket.

SIERRA LEONE

1. The country had a mixed year - coordinator was active both at the chapter and science and technology levels.
2. A strong committee on science and technology had been set up by the government.
3. The chapter was trying to link up with NGOs working in development.

GHANA

1. A national workshop had been held in June for registration of members beyond universities and like institutions and to enlist the support of the government.
2. The national chapter constitution had been ratified and 15 members had paid \$20 membership fees.
3. Africa Science Day was commemorated in collaboration with the relevant ministries at a village in Kumasi.
4. Peer review had been conducted and scientists encouraged to write proposals for research.
5. Operations of the chapter had been streamlined and bank accounts put in order.
6. The chapter was working on strengthening networking with other organizations.

ETHIOPIA

1. The chapter had been registered as an association.
2. Africa Science Day was commemorated, with policy-makers and other stakeholders attending the celebrations.
3. Research projects were reported to be going on.
4. Progress had been achieved linking the chapter with stakeholders. The Science Commission, for example, had requested the chapter to run a seminar for media practitioners.
5. A member had been involved in a science research project by the Ministry of Capacity Building and the results would be used to inform the policy formulation process.
6. A member had received a promotion in government.
7. The co-ordinator had used various fora to promote the activities of ATPS.
8. The Chapter was working on an internet-based strategy to reverse the brain drain and thus promote capacity building.
9. The co-ordinator was encouraging his students at the university to do research on science and technology. Four students had done research in the area.
10. An office for the national chapter had been established.
11. An accounting and banking system had also been set up.
12. The chapter was considering revising its strategic plan.
13. There are plans to launch a news bulletin for the chapter.



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14. A Science communication for journalists programme is also under way.
15. There were attempts to involve the Christian Relief and Development (CRD) organisation with a view to obtaining funding.
16. The Chapter had tended to concentrate its activities in Addis Ababa and efforts were being made to move further into the country.
17. Cooperation with the government was still wanting as was recognition of ATPS by authorities. During the Africa Science Day celebrations, for example, no mention was made of ATPS by the media covering government functionaries who attended the event.

ZAMBIA

1. Lack of funding during the previous year had affected the chapter's activities.
2. Networking had continued.
3. The chapter had sent some members to a methodology workshop in Zimbabwe.
4. The co-ordinator had attended a workshop on poverty eradication in Tanzania. The chapter had generated a policy brief and streamlined its working relations with the Tanzanian chapter. Two of its members had been incorporated into the biotechnology taskforce.

COMMENTS FROM THE EXECUTIVE DIRECTOR ON THE REPORTS

1. Some chapters have been inactive. When that happens the country suffers.
2. Reporting is important and must be comprehensive.
3. Africa Revival Day had, in general, been well commemorated.
4. National chapters were gradually being registered and a system that allows delegation of authority should, therefore, be established. Such delegation would allow continuity of chapter activities in the absence of the co-ordinator.
5. There is a strong need to conduct fund-raising at the national level.
6. Fund-raising should be handled with care in order not to demonstrate value for money.

COMMENTS FROM COORDINATORS ON THE REPORTS

1. Policy-makers should be invited to ATPS conferences and workshops.
2. Individual chapters that are yet to be registered should explore ways and means of doing so in their own countries as registration laws vary from country to country.

Educational Tour to Mohale Dam

Delegates took time off from the workshop to make an educational tour of Mohale Dam, part of the Lesotho Highlands Development Authority's initiative to harness water for sale to South Africa and for generation of electricity locally. The journey through Lesotho's mountains caused great anxiety among the visitors with their nerves on edge as they negotiated their way over high cliffs, narrow canyons and rocky terrain to succour the scenery of the reputed mountain kingdom.



**MASERU
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10.0 ATPS Annual General Meeting

The ATPS Annual General Meeting was held on Friday November 14, 2003 in the Cinema Hall of the Lesotho Sun International Hotel and Casino in Maseru, Lesotho.

The outgoing chairman Prof. Norah Olembo gave apologies of Board members who had been unable to attend. Dr. Osita Ogbu, an ex-official member of the Board, gave profiles of the members of the out-going Board. He also recommended inclusion of new chapters into ATPS. Dr. Osita put forward a recommendation that the outgoing Board be retained for a further two-year period. The ATPS Annual General Meeting agreed as follows:

1. That the entire ATPS Board be retained to run the affairs of ATPS for a new two-year term.
2. That new chapters join the network.
(The proposal to re-elect the Board for a new two-year period was made by Prof. Matsela of Lesotho and seconded by Mr. Chris Squire of Sierra Leone and Prof. Bamiro of Nigeria.)
3. That the new Board makes a decision on the venue for the next ATPS Conference and Workshop.



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11.0 Closure of ATPS Conference and Workshop

The Third ATPS Conference and Workshop was officially closed by Dr. D.R. Phororo, Lesotho's Minister for Agriculture and Food Security who termed the meeting an important investment that would lead to embracing science and technology as critical tools for development. The minister brought out the various lessons that had emerged from the conference and workshop, concluding that a pro-people approach by scientists was needed to stem the onslaught of poverty and hunger in Africa.

Dr. Phororo said appropriate and innovative systems of technology must be designed and applied but should reach the people. He said it was ironic that Lesotho should experience food insecurity given its abundant water resources and wondered whether Africa was indeed incapable of converting scientific knowledge into products. Indigenous knowledge, he added, could help solve the continent's food problems, saying over reliance on technological miracles such as GMOs may not provide adequate solutions.

The minister called for the uplifting of the status of women and recognition of their role in food production. His government, he said, placed employment creation and food security as their primary priorities, followed by infrastructure, quality basic education, quality health care and social welfare. Science and technology had a fundamental role to play in the realization of the government's priority goals.

The minister paid tribute to Lesotho Minister for Communications, Science, Technology, and ATPS for hosting the conference and workshop. He singled out the Lesotho chapter for its role in organizing the meeting.

APPENDIX 1: OPENING SPEECH

Opening Remarks by Dr. ‘Mamphono Khaketla, Honourable Minister for Communication, Science and Technology at the African Technology Policy Studies Network (ATPS)/Ministry of Communication, Science and Technology (Lesotho) Conference/Workshop on “Science and Technology and Food Security in Africa”

His Majesty King Letsie III
The Right Honourable Prime Minister
Honourable Ministers
Your Excellencies Members of the Diplomatic Corps
The Principal Secretary, Ministry of Communications, Science and Technology
Vice Chancellor of the University of Lesotho
Senior Government Officials
Chairman of the African Technology Policies Studies
The Local Coordinators of ATPS
Distinguished Participants
Members of the Press
Ladies and Gentlemen:

On behalf of the Government of the Kingdom of Lesotho, and on my own behalf, I wish to extend a warm Lesotho welcome to you all and greet you with our traditional greeting, *khotso (peace be with you)*. In particular I would like to heartily welcome and thank the Chairman and members of the ATPS Board for having kindly honoured us to host this unique gathering which indeed is one of its kind in Lesotho. This is not the first time that we find ATPS in our midst. Earlier this year we were privileged to host another ATPS activity which we would believe, was time well spent.

I wish to welcome with pleasure all esteemed members of the science and technology policy fraternity, researchers, academia, government representatives, our development agencies and international partners of varied levels of expertise and experience from all over sub-Saharan Africa: west, east and south. I am informed that we also have specialists from as far a field as India, Canada, Uruguay and USA. I am encouraged to note that our own Lesotho citizens are participating in large numbers and some are actually presenting papers at this conference. It is a learning opportunity of rare value.

Master of Ceremonies,
Ladies and Gentlemen:

I am greatly honoured that the Government of Lesotho, through the Ministry of Communications, Science and Technology, is hosting this very important and educating experience, which we hope our people will use to their greatest advantage especially given the relevance of the theme for this third annual conference and workshop, which is ***Science And Technology And Food Security In Africa***. The objectives of this conference are:

- To address issues related to S&T for food security in Africa;
- To provide another skills-development opportunity on S&T policy- related research methodology;
- To review new research proposals for possible funding;
- To capacitate Lesotho on S&T policy implementation and research management

This theme is not only timely but also relevant, considering the current economic predicament that Africa faces. The theme hits very close to the bone for us in Lesotho given the severe drought and subsequent poor harvests over the last two ploughing seasons. The time has come for us to think of more innovative and technology driven ways of ensuring better food security.



**MASERU
LESOTHO**

Those of you who arrived by air must have noticed the devastation on the ground in terms of the drought and dryness. Thus for us this seminar is not just an academic exercise but also something which should be taken seriously. We are reminded of the basic necessity of food and the fact that millions of Africans are starving everyday and several thousands continue to die due to starvation and related diseases including the great pandemic, HIV/AIDS. We all need to ask ourselves how prepared we are to protect our peoples from utter starvation in spite of plentiful human, and other resources. We need to accept the responsibility to work together to prevent and eradicate the prevailing evils of poverty, starvation and pandemics. If the most regular onslaught of drought should cause so much misery (in southern Africa especially), what do we do to make food security and community health our foremost priority concerns and challenges? I wish this conference could challenge us to think critically and creatively of alternative ways to address the issue of food security among our peoples. Food security does not merely refer to effective production of crop and animal products, but also to various ways of storing and preserving these foods for both local and regional use. Africa should be challenged to undertake critical studies into indigenous and current systems of food production, food storage, food preservation and dissemination and develop these systems to meet the challenges of today.



**MASERU
LESOTHO**

The pervasive role of science and technology in driving the economy of modern nations is no longer in doubt. I am sure you will agree with me that science includes all careful and objective reflection of research and practice and their fruits, which constitute technology. Furthermore, varied stock of knowledge instruments and tools and infrastructure constitute observable aspects of our technologies. Technological advancement is also used today as a measure of progress and civilization. This, therefore, depicts the need for critical assessment of our position in it. If we in Lesotho and in most of Black Africa remain mere consumers of other people's scientific and technological products, can we ever hope to advance in these important areas of development? Perhaps the primary clarion call should address our attitudes towards sciences, mathematics and technology. Unless and until our individual and group attitudes and practices towards these subjects change we cannot hope to develop. This further calls for a strong support for research and development in order to turn our knowledge into goods and services. We need to re-tap our indigenous technology capabilities of food production (like seasonal planting and harvesting, traditions and practices such as weather forecasts, "ho upa linonyana" and others), for food storage and preservation practices. In this era of the information age, one cannot overlook the practical role played by new emerging technologies such as information and communication technologies (ICTs) as well as biotechnologies towards sustainable development. This inevitably includes poverty alleviation and food security, which are to be addressed in accordance with the declared United Nations Millennium Development Goals.

It was only last Thursday and Friday that I joined several other African Ministers of Science and Technology in the context of NEPAD. What an eye-opener it was. Amongst the papers prepared for that conference was one prepared by our very own Executive Director, Dr. Ogbu, in collaboration with Dr. Khalil Timamy who hit a very raw nerve when they said most African countries "romanticize science and technology" and that most policymakers although they emphasize the seriousness of science and technology most governments merely pay lip service and technology. I hope the outcome of this conference will produce more tangible results.

In conclusion, Master of Ceremonies: Allow me to highlight that, the challenges indicated above are not only our individual national priority areas for human development but are the regional and international concerns of such bodies like the African Union and the New Partnership for Africa's Development (NEPAD), the Commonwealth, UNCTAD as well as the United Nations Commission for Science and Technology to mention but a few. We of the Science and technology constituency should, therefore, recognize the broad opportunities that emanate from the support and initiatives of these bodies.

The challenge to the people assembled in this hall today, is to come up with solutions of how science and technology can be utilized to satisfy the urgent economic and social needs of the region.

I wish you successful deliberations so that you can achieve the set objectives. Allow me, Master of Ceremonies, once more to reiterate my welcome to you all. I am aware that you will take off your busy schedule to visit Mohale Dam, one of the two Lesotho Highlands Water Project dams. Enjoy the scenic view and enjoy the refreshing mountain air. My I also thank the ATPS Board, management and the organizing committee for making this conference a success.

Ladies and gentlemen, it is now my singular honour to declare the Third ATPS Annual Conference and Workshop officially opened.

KHOTSO! PULA! NALA!



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APPENDIX 2: WORKSHOP PROGRAMME

PLENARY SESSION

ATPS/MCST CONFERENCE AND WORKSHOP
SCIENCE & TECHNOLOGY AND FOOD SECURITY IN AFRICA

Monday, 10 November 2003

Opening Session

Chair: *Principal, Ministry of Communications, Science and Technology, Lesotho*

9:00a - 11:00a Brief remarks from Dr. Osita Ogbu, *Executive Director, ATPS*
Brief remarks from Prof. Norah Olembo, *Chair, ATPS Board*
Keynote Speakers: "Science & Technology for Food Security in Africa"
Prof. Bede Okigbo, *former Director, United Nations University/Institute for Natural Resource in Africa (Ghana)*
Dr. Carlos Seré, *Director General, International Livestock Research Institute, (Kenya)*
Official Opening: Hon. Dr. 'Mamphono Khaketla, *Minister for Communications, Science and Technology (Lesotho)*

11:00a - 11:30a TEA/COFFEE BREAK

Session I

Chair: *Permanent Secretary, Communications, Science and Technology, Lesotho*

11:30a - 12:00p **"The WTO and the Future of African Agriculture"** by Dr. Ablassé Ouedraogo, *former Deputy Director General, WTO*

Discussant: Dr. Mohamed Khalil-Timamy, *Senior Lecturer, Environmental and Technology Policy, University of Nairobi and Senior Policy Research Associate, ATPS*

12:00p - 12:30p Open discussion

12:30p - 2:00p LUNCHEON
Venue: Pool Area/Terrace
"From Science to Products –Transmitting Knowledge to African Rural Farmers: What Works and What Does Not Work" by Prof. Babatunde Obilana, *ICRISAT*

Session II

Chair: *Prof. Oliver Saasa, Research Professor, Institute of Economic and Social Research, Lusaka and ATPS Board Member*

14:00p – 14:30p **"How Viable are Indigenous Technologies Towards Realising Africa's Food Security?"** by Martin Kimani, *Africa Regional Centre, Centre for Agriculture and Biosciences (CABI), Nairobi*

Discussant: Ms. Bitrina Diyamett, *Senior Scientific Officer, Tanzania Commission for Science and Technology (COSTECH) and National Coordinator, ATPS Tanzania Chapter*

14:30p – 15:00p Open discussion



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- 15:00p – 15:30p **“HIV/AIDS and Its Impact on Africa’s Agricultural Performance”** by Dr. Acholla-Pala Okeyo, *Huairou Commission, (New York)*
- Discussant: Dr. Sylvester Ndeso Atanga, *Lecturer, Epidemiology & Public Health, University of Buea, Cameroon and National Coordinator, ATPS Cameroon Chapter*
- 15:30p – 16:00p Open discussion
- 16:00p – 17:30p TEA/COFFEE BREAK AND MARKETPLACE/EXHIBITION AND NETWORKING
- 18:00p – 20:30p Cocktail Reception hosted by the Ministry of Communications, Science and Technology**

Tuesday, 11 November 2003

Session III

Chair: Prof. Norah Olemba, *Professor of Biochemistry, University of Nairobi, and ATPS Board Chair*

- 8:30a - 09:30a **“Biotechnology and the Implications of the GMO Revolution for Africa’s Food Security: *The African Perspective*”** by Dr. Victor Konde, *UNCTAD*
- “Biotechnology and the Implications of the GMO Revolution for Africa’s Food Security: *Lessons from Asia and Latin America*”** by Dr. Padmashree Gehl Sampath, *United Nations University/Institute for New Technologies*
- Discussant: Dr. Musa Dube, *Faculty of Agriculture, University of Swaziland and National Coordinator, ATPS Swaziland Chapter*
- 09:30a - 10:00a Open discussion
- 10:00a - 10:30a TEA/COFFEE BREAK

Session IV

Chair: Mr. Chris B. Squire, *Head, Department of Mechanical Engineering, University of Sierra Leone, and ATPS National Coordinator, Sierra Leone Chapter*

- 10:30 a - 11:00a **“Harnessing ICTs for Improved Agricultural Performance in Africa”** by Dr. ZM Nyiira, *Executive Secretary, Uganda National Council for Science & Technology and former National Coordinator, ATPS Uganda Chapter*
- Discussant: Prof. Melvin Ayogu, *Professor of Economics, University of Cape Town, South Africa and Coordinator, ATPS Regional Project on “Strengthening ICT Policy in Africa: Governance, Equity and Institutional Issues”*
- 11:00a - 11:30a Open discussion
- 11:30a - 12:00p **“Why has Africa Fallen Short of Building Dynamic Agro-Processing Capabilities? Options, Constraints and Prospects?”** by Dr. Wellington Otieno, *Foodlink Resources (Kenya)* and Ms. Ada Mwangola, *OXFAM (Kenya)*
- Discussant: Prof. Banji Oyeyinka, *Senior Research Fellow, United Nations University, Institute for New Technologies, The Netherlands and former National Coordinator, ATPS Nigeria Chapter*
- 12:00p - 12:30p Open discussion
- 12:30p - 2:00p LUNCHEON



**MASERU
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Venue: Pool Area/Terrace

“Lesotho Initiatives Toward Food Security: A Situation Analysis” by Prof. Mafa Sejanamane, National University of Lesotho

Session V

Chair: Ms. Yolonda Richardson, *President and CEO, CEDPA, Washington DC, and ATPS Board Member*

2:00p – 2:30p **“Gender Dimensions of the Current Agricultural Performance in Africa”** by Dr. Rose Rita Kingamkono, *Tanzania Commission on Science and Technology*

Discussant: Ms. Charlotte Wonani, *Lecturer, Development Studies Department, University of Zambia and National Coordinator, ATPS Zambia Chapter*

2:30p – 3:00p Open discussion

Tuesday, 11 November 2003

3:00p – 3:30p **“Markets, Institutions and Agricultural Performance in Africa”** by Dr. Julius Mangsioni, *Bunda College of Agriculture, Malawi*

Discussant: Prof. Michael C. Madukwe, *Professor of Agricultural Extension, University of Nigeria, Nsukka and ATPS National Coordinator, Nigeria Chapter*

3:30p – 4:00p Open discussion

4:00p – 4:30p TEA/COFFEE BREAK

4:30p – 5:00p **“Research Priority Areas for Africa’s Food Security”** Prof. Shellemia Keya, *TAC Executive Secretariat, Food and Agricultural Organisation of the United Nations, Italy*

Discussant: Dr. John Mugabe, *Executive Secretary, African Commission on Science and Technology, NePAD, South Africa*

5:00p - 5:30p Open discussion

GROUP A: AGRICULTURAL TECHNOLOGY POLICY

Wednesday, 12 November 2003

Morning Session:

Chair: Prof. Norah Olembo

9:00a - 9:50a **A1:** “The policy of reducing the importation of rice: enhancing national capacity for rice self-sufficiency in Ghana” by *Paul Kofi A. Dartey and D. Awunyo*

9:50a - 10:40a **A2:** “The influence of modern technologies on indigenous knowledge in farming systems of Morogoro district, Tanzania” by *Adolf F. Makauki and Josephat Itika*

10:40a - 11:10a TEA/COFFEE BREAK

11:10a - 12:00p **A3:** “Assessing the status of food biotechnology in Swaziland and Nigeria” by *F.M. Badejo and L.O. Sanni*

12:00p - 12:50p **A4:** “Biotechnology systems of innovation: A study of institutions and policies in Cameroon” by *Violet Bumah and Alfred Ngwa*

12:50p - 2:00p LUNCH BREAK



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Afternoon Session:

Chair: Prof. Babatunde Obilana

- 2:00p - 2:50p **A5:** “Socio-economic effects of improved post-harvest technologies in maize production in Kaprochwa district of Uganda” by *Paul Mwebaze and Edward Kato*
- 2:50p - 3:40p **A6:** “Selecting appropriate value adding technologies for diversifying utilization of tissue-culture derived bananas in East Africa” by *Margaret Karembu, S. Wakhusana and J. Namaganda*
- 3:40p - 4:10p TEA/COFFEE BREAK
- 4:10p - 5:00p **A7:** “The impact of biogas technology in Lesotho: Facts and challenges” by *Elliot Lefa Thamae, Muso Raliselo and TS’ehlo Moshe*
- 5:00p - 5:50p **A8:** “Small-scale irrigation schemes in Swaziland and their role in poverty alleviation: Implications for policy formulation” by *Absalom Manyatsi and Patrick Khumalo*

Thursday, 13 November 2003

Chair: Dr. Wellington Otieno

- 8:30a - 9:20a **A9:** “Effects of institutional and policy reforms in Uganda’s forestry sector on the sawmilling technology and opportunities for improvement” by *Joseph Obua and Paul Mugambi*
- 9:20a - 10:10a **A10:** “A study of the effectiveness of farm technologies delivery systems on small-scale farming in South-West, Nigeria” by *Abel Babalola Ogunwale*
- 10:10a - 11:00p **A11:** “Biotechnological innovations in Soil fertility management for women farmers: the key to improving small-holder agriculture in Ghana” by *S. Agyenim Boateng, S. Boadi and J. Haleegoah*
- 11:00a - 11:20a TEA/COFFEE BREAK
- 11:20a - 12:10p **A12:** “Towards a national strategy for enhancing the adoption of improved varieties of maize for food security in Ghana” by *Christopher Kwame Ayim*
- 12:10p - 1:00p **A13:** “Technology and marketing problems of small-scale dairy enterprises in Kenya” by *Gidraph Nduati and Winifred Karugu*

GROUP B: INFORMATION & COMMUNICATION TECHNOLOGY POLICY

Wednesday, 12 November 2003

Morning Session:

Chair: Prof. Oliver Saasa

- 9:00a - 9:50a **B1:** “The Information and Communication Technology (ICT) sector in Nigeria: A case study of the computer hardware industry sub-sector” by *O.A. Bamiro, B.A. Durojaiye, and A. I. Onueme*
- 9:50a - 10:40a **B2:** “A study of the effect of computerization on the performance of government institutions in Sierra Leone” by *Abu Kamara*
- 10:40a - 11:10a TEA/COFFEE BREAK



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- 11:10a - 12:00p **B3:** “Social dimensions of information technology (IT) in Kenya: With reference to policy implications on the social structure” *by Mumbi Machera*
- 12:00p - 12:50p **B4:** “Investigation of Lesotho’s ICT readiness and formulation of ICT policy framework” *by Teferi Kebede and Ntsibane Ntlatlapa*
- 12:50p - 2:00p LUNCH BREAK
- Afternoon Session:*
Chair: Ms. Yolonda Richardson
- 2:00p - 2:50p **B5:** “What kind of technology is needed for effective teaching and learning in the primary schools of Lesotho” *by Sophia Majara*
- 2:50p - 3:40p **B6:** “A study of the effects of electronic Banking on the performance of selected commercial banks in Sierra Leone” *by Sarah F. Bendu*
- 3:40p - 4:10p TEA/COFFEE BREAK
- 4:10p - 5:00p **B7:** “Information and Communication Technologies (ICTs) in Cameroon: Changes and prospects for the future” *by John Suh Che*
- 5:00p - 5:50p **B8:** “The technological capabilities of the Baking industry in Nigeria: Implications for learning and training” *by Nnenna J. Enwere*

Thursday, 13 November 2003

Chair: Prof. Melvin Ayogu

- 8:30a - 9:20a **B9:** “Has the new and emerging information technology improved efficiency in the banking sector in Ethiopia?” *by Tassew Belachew and Abdurahman Ame*
- 9:20a - 10:10a **B10:** “Determination of the support required to promote, adopt and apply ICTs in Swaziland: implications for policy formulation” *by MD Dlamini and Musa A. Dube*
- 10:10a - 11:00p **B11:** “Effects of telecenters on agricultural technology transfer in Uganda” *by James Kakooza and Dave Khayangayanga*
- 11:00a - 11:20a TEA/COFFEE BREAK
- 11:20a - 12:10p **B12:** “A study on ICT for Rural development in Ethiopia” *by Berhanu Denu*
- 12:10p - 1:00p **B13:** “Mozambique to come”

GROUP C: TECHNOLOGY TRANSFER, TRADE & INDUSTRY, IPRs, GENDER AND SME TECHNOLOGY POLICY ISSUES

Wednesday, 12 November 2003

Morning Session:

Chair: Prof. Banji Oyeyinka

- 9:00a - 9:50a **C1:** “Assessment of technological capabilities in the industrial small and medium scale enterprises sector in Zambia” *by William Mbuta and William Musonda*
- 9:50a - 10:40a **C2:** “Trade liberalization and production in Uganda: A case of manufacturing sector” *by Nichodemus Rudaheranwa and Ashie Mukungu*
- 10:40a - 11:10a TEA/COFFEE BREAK

- 11:10a - 12:00p **C3:** “Technology accumulation and development in Small and Medium Enterprises (SMEs): A case study of Agro-allied sub-sector of Nigeria’s economy” by *D. A. Okongwu*
- 12:00p - 12:50p **C4:** “Local requirements for effective technology transfer and diffusion in Zambia: Options, constraints and prospects” by *Lipalile Mufana and Mutombo Namuunda*
- 12:50p - 2:00p LUNCH BREAK
- Afternoon Session:*
Chair: Dr. Mohamed Khalil-Timamy
- 2:00p - 2:50p **C5:** “The leather industry of Ethiopia: An investigation of supply constraints and firms technological capabilities” by *Abreham Gebeyenu and Dejene Aredo*
- 2:50p - 3:40p **C6:** “Are there significant technology and productivity spill-overs from multi-national corporations in sub-Saharan Africa? A cross-country study of Ghana, Kenya, Tanzania, Zambia and Zimbabwe” by *Samwel Bwalya and Peter Sampa*
- 3:40p - 4:10p TEA/COFFEE BREAK
- 4:10p - 5:00p **C7:** “The Technology factor in Solid Waste Management in Nigeria” by *A.J. Kumuyi*
- 5:00p - 5:50p **C8:** “Utilization of the patent system by R&D institutions in Tanzania” by *Georges Shemdoe*

Thursday, 13 November 2003

Chair: Dr. Osita Ogbu

- 8:30a - 9:20a **C9:** “Promoting female participation in Science and Technology for development and poverty alleviation in Cameroon” by *John W. Forje*
- 9:20a - 10:10a **C10:** “Evaluation of technology and policy framework for the promotion of small and medium scale Kenyan Leather and leather goods manufacturing” by *B.O. F. Odongo*
- 10:10a - 11:00p **C11:** “A study of licensing and foreign technology implications for technology transfer in industries in Nigeria” by *E. O. Essien and K. Hassan*
- 11:00a - 11:20a TEA/COFFEE BREAK
- 11:20a - 12:10p **C12:** “Foreign Direct Investment (FDI), Technology Transfer and Poverty Reduction in Botswana” by *Donatilla Kaino*
- 12:10p - 1:00p **C13:** “Technology Requirements of Metal Working Micro- and Small Enterprises in Zimbabwe” by *Charles Halimana*

13 – 15 November 2003

Thursday, 13 November 2003 (Afternoon Session)

1:00p - 2:00p LUNCH BREAK

RESEARCH METHODOLOGY TRAINING WORKSHOP

- 2:00p - 3:00p “Introduction to Technology Policy” by *Dr. Mohamed Khalil*
- 3:00p - 4:00p “Research Methodology Issues” by *Prof. Banji Oyeyinka*



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- 4:00p - 4:30p TEA/COFFEE BREAK
- 4:30p - 5:30p “Writing Skills” by *Magayu K. Magayu*

Note: The Board will meet concurrently in the Suite 1/BR1.

Friday, 14 November 2003

Morning Session:
Chair: Prof. Norah Olembo

ATPS ANNUAL GENERAL MEETING

- 9:00a – 10:30a UNESCO funded presentation on Technology and Poverty Eradication (TAPE) by *Dr. Peggy Oti-Boateng, Dr. A. Komba and Mr. M.A. Jalloh*
- 10:30a – 11:00a Presentation of the Strategic Plan by Prof. Melvin Ayogu
- 11:00a – 11:30a [WORKING] TEA/COFFEE BREAK
- 11:30a – 12:30p Annual General Meeting

Afternoon:
12:30p – 5:00p Educational tour to Mohale Dam (including lunch)

7:00p onwards Closing dinner Venue: Salon A&B

Saturday, 15 November 2003

Chair: Dr. Osita Ogbu

NATIONAL COORDINATOR’S MEETING

- 9:00a – 11:00a National Coordinator’s Meeting
- 11:00a – 11:30a TEA/COFFEE BREAK
- 11:30a – 1:00p National Coordinator’s Meeting
- LUNCH BREAK



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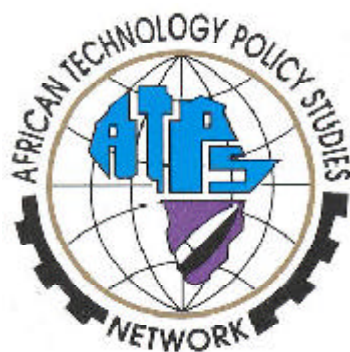
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African Technology Policy Studies Network



Science and Technology and Food Security in Africa

Report of the 2003 ATPS Annual Workshop and
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The African Technology Policy Studies Network (ATPS) is a multi-disciplinary network of researchers, policy makers, actors in the private sector and other end users interested in generating, promoting and strengthening innovative science and technology policies in Africa. With a regional secretariat in Nairobi, the network operates through national chapters in 17 countries, with an expansion plan to cover the entire sub-Saharan Africa.

One of the objectives of the network is to disseminate research results to policy makers, legislators, the organized private sector, civil society, mass media and farmers' groups through publications, dialogue and advocacy. Among its range of publications are the Working Paper Series (WPS), Research Paper Series (RPS), Special Paper Series (SPS), Technopolicy Briefs and Workshop Reports.

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