



Economic Commission for Africa



African Union



SCIENCE
WITH
AFRICA **2**
Conference

**Conference
Report**

23-25 June 2010
Addis Ababa, Ethiopia



Economic Commission for Africa



African Union



The second Science with Africa Conference

23-25 June 2010, Addis Ababa, Ethiopia

Conference Report

Partners:



Government of Finland



ARIPO

OAPI

Technical Partners:



Media Partners:



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Acronyms and abbreviations

AfDB	African Development Bank
AFHDF	African Footprint Human Development Framework
AIF	African Innovation Framework
AMCOST	African Ministerial Council on Science and Technology
ANDI	African Network for Drugs and Diagnostics Innovation
ANSTS	Académie Nationale des Sciences et Techniques du Sénégal
ARCT	African Regional Centre for Technology
ARIPO	African Regional Intellectual Property Organization
ASBC	African Science to Business Challenge
ASTIEF	African Science, Technology and Innovation Endowment Fund
AUC	African Union Commission
AUC-HRST	African Union Commission of Human Resources, Science and Technology
CPA	Consolidated Plan of Action
CTIC	Conservation Technology Information Centre
GDP	Gross Domestic Product
ICSU ROA	International Council for Science Regional Office for Africa
ICT	Information and Communication Technology
IDRC	International Development Research Centre
IGI	International Genealogical Index
IPRs	Intellectual Property Rights
IP	Intellectual Property
MDG	Millennium Development Goal
NASAC	Network of African Science Academies
NEPAD	New Partnership for Africa's Development
OAPI	Organization Africaine de la Propriété Intellectuelle
PAIPO	Pan-African Intellectual Property Organization
R&D	Research and Development
RTI International	Research Triangle Institute, International
STI	Science, Technology and Innovation
SWA	Science with Africa Conference
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization

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I. Background

1. The African Union Commission (AUC) is committed to ensuring that science and technology in Africa contributes to its sustainable development efforts. The Act establishing the Union recognizes the need for Africa to embark on an ambitious strategic science and technology development programme, aimed at contributing to the well-being and an improved quality of life for African citizens. To this end, the establishment of the African Union (AU) in 2002 was accompanied by setting up the AU Commission on Human Resources, Science and Technology (AUC-HRST) to drive this strategic programme. This has further generated tremendous momentum in deploying science as a tool for development in Africa.
2. The New Partnership for Africa's Development (NEPAD), is a programme of AU adopted in Lusaka, Zambia in 2001, its main objective being to enhance Africa's growth, development and participation in the global economy. AUC created the African Ministerial Council on Science and Technology (AMCOST) as a platform for the Union to periodically deliberate on science and technology issues. In 2005, through NEPAD and AMCOST, AUC successfully developed Africa's science and technology Consolidated Plan of Action (CPA) to secure a competitive advantage and to leverage Africa's capabilities and capacities by focusing on research and development (R&D) to respond to its challenges and needs. In 2007, AU Heads of State and Government adopted the theme "Science, Technology and Research for Africa's Socio-economic Development" and subsequently declared 2007 as the launching year for building constituencies and champions for science, technology and innovation (STI) in Africa.
3. UNECA promotes and facilitates implementation of the 2005 AUC/NEPAD CPA, which calls for utilization of STI for the sustainable growth and promotion of socio-economic integration of the African continent. From 3 to 8 March 2008, UNECA, in collaboration with AUC and other United Nations agencies and partners, organized the first Science with Africa conference (SWA-I) at the United Nations Conference Centre in Addis Ababa, Ethiopia. It was a highly successful conference with an attendance of approximately 800 participants representing African governments, academia, STI business enterprises (the private sector), civil society, media and the youth.



4. The first conference (SWA-I) outlined the roadmap for advancing STI for socio-economic prosperity of the African continent. The remarkable achievements included: (a) Creation of an informed platform for promotion of the interface between scientific research, policy development and business enterprises; (b) Development of the African Innovation Framework (AIF); (c) Preparation for establishment of the African Science Technology and Innovation Endowment Fund (ASTIEF); and (d) Hosting a consultative forum on the science of climate change and economic prosperity in Africa.

5. The second conference on Science with Africa (SWA-II) which took place 23-25 June 2010, was a follow up to SWA-I. UNECA and AUC, in collaboration with the Government of Finland, UNESCO and other partners, organized SWA-II in Addis Ababa, Ethiopia at the United Nations Conference Centre. The theme of SWA-II was, "Science, Innovation and Entrepreneurship", and the participants focused on identifying the policies, measures and mechanisms required to accelerate Africa's economic growth and sustainable development through science, innovation and entrepreneurship.

6. It has been demonstrated, beyond doubt, that knowledge generation through R&D is strongly linked with sound economic growth. In 2008, the United States of America, with the biggest world economy, accounted for 27.7 per cent of the world's share of scientific publications in academic journals. China, the second largest world economy, accounted for 10.6 per cent, Japan, the third largest world economy, 7.6 per cent, India, 3.7 per cent, South Africa, 0.5 per cent. The whole African continent accounted for 2 per cent of the world's share in generation of knowledge. Consequently, the main outcomes of SWA-II were expected to promote and facilitate the growth of knowledge-based economies on the African continent.

II. Conference Structure and Themes

A. Pre-conference events

7. The conference was preceded by events organized in the form of workshops, which dealt with the following:
 - (a) Launch of the Network of Technology Development and Transfer;
 - (b) Innovation, Intellectual Property Rights (IPRs) and entrepreneurship in Ethiopia;
 - (c) National Academy and Science Councils of Francophone countries;
 - (d) Pan-African System of Certification in Ethics Review;
 - (e) Africa's Water Quality Report; and
 - (f) Science, Innovation and Communication.

B. Special events

8. During the conference, in collaboration with its partners, UNECA organized special events that included:
 - (a) Launch of ASTIEF;
 - (b) The African Science to Business Challenge (ASBC) Awards ceremony (UNECA in collaboration with RTI International of United States of America);
 - (c) Launch of the Creativ Lab Programme (UNECA in collaboration with CTIC of Spain); and
 - (d) Staging of exhibitions (throughout the conference) by STI institutions, organizations and companies.

C. Conference sessions

9. Plenary sessions included:
 - (a) Opening ceremony;
 - (b) Keynote address on Science, Innovation and Entrepreneurship by Dr. Umar Bindir (Nigeria);
 - (c) STI Investment: launch of ASTIEF;
 - (d) STI Investment;
 - (e) Protecting African patents and bio-assets;
 - (f) African inventions: prospects and challenges;
 - (g) Women and innovation; and
 - (h) Closing ceremony.

10. Parallel thematic sessions included:
 - (a) Climate change;
 - (b) Information and communication technologies (ICTs);
 - (c) Agriculture;
 - (d) IPRs and technology transfer;
 - (e) Commercializing science;
 - (f) Infrastructure: energy, transport and water;
 - (g) Health and life sciences; and
 - (h) Green science and technology.

III. Attendance

11. Approximately, 500 scientists, engineers, technologists, inventors, entrepreneurs, policy-and decision makers, journalists and students from 56 countries were in attendance. Conference delegates represented governments from some African countries, intergovernmental, regional and international organizations, business communities, Africa's public and private tertiary education and research institutions, and development partners.

A. Participants from Africa

12. The following African countries (41) were represented: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, the Comoros, Côte d'Ivoire, Democratic Republic of Congo (DRC), Egypt, Ethiopia, Gabon, the Gambia, Ghana, Guinea, Kenya, Lesotho, Libyan Arab Jamahiriya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Namibia, the Niger, Nigeria, Republic of Congo, Rwanda, Senegal, South Africa, the Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia and Zimbabwe.

B. Participants from Europe, the Americas and the Asia-Pacific region

13. The following European countries (7) were represented: Finland, France, Germany, Ireland, the Netherlands, Switzerland and United Kingdom. Other conference participants came from the following countries (8): Australia, Brazil, Canada, India, Pakistan, Saudi Arabia, South Korea and United States of America.



IV. Opening Ceremony

14. H.E. Mr. Juneydi Saddo, Minister of Science and Technology of the Federal Democratic Republic of Ethiopia officiated at the opening ceremony of SWA-II. Other speakers during the opening ceremony were: H.E. Mr. Abdoulie Janneh, United Nations Under-Secretary-General and UNECA Executive Secretary; Dr. Vera Brenda Ngosi, Director of AUC-HRST who represented H.E. Prof. Jean-Pierre Ezin, the Commissioner of AUC-HRST; Ms. Virpi Kankare, who represented H.E. Leo Olasvirta, Ambassador of Finland to Ethiopia and UNECA, and Prof. Gretchen Kalonji, Assistant-Director-General (designate) for Natural Sciences for UNESCO.

A. Guest speakers

15. The welcoming note and opening remarks of H.E. Abdoulie Janneh emphasized on the important contribution of innovation and entrepreneurship to growth and development. Examples were given on the productive and prosperous linkage between science, innovation and entrepreneurship, driven by intellectual assets and concomitant property rights. He urged the conference to see how Africa could stimulate innovation through a combination of policies that supported R&D and stimulated utilization of research products by entrepreneurs and venture capitalists. The issue of fruitful partnerships between the African scientific community and their peers in other parts of the world was also stressed.

16. In her opening remarks, Dr. Vera Brenda Ngosi, Director of AUC-HRST, emphasized the importance of science for Africa's development, prosperity and stability. She noted the SWA-II theme as having an immense potential to trigger the cause of transformation that would enable many African member States to evolve into knowledge economies through harnessing of science. A summary was given of the progress made in the period between SWA-I and SWA-II (2008-2010), including the establishment of a programme to finance and build capacity to manage research grants, science awards, African research and education networks, leadership programmes and youth development. She also informed the conference that AUC was in the process of establishing a Pan-African University aimed at becoming a link between Africa's higher education, research and industry.

17. Prof. Gretchen Kalonji reminded the conference that UNESCO had two overarching priorities, namely gender equity and Africa. She gave an overview of the existing initiatives and programmes at UNESCO and informed the conference of the privileged partnership between UNESCO and AUC in implementing the AUC /NEPAD CPA for



science and technology. She also reported on the ongoing and future collaborative initiatives and programmes between UNESCO, AUC and other institutions in Africa in STI areas such as renewable energies, water management and earth science education. The future need to focus on engineering and entrepreneurship at UNESCO was stressed.

18. Ms. Virpi Kankare, on her part, shared with participants the success stories and best practices from Finland with regard to nurturing and promoting innovation to support development. Education was pointed out as the key driving force in Finnish development endeavours, and it being the centre of all innovative and successful Finnish applications and products such as Nokia. She concluded that a difference could be made by pursuing consistent STI policy.

19. H.E. Mr. Juneydi Saddo outlined the importance of having strong and dynamic national innovation systems in Africa. He argued that the existence of such systems were possible if African governments were committed to taking the leadership role by putting in place sound national policies, having prioritized scientific and technological programmes. He also defined the leadership role as promoting the linkage between industry, higher education and research institutions, and availing adequate resources for education and R&D. He urged the conference to find ways in which STI would boost economic growth and subsequently reduce abject poverty in the continent.

B. Keynote address

20. Eng. Dr. Umar Bindir, the Director-General of the National Office for Technology Acquisition and Promotion (NOTAP) of Nigeria was invited to give a keynote address on, “linking science and technology to enhance innovation for sustainable socio-economic development in Africa.” He presented a detailed account on the main attributes associated with the establishment of a sound link between science and technology development for the enhancement of innovation for socio-economic prosperity. He argued that for a country desiring to have a competitive and dynamic knowledge-driven economy, the following foundation blocks ought to be present:

- Realistic national STI policies that can be implemented;
- Vibrant national systems of innovation;
- Adequate R&D funding;
- Sound IPR culture and legal frameworks;
- Ubiquitous, affordable and functioning ICTs infrastructure;
- Availability of adequate delivery-oriented human capital; and
- Monitoring, evaluation and review mechanisms for STI national systems. 21.

21. The conference was informed that universities played a key role in the generation of new knowledge through their R&D activities, but that African universities did not perform well in research. Therefore, they did not appear on the



2010 list of top 10 universities in the world, namely University of Cambridge, UK; Harvard University, USA; Yale University, USA; University College London, UK; Massachusetts Institute of Technology (MIT), USA; University of Oxford, UK; Imperial College London, UK; University of Chicago, USA; California Institute of Technology (Caltech), USA and Princeton University, USA. The topmost African university was the University of Cape Town, South Africa, positioned at 161 on the world's ranking list.

Table 1 clearly exemplifies the following equation:

$$\text{Economic Prosperity} = \text{Knowledge} + \text{Technology} + \text{Innovation}$$

Table 1: World knowledge generation by selected countries (2010 GDP in \$US trillion)

Country	2010 GDP \$US in trillion	% of world knowledge generation
USA	14.3	27.8
Japan	5.1	6.8
China	4.9	6.3
Germany	3.4	6.2
India	1.2	2.3
South Africa	0.287	0.5

Source: IMF 2010 & UNESCO Report 2010.

22. The conference was also informed of Africa's very low share in world trade, for instance in 2006, exports from Africa accounted for 3.1 per cent of the world's total, whilst its import accounted for 2.4 per cent. These dismal figures were attributed to very low utilization of STI in economic enterprises on the continent.

23. The informative and high-calibre keynote presentation was followed by interventions from ministers and representatives of some government officials present at the conference. Subsequent panel presentations and plenary discussions further elaborated the concerns and suggestions articulated by government and institutional officials and representatives from the business and scientific communities.

V. Outcomes of the Conference

24. The main recommendations that emanated from the keynote address are as follows:

Recommendation No. 1

- African governments and their institutions should promote, facilitate, strengthen and safeguard the business, market and entrepreneurship capacity and skills within their national STI systems, in order to translate R&D outputs into wealth creation commodities.

A. Pre-events

Launch of African technology development and transfer network

25. It was argued that realization of the decision (made by African Heads of State and Government in 2006 in Khartoum, the Sudan) to allocate at least 1 per cent of their national gross domestic product (GDP) to R&D would not be easy because a good proportion of that percentage should be contributed by the private sector. However, this sector was considered weak and still at its adolescent growth stage in Africa.

26. UNECA had decided to promote and facilitate the commercialization of Africa's R&D products by launching the first African Technology Development and Transfer Network. The Network looked to "generate economic and social value" from R&D outputs by facilitating technology adaptation, diffusion and commercialization; and encourage investment in R&D. This initiative would be managed by the ICT, Science and Technology Division (ISTD) of UNECA.

Recommendation No. 2

- UNECA and AUC should help African member States develop methods to monitor progress and development impact of knowledge as well as IPR and technology transfer.

Ethiopian inventors, policymakers and stakeholders forging partnership to promote and support innovation

27. The one-day national workshop was aimed at bringing stakeholders together to discuss the challenges and opportunities of Ethiopian inventors, as well as share experiences and knowledge. It was also aimed at providing a forum for policymakers and inventors/innovators in Ethiopia to discuss the existing national IPRs regime, creation of an enabling environment for innovation and entrepreneurship, and follow-up activities in capacity strengthening of Ethiopian inventors/innovators.

Recommendation No. 3

- The participants recommended creation of an enabling policy and legal environment that should promote innovation and develop specific action plans to be coordinated by a task force composed of the workshop organizers, namely the Ethiopian Intellectual Property Office (EIPO), the Ethiopian Inventors Association (EIA) and UNECA.

Africa's water quality report

28. This workshop was organized by the Pan-African Chemistry Network (PACN) to report on its 2009 Sustainable Water Conference. The conference was informed that approximately 40 per cent of Africa's population had no access to safe and clean drinking water and that approximately 60 per cent lived in poor sanitation conditions. The importance



of the availability of clean and safe drinking water for attainment of the Millennium Development Goals (MDGs), (e.g. human health and well-being) was emphasized.

29. The workshop's participants affirmed that sustainable food, water and sanitation policies and strategies must be jointly considered, developed and implemented, particularly given that food production accounted for 90 per cent of the water consumption in Africa.

Recommendation No. 4

- Workshop participants urged African governments to provide sustainable water strategies and frameworks for clean and safe water, sanitation services, and food. The African academic and research communities have to develop and support centres of excellence for monitoring and treatment of water.

Science, innovation, communication

30. The workshop was organized by ISTD of UNECA, Research-Africa, SCIDEV and Science Africa Newspaper. A series of presentations were made on science journalism in Africa. It was noted that science journalism in Africa was at its infancy. It was also reported that the interface between the media and the scientific community in Africa was still very weak, hence the low public understanding of science on the continent. Reasons for the weakness were discussed in considerable detail.

Recommendation No. 5

- UNECA, AUC and their partners (i.e. media stakeholders) should promote development of a critical mass of science journalists in Africa, and arrange capacity-building programmes for them through training, mentoring, scholarships, exchange and establishment of science journalism awards and networks.

The role of African Academies of Science in promoting STI for socio-economic development

31. The workshop was organized by ISTD of UNECA, the African Regional Centre for Technology (ARCT), the National Academy of Sciences of Senegal and UNESCO. It was attended by 30 scientists, directors of national councils of science and regional science institutions. The workshop provided a platform for sharing knowledge and experience on the role of African academies of sciences in promoting the utilization of STI for accelerated economic growth on the continent.

Recommendation No. 6

- UNECA in collaboration with AUC, UNESCO and other partners should support the implementation of the following programmes: (a) Creation and strengthening of well-functioning academies of sciences in all African countries, and promote and facilitate the network of these academies; (b) Capacity-building on management of STI for Africa's sustainable development; and (c) Develop pan-African wind farms and solar panels to use renewable energies on the continent.

B. Special events

32. Approximately 50 STI institutions, organizations and companies staged very attractive and educational exhibitions from the beginning (23 June 2010) to the end of the conference (25 June 2010) at the United Nations Conference Centre. The African Science to Business Challenge (ASBC) awards were given to the 2010 winner. The finalists included Mr. Bashir Yusuf Abubakar, Mr. Owonikoko Taslim, and Mr. Omoniwa Babatunji, all from Nigeria. Bashir Yusuf Abubakar's project on characterization of Moringa Oleifera seeds for use as water coagulant was announced as the winner. The material and financial resources for ASBC awards were provided by UNECA and RTI International of United States of America. On the same day (24 June 2010), the Creativ Lab programme (a computer-driven joint initiative between UNECA and CTIC of Spain) was launched.

33. Another special conference event was the launch of ASTIEF. African countries had for a long time been investing in R&D to address the many challenges faced by the continent. However, the research results were not transformed into viable commercial products due to limited financial resources and lack of an effective link between research centres and the private sector. To bridge these gaps, UNECA and its partners launched ASTIEF (and ASBC), a Fund designed to motivate and support Africa's inventors and innovators to create sustainable industries and enterprises to secure their future and that of the continent.

Recommendation No. 7

- African governments should reduce transaction costs in the registering and commercializing of innovations; and should support local entrepreneurs in accessing financial resources.

Recommendation No. 8

- African business communities, regional and international Development Banks on the continent and in the Diaspora, friends and supporters of the continent (including individuals and corporate sectors) should be urged to make financial contributions to ASTIEF that will fund and support enterprising individuals and R&D centres in Africa, to transform their research findings and inventions into market commodities.

C. Plenary sessions

34. The first plenary session was devoted to the opening ceremony of the conference and the keynote address by Dr. Umar Bindir of Nigeria (the summary of which has been presented above). Another plenary session was devoted to the launching of ASTIEF, which was treated as part of the special events of the conference.

Science, technology and innovation investment

35. This session was organized by UNECA, AUC and their partners including other United Nations agencies, notably UNESCO and UNEP. Africa's current demographic growth trends, the diminishing arable land in many African countries and other negative consequences of climate change, has compelled the continent to embark on the promo-



tion of a green revolution based on agricultural mechanization and well-planned irrigation systems, and on utilization of quality seeds and soil nutrients.

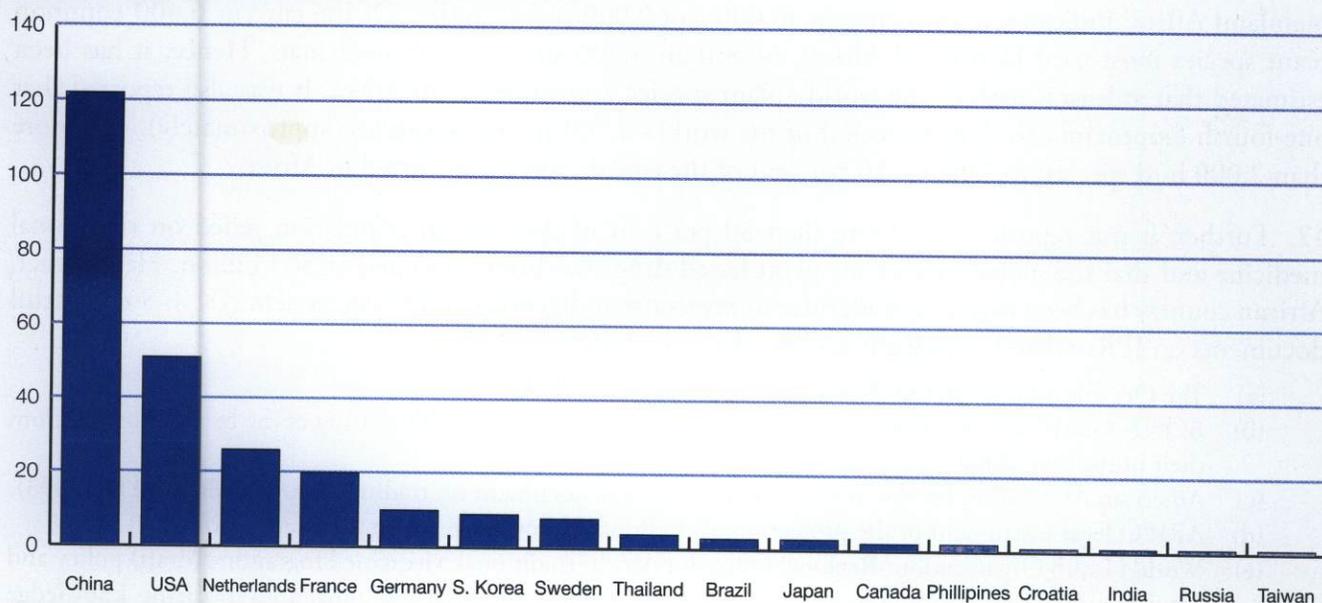
36. The conference was informed of the availability of the vitamins market, especially for livestock feeding, fortification of foods to enhance nutritional quality and pharmaceutical application on multivitamin capsules and tablets. The impact of domesticated technologies on job and wealth creation was emphasized in this session. It was observed that the lack of adequate financial resources and the current high transaction costs in registering innovations inhibited the growth and survival of entrepreneurs on the continent. African governments were urged to empower female scientists, engineers and technologists and promote African women entrepreneurs.

37. The conference was informed of AfDB as not only being a financial institution but, also an African knowledge and policy think-tank. The Bank has acknowledged over the years, the role of quality basic education, especially in the sciences, as necessary bedrock for the development of STI at higher levels. In 2008, the Bank adopted a Higher Education Science Technology (HEST) strategy in order to assist African countries to develop science and technology skills needed to build human capital and foster economic growth and development. Consequently, it began supporting its member countries to invest in the expansion and strengthening of higher education institutions and centres of excellence, with special emphasis on enhancing science, technology and research capacity (e.g. Burkina Faso, Kenya, Nigeria and Rwanda).

African inventions and innovation: Prospects and perspectives

38. This session was organized by ISTD of UNECA, International Development Research Centre (IDRC) of Canada and UNESCO. The patent system has played a positive role in stimulating local inventive and innovative activities as well as facilitating transfer of technology, thereby contributing to scientific and technological progress and socio-economic development. The economic prosperity of developed countries and of the emerging big economies has relied on the establishment of well-functioning national STI systems, and on an efficient and effective use of patent systems. Together, these have created an enabling environment for the commercialization of local innovations and inventions, as well as provision of the capacity to absorb and utilize imported technologies and innovations.

Figure 1: Patent data on cassava (2005-2010)



Source: esp@cenet-worldwide, Matheo Patent Software.

39. The presentations at the conference highlighted the inventions from various countries, emphasizing major challenges that African inventors faced in the process of bringing their inventions and innovations to the market place. The fragmented nature and low level of support as well as inadequate investment in R&D

were some of the reasons that brought about low level of inventions and innovations on the continent. This problem was exemplified by examining the 2005-2010 patent data on cassava, a staple food for more than 60 per cent of the African population. Figure 1 above shows that in the period between 2005 and 2010, there were no African countries that registered a patent on cassava.

40. It was argued during the conference that African governments and their appropriate institutions should develop a technological and innovative culture aimed at stimulating accelerated economic growth in each African country. Youths and women have a key role to play in this endeavour.

Recommendation No. 9

- African governments and their relevant institutions should strongly be urged to establish national records of innovations and inventions (database) and their concomitant museums to celebrate African talents in order to stimulate future generations of researchers and inventors.

Recommendation No. 10

- UNECA and AUC should urge each African government to have a national Intellectual Property (IP) policy by 2015. The prepared policy should take into account national science, technology, innovation systems and economic development plans as well as implementation tools that ensure involvement of local communities.
- African governments should also create an enabling environment to raise awareness about “intellectual property” and strengthen national capability for handling IP applications through research and examination. Steps should be taken to strengthen similar capacities of ARIPO, OAPI, *Intellectual Property Technology Transfer Offices (IPTTOs)* and the Pan-African Intellectual Property Organization (PAIPO), etc.

Protecting African patents and bio-assets

41. This session was organized by ISTD of UNECA, IDRC of Canada and UNESCO. It was reported at the conference, of Africa’s huge variety of natural products and its bio-resource potential, for example, on mainland Africa, indicates, approximately 40,000 to 60,000 plant species. Of the current 6,400 common plant species most used in tropical Africa, more than 4,000 species were medicinal. Hence, it has been estimated that at least a sixth of the world’s plant species were endemic to Africa. It was also reported that one-fourth (approximately 1,229 species) of the world’s 4,700 mammal species (approximately), and more than 2,000 bird species, making up 20 per cent of the world’s species, occurred in Africa.

42. Further, it was reported that more than 80 per cent of the African population relied on traditional medicine and that the global market for plant based drugs has been estimated at \$43 billion. Hence, each African country has been urged to modernize its respective indigenous knowledge system (IKS). Some useful documents on IPRs related to indigenous knowledge include:

- (a) The Organization of African Unity (OAU) Model Law (2000);
- (b) BONN Guidelines on access to genetic resources and fair, and equitable sharing of the benefits arising from their utilization (2002);
- (c) American Association for the Advancement of Science document on traditional knowledge and IP (2003);
- (d) ARIPO legal instrument of the protection of traditional knowledge and expressions of folklore (2006);
- (e) World Health Organization/ Regional Office for Africa/Traditional Medicine Programme (draft) policy and regulatory framework for the protection and promotion of traditional and indigenous medicine knowledge and access to biological resources in Africa (2006); and
- (f) World Intellectual Property Organization document on IP and genetic resources, traditional knowledge and traditional cultural expressions/folklore (2006).

43. It was also emphasized that the Convention on Biological Diversity (CBD) which was signed in Rio in 1992, enforces protection of the rights of local people and local knowledge as well as conservation of biological resources.

44. The conference agreed on the claim that proper bio-safety norms and legal frameworks for regulating biological and genetic resources, as well as indigenous knowledge were yet to be established in many countries in Africa. As a result, available bio-assets were not being developed indigenously for commercial use and were being subjected to rampant bio-piracy.

Recommendation No. 11

- UNECA and AUC should urge African governments to take steps to establish fully functional bio-safety authorities as a matter of urgency, and encourage indigenous research on genetically modified crops and utilization of bio-assets for modern medicine and for other value-added products based on indigenous knowledge of traditional medicine.
- UNECA and AUC should urge African governments to strengthen national legal frameworks dealing with IPRs; and strengthen ARIPO, OAPI and PAIPO.
- Each African government should create an interactive website to disseminate information on bio-piracy and related matters.

Women and innovation

45. This session was organized by the African Centre for Gender and Social Development (ACGS) of UNECA. The conference reiterated the need for African governments to continue promoting and investing in women and youth to increase their in-take in science and technology education. Courses on entrepreneurship should be introduced in the science and engineering curricula at tertiary institutions. Workshops should be organized to train researchers and innovators in IP protection and commercialization skills.



Recommendation No. 12

- UNECA and AUC in collaboration with AfDB, UNESCO and other partners should support national, subregional and global initiatives aiming at mainstreaming gender equity in STI systems.
- African governments should mainstream gender equity in water management.

Recommendation No. 13

- UNECA and AUC in collaboration with AfDB, UNESCO and other partners should provide a special fund for implementing the objectives of Recommendation No. 12.

D. Parallel thematic sessions

46. Many of the deliberations and suggestions emanating from these sessions were similar to those recorded in the pre-conference, special events and plenary sessions. Furthermore, some topics dealt with during this part of the conference were a repetition of the previous conference (SWA-I), for example, climate change in Africa. Consequently, repetitions would be avoided and such topics would be treated as programmes and/or initiatives of UNECA in continuum.

Agriculture sciences, technologies and markets

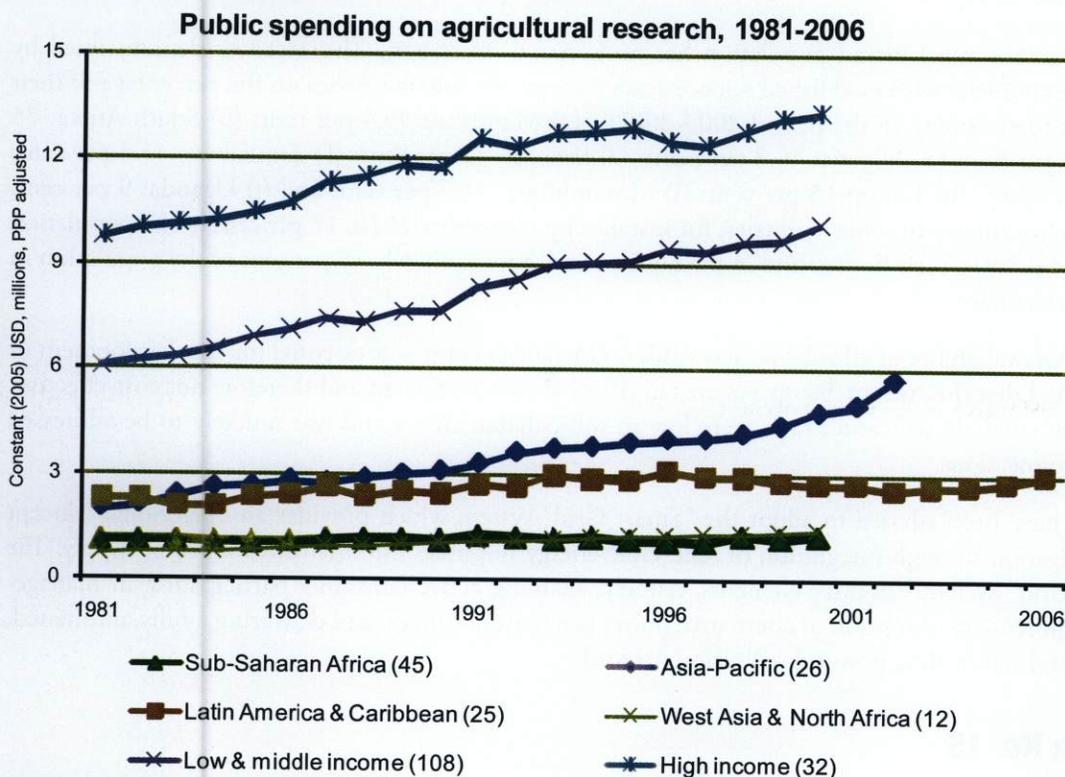
47. This session was organized by the Food Security and Sustainable Development Division (FSSD) of UNECA. In Africa, agriculture is currently accounting for 70 per cent of full-time employment on the continent, and 40 per cent of Africa's GDP flows from the agricultural sector. Approximately, 80 per cent of the rural population in Africa depends on this sector for their livelihood. It is, therefore, the prime engine for development of Africa's mostly agrarian economies and the most important of all socio-economic sectors on the continent.



48. Notwithstanding, Africa's agriculture has historically lagged behind the rest of the world. It remains a subsistence sector that is characterized by poor productivity, and production of raw material for other continents, making it unable to satisfy the Region's huge agricultural commodities market. Africa now processes only 10-15 per cent of its total agricultural produce, markets only 20-25 per cent of its production, spends annually an estimated \$33 billion on food imports and receives annually about \$5 billion of food aid.

49. In recent years, African leaders have been placing increasing emphasis on the role of STI in economic transformation. The 8th African Union Summit which met in January 2007 in Addis Ababa, Ethiopia adopted a series of decisions in favour of utilizing STI for socio-economic development on the continent. Figure 2 show sub-Saharan Africa as having the lowest amount of expenditure on agriculture. It has been estimated that African governments spend on average about 4.5 per cent of their subjects on agriculture, which has been claimed as the backbone of their national economies. It was also reported at the conference, of the decline of agricultural assistance to Africa from the G-8 countries, from about \$20 billion (in the 1980s) to about \$5 billion (in 2007).

Figure 2: Global expenditure in agriculture



Source: Beintema and Stads (2008).

50. The conference acknowledged that the most important reason for the above mentioned situation was technological backwardness, resulting from the lack of action with regard to aligning science and technology strategies with agricultural development in African countries. The session also dealt with the 12 agricultural commodities agreed upon as priorities by the African Heads of State and Government in 2006 in Abuja, Nigeria. These commodities included cereals (maize, rice, sorghum and millet), and livestock related commodities (fish, poultry, beef and milk). Others were cassava, vegetables, cotton and palm-oil. Evolution of agricultural biotechnology innovation in Africa was discussed, and an overview on the coverage of biotech crop planting and building of bio-safety frameworks in Africa, were presented at the conference.

51. The conference was informed that the livestock and poultry subsectors, which were supposed to be integrated into the African farming system, had received little support and hence were practically stand-alone sectors.

Recommendation No. 14

- UNECA and AUC should urge African governments to promote and facilitate public-private sector linkages in integrated technology development, transfer and marketing for primary commodities, their processing and the support services for crops, livestock and poultry.
- UNECA and AUC should create a regional documentation and information dissemination centre for innovative technologies in agriculture.

Renewable energies and rural electrification

52. This session was organized by the Regional Integration, Infrastructure and Trade Division (RIITD) of UNECA. The issue of energy in Africa was intensively discussed during SWA-I in 2008 and hence, this report will avoid reproducing the contents of SWA-I report.

53. Over 75 per cent of the sub-Saharan population has no access to electricity. This fact was demonstrated by giving examples of some countries with established science academies in sub-Saharan Africa on the percentage of their populations with access to electricity in the period 2003-2007: (a) Mauritius: 99.4 per cent; (b) South Africa: 75 per cent; (c) Ghana: 54 per cent; (d) Nigeria: 46.8 per cent; (e) Senegal: 42 per cent; (f) Zimbabwe: 41.5 per cent; (g) Cameroon: 29.4 per cent; (h) Kenya: 15 per cent; (i) Mozambique: 11.7 per cent; and (j) Uganda: 9 per cent. However, there were improvements in some countries, for instance by November 2010, 17 per cent of the population in Mozambique had electricity in their homes; and in the same period, approximately 15 per cent of the population in Tanzania had access to electricity.

54. It was reiterated that availability of affordable, accessible and reliable energy was essential for the development of all nations. It was reported that the current energy systems in Africa were not efficient and therefore not cost-effective. It was also reported that rural electrification rates were low in sub-Saharan Africa and was unlikely to be addressed through national grid connections.

55. African countries have been advised to adopt the "Smart Grid" system which provides an operational concept for climate change mitigation through integration of renewable energy resources into mainstream power supply. The vision for the "Smart Grid" system has three elements, namely, enabling active consumer participation in management of their power requirements, adoption of alternative power generation sources, and delivering a fully automated, remotely configurable and self-healing power distribution network.

Recommendation No. 15

- UNECA and AUC should urge African governments to start promoting greener economies through investments for the development and utilization of renewable energies, especially the ubiquitous and enormous solar and wind energy resources available on the continent.

Information and communication technologies in Africa

56. This session was organized by ISTD of UNECA. The following ICTs issues were discussed at length: challenges that hinder adoption of cutting-edge ICT research in the market place; the role of ICTs incubators in promoting innovation and entrepreneurship; and the legal and regulatory environment for knowledge economy (particularly in areas such as e-banking, e-health and e-governance).

57. Other important topics included: development of ICTs innovations for uptake by subject matter experts, the role of open-source in stimulating ICT research and enhancing local ICT innovations, skills and the industry; and the best practice in sharing and creating ICT networks.

Recommendation No. 16

- UNECA and AUC should continue promoting and facilitating investments in ICTs in Africa for the purpose of promoting quality education, research, innovation and entrepreneurship, as well as increasing economic growth and competitiveness for job and wealth creation on the continent.

Green science and technology

58. This session was organized by ICT, ISTD of UNECA, the Global Footprint Network of United States of America, the International Council for Science Regional Office for Africa (ICSU ROA) and UNEP. The session was made up of two workshops: (a) Science of Climate Change, Mitigation and Adaptation in Africa; and (b) African Footprint Human Development Framework (AFHGF).

(a) Science of Climate Change, Mitigation and Adaptation in Africa

59. The conference decided that scientific findings on climate change in Africa should be submitted to the African political leaders to enable them to adequately negotiate (from a better informed and united position) at the United Nations Framework Convention on Climate Change (UNFCCC) Summit in Mexico in December 2010. This came from a review of the Copenhagen Summit held in December 2009 where the negotiations failed to get an agreement. It was noted that in Copenhagen, the political and scientific components from Africa were not working together. It was also apparent that the two were negotiating in parallel. Consequently, the African scientists have been duty-bound to present to the African Heads of State and Government the acquired data and knowledge on the science of climate change, projections of realistic future climate scenarios with projected impacts, and attendant implications over Africa.

(b) African footprint human development framework

60. It is becoming clear that human welfare is critically linked to mankind's use and stewardship of ecological assets. Nowhere is this truer than in Africa – a region with tremendous natural wealth, yet which often suffers first and most tragically when humanity's demand on nature exceeds what nature can provide. In Africa, more than 75 per cent of the population live directly off the land, a higher percentage than any other continent. This makes Africa more immediately and directly vulnerable to ecological shocks than any other region.

61. The ecological footprint tool measures the amount of bio-capacity (forest, agricultural land, grazing land, fisheries, urban land and carbon absorption land) people have and how much they use. In other words, the ecological footprint measures for any given year the amount that nature provides (bio-capacity) and the amount that we consume (footprint). The ecological footprint provides a way for a country to monitor its economic performance, quality of life and natural wealth, as well as to make policy and investment decisions that is in the best interest of the country.

Health and life sciences

62. This session was organized by UNECA and its numerous partners who supported this conference. Africa bears a disproportionately heavy disease burden largely accounted for by a variety of communicable and non-communicable diseases. The conference was informed that less than 10 per cent of global research funds targeted diseases of the poorest people in the world that accounted for most infections and deaths globally.

63. The conference explored the relationship between health and life sciences/ technologies within the framework of the continent's economic growth and sustainable prosperity. It was found absolutely essential that Africa's health innovation systems be improved for the well-being of its population. Issues pertaining to international cooperation and partnership in this domain were discussed at length, and objectives of the African Network for Drugs and Diagnostics Innovation (ANDI) were presented at the conference.

64. The conference also examined several innovative projects that contributed to measures for meeting Africa's challenges and opportunities in the health sector, for example, radio-isotopes for innovative pharmaceutical research, application of nano-sciences and technologies in health care, standards for pharmaceutical firms, space sciences and technologies policy for health innovation, and medicinal plants confronted with the negative consequences of climate change.

VI. Way Forward

65. UNECA and AUC should promote and facilitate the implementation of decisions made by conference participants. The conference made some concrete decisions that called for immediate action by African governments, their R&D institutions, the private sector operating in Africa and their development partners. The selected issues for immediate action included the following:

Science of climate change, mitigation and adaptation in Africa

Immediate actions:

- (a) A two-page Statement on the Science of Climate Change, Mitigation and Adaptation in Africa to be prepared by Network of African Science Academies (NASAC) by mid-July 2010, in consultation with other African scientists, UNECA and AUC. The issue of provision of climate change funds and Africa's accessibility to these funds will be addressed in the prepared statement.
- (b) NASAC, UNECA and AUC should distribute the prepared two-page Statement on climate change in Africa to African governments through senior government officials for their perusal and appropriate submission to their respective ministers, and for their consumption and incorporation before heading to Mexico in December 2010.
- (c) Long-term initiatives on the science of climate change, mitigation and adaptation, and growth of sustainable green economies in Africa will be jointly coordinated by UNECA and AUC in collaboration with their regional (Africa) partners. An establishment of an UNECA-AUC hosted Pan-African Green Technology and Innovation Centre is envisaged.

African footprint human development framework

Immediate actions:

- (a) A memorandum of understanding between UNECA, Global Footprint Network and the International Council for Science Regional Office Africa (ICSU ROA) should be signed soon for implementing AFHDF.
- (b) AFHDF should provide a guide to African countries in establishing their national ecological balance sheets, sustainable development and management of their natural resources within a green economy paradigm and developing strategies for global climate change negotiations.



Health and life sciences in Africa

Immediate actions:

- (a) UNECA and AUC should help to create and promote platforms, networks and consortia in Africa for transforming research products from the health and life sciences and technologies into new products and practices that are owned by African scientists, technologists and entrepreneurs.
- (b) Africa should establish regional and international R&D partnerships for attaining international standards for Africa's products and for accessing international markets.
- (c) ANDI is a concrete pan-African initiative that aims to support collaborative health product R&D and commercialization. UNECA, AUC and African governments should support and invest in ANDI.

Agricultural sciences, technologies and markets

Immediate actions:

- (a) The conference agreed upon the proposal to establish a Centre for Agricultural Innovation and Entrepreneurship in Africa (CAIEA) which will champion, among others, the following:
- (b) Developing and promoting Africa's agricultural technologies, innovations and information systems; and
- (c) Promoting the creation of private-public sector partnerships and mechanisms for production and dissemination of quality seeds to farmers across the continent. Similar partnerships on livestock and dairy/poultry industries should be promoted.

Promotion of nanosciences and nanotechnologies in Africa

66. During the conference, it was argued that nanosciences and nanotechnologies were new emerging STI fields and important in modern cost-effective health, water and energy services. It was also reported that only a few countries in Africa (e.g. Morocco, South Africa and Tunisia) had developed good functioning research centres dealing with nanosciences and nanotechnologies. Consequently, the conference urged African governments and their educational and research institutions to start working closely with the private sector in promoting the utilization of nanosciences and nanotechnologies in health, water and energy sectors.

Immediate actions:

- (a) UNECA and AUC, in collaboration with Africa's science academies should form a team of African experts in this domain, to prepare a project proposal that intends to promote the utilization of nanosciences and nanotechnologies in health, energy and water sectors and in the growth of green economies in Africa. The project proposal should be realistic, needs-driven, with clear deliverables in a given time frame. The team of experts should submit the project proposal to UNECA and AUC by December 2010.

