
Chapter 1: Organization of the Meeting

The African Technology Policy Studies Network(ATPS) partnered with the African Academy of Sciences (AAS), African Centre for Technology Studies (ACTS), and International Service For the Acquisition of Agri-biotech applications (ISAAA) to commemorate the Scientific Revival Day on June 30th, 2005.

The Scientific Revival Day was dedicated, during the 46th Ministerial Conference of the Organization of African Unity (OAU), to deliberate on the role of science and technology in addressing socio-economic challenges in Africa. The Ministerial Council made a resolution requiring member states to mark the day with programmes befitting the event.

ATPS has been on the forefront of popularizing and marking this day since 2002 when it brought together key personalities in the scientific community ,academia, government, members of the press, national, regional, and international research institutes for a round table discussion to deliberate on how science and technology can be re-deployed to improve Africa's development.

ATPS and its partners sought to highlight the benefits of innovation to economic development by hosting a one-day workshop and exhibition to commemorate *the 2005 Scientific Revival Day of Africa* by focusing on the theme: *"Harnessing Emerging Technologies to Alleviate Poverty"*

The objectives of the workshop were:

- ❑ To examine the challenges facing the private sector in the uptake and commercialization of innovations
- ❑ To discuss the role of knowledge-based institutions, such as research organizations, universities and academies in improving national competitiveness in technological innovations
- ❑ To examine the role of intellectual property in the process of technological innovation
- ❑ To hold panel discussion with high-level decision-makers in research institutions, government, private sector and civil society to incorporate science and technology into national development policies

The day was marked with lectures, discussion, panel discussions and exhibition of innovations by researchers and scientists. The exhibitions were done by Small and Medium Enterprises, private and public secondary schools and colleges in Kenya.

The guest speaker was Prof Kilemi Mwiria, Assistant Minister, Education, Science and Technology.

Chapter 2: Opening Ceremony

The 2005 scientific revival day opening session was chaired by Prof GBA Okello, Executive Director, African Academy of Sciences (AAS).

2.1 Remarks from Dr Osita Ogbu, Executive Director, ATPS

The Executive Director of the African Technology Policy Studies Network (ATPS), Dr Osita Ogbu began his welcome address by welcoming participants to the annual Scientific Revival Day; a day in which scientists and researchers meet to remind themselves of the role science can play in development. At the same time, he accentuated the importance of translating innovations from the lab to the market place for economic growth and subsequently poverty eradication in Africa. He said that often when writing economic plans and poverty eradication papers, little emphasis is placed on the role science and technology can play, yet, there is abundant evidence that western countries have developed because of science and technology.



Dr Ogbu particularly challenged the youth stating that science on its own is not enough and that science has to be taken out of the laboratory to become goods and services.

Dr Ogbu said moving from invention to innovation was a huge leap and would need government partnership to ensure that students in science and engineering schools are kept in order. Dr Ogbu emphasized that Africa ought to build its own capacity in order to reform and make noise, “noise” (to alert the system).

An economist himself, Dr Ogbu said he often jokes about how if you asked an African president to appoint a science adviser, the president would invariably appoint a physics, chemistry or bio-chemistry Professor who would be of little help since the president would not be in need of advice concerning physics, chemistry or biochemistry. He restated that science is a discipline; and the issues of Science & Technology policy or Science & Technology management are different from science.

Dr Ogbu highlighted the role of ATPS in propagating the use of science and technology (S&T) policy to advance the course of science in development which ATPS has been doing in over 23 African countries. He called on journalists to avoid pre-occupation with politics and challenged them to work with scientists to build popular support for S&T in the continent. He further commended the students who attended the scientific revival day from within Nairobi and its outskirts saying that the students had distinguished themselves in science and urged scientists to encourage the students to invest in science as they are the future of science.

Dr Ogbu acknowledged the Assistant Minister of Science and Technology Honorable Professor Kilemi Mwiria for finding time to come and officially open the workshop as the Guest of Honor.

2.2 Guest of Honor

Hon Prof Kilemi Mwiria, Assistant Minister, Ministry of Education, Science and Technology: Creating Wealth for Eliminating Poverty

Professor Mwiria began by highlighting the government's role in developing science and technology to eliminate poverty in the continent. He said the government should ideally create an open political environment that accommodated democracy and tolerated questions and emphasized that the government had a role to back up policies with resources through the adoption and funding of strategic plans from research institutions.

The Assistant Minister further asserted that science and technology policies in Africa should reflect the continent's values encompassing how to achieve set targets and recommended the government for its work in retaining the best researchers through competitive remuneration.

Professor Mwiria beckoned the government to respect and honor to key scientists who innovate in order to motivate those who practice and hope to practice science. He remarked that a scientist or researcher seldom gets awarded with national medals during public holidays. Professor Mwiria also called for a supportive regulatory framework in terms of patents which he believed can be done by removing barriers in the antiquated legislation. The government could also play a bigger role by subsidizing local products in order to help them compete favorably in the market.

The Assistant Minister advocated for carefully planned liberalization that it does not adversely affect local products produced by local innovators. He also advised scientists, researchers and local innovators to maintain high standards in their innovations and cautioned participants against the public mentality that low price equals low quality.

Prof Kilemi Mwiria challenged scientists and researchers to work at popularizing and demystifying science through forums such as the Scientific Revival Day and urged the organizers to take the day to the districts, provinces and the grassroots more often than annually.

The Assistant Minister further challenged the scientists to communicate science more simply and lauded ATPS for its efforts to work with journalists in translating hard technical science jargon to simple non-technical language that can be published in the papers for easy consumption by those with simplistic science knowledge. He said that he would rather the scientists market and popularize locally innovated goods than spend time seeking recognition in international journals that seldom benefit the continent at the grassroots level.



Prof Mwiria continued to summon the scientists and researchers to engage leaders and politicians to be converted into missionaries of science since the politicians reached local people in the communities, families and churches and would therefore act as ambassadors to the community. He asked the scientists to appreciate the support politicians and government leaders give the budgeting process of research institutions in parliament. Professor Mwiria advised that the politicians are ambassadors to local people as they are able to reach communities, families, churches at all levels.

In an effort to popularize and democratize science, Prof Mwiria provoked scientists and researchers to reach to disadvantaged groups such as women, certain religious groups and rural communities, who have no access to labs and have few resources. He counseled that it was important to involve disadvantaged groups because the more widespread the missionaries of science, the more the continent can harness from scientific innovations.

The Assistant Minister acknowledged that the Ministry of Education had a significant role to teach basic sciences and help young people appreciate science at elementary levels. He however admitted that the performance of sciences was poor at primary, secondary and university level. He called for measures to make science subjects more interesting to students by getting better qualified teachers whose skills are upgraded from time to time.

He also suggested the following measures to combat poor science performance in the country:

1. Use of locally available learning and teaching material,
2. Incentives for science teachers and encourage students to pursue science teaching.
3. Crash programs at institutions of higher learning to ensure there are adequate science teachers to pursue science courses up to doctorate levels.

The Assistant Minister also took fault with the methods of learning science in Kenyan schools and told science teachers to discourage broad learning through memorization of facts. He instead asked teachers to encourage creative students and give them space. He conceded that the Kenyan exam system has encouraged reproduction of facts (leading to Bookworms) and which is a reflection of the educational system that encourages memorization of facts.

Prof Mwiria identified tradition as an obstacle to science as he advocated for the support of talents that support science. He declared that science was in existence before the coming of the white man and encouraged the adoption of positive aspects from traditional science. He challenged scientists to work with traditional scientists who have not been to formal school. He also prompted the scientists and researchers to harness emerging technologies like the Internet to expand their knowledge base and praised it as a great opportunity to know and use what has been previously discovered.

Prof Kilemi acknowledged that science is expensive and needs partnering with industry, the private sector, external partners and the local community. He lauded the International Centre of Insect Physiology and Ecology (ICIPE) for its efforts to make sure the innovated honey bee, silkworm and neem products benefited the respective local communities. The Assistant Minister drew attention to the untapped potential of university students as research assistants who are cheap and enthusiastic but are rarely used to conduct research.

Prof Kilemi concluded his presentation by acknowledging that a good strong economy is needed to provide market for locally innovated goods. He asserted that there has to be employment and good income for people to prefer locally produced products instead of cheap imported goods. He wound up by underlining the importance of cultivating a political environment that supports growth and challenged scientists to be involved in creating and sustaining the political environment. He further challenged scientists not to divorce politics from science heartening them to be more involved in politics, civil society and leadership positions so that they can make noise from within.

2.2.1 Question and Answer Session

Question

What is the policy of the Kenyan government on Science & Technology and innovation? The participant also felt it was wrong for the Assistant Minister to term science teachers as poor.

Answer

The Assistant Minister said he was looking at the draft policy document of Kenya National Council of S&T which he said is more detailed as it addresses current and future capabilities. He committed himself to better dissemination of the draft policies

A: Responding to the participant who thought the Assistant minister was attacking science teachers. Prof Kilemi said it is more about the poor environment that the teachers had to operate from than the teachers themselves. He said most schools lack good, adequate teaching material and equipment. For example most schools lack text books, science and lab equipment He said often teacher,s admitted into science and technology colleges had not started off well as they were admitted with low grades. He also touched on the conduct of university lectures and professors who insist on giving higher marks to student who regurgitate what they have been taught.

The minister said that all the science constrains are as the result of the education system from Primary to Tertiary institutions. He added that this was also partly a social problem and all players had to look at all these dimensions to see how to turn things around.

Question

What plans does the Kenyan government have to increase its resource allocation for Science and &Technology which is imperative and should be given priority if Kenya is to industrialize by the year 2020. What are the government's plans to increase investment in this area? The participant stated that it is going to require a great deal of resources because science is more than talks and workshops and requires hard cash for equipment, facilities and operations.

Answer

The Government is doing much more than before by voting for funding on Research & Development and will continue to avail more money but it was imprudent to solely depend on the government for research funding and scientific organisations should be able to partner with organizations that may be interested in the research findings.

Prof Mwiria said that African countries spend up to only 2% of their budget on research opting to spend money paying unnecessary civil servants while other western countries spent up to 20% in research. He said it was time for politicians, the local community and the scientific community to partner and to vote in resources for research. He emphasized that Everyone has a duty to be involved in solving Africa's problems through scientific research and more should be done towards creating an enabling environment for science growth.

Question

The participant said researchers are often coming up with innovations and inventions but are stuck when it comes to distribution to the community. He asked the government for a way forward for universities and institutions in this predicament. He also said most private sector industries were reluctant to support researches which was a major setback to researchers.

Answer

Prof Mwiria said that government should invest more in research than foreigners since the research was dealing with local problems that the government had a vested interest in. As people, who vote, he urged Kenyans to ensure that there is a larger vote for resources to

ensure that university professors are well remunerated, have a good working environment and facilities, and have money for research. He once again called for scientists to attract resources outside of government and establish partnerships with external partners and the private sector. He however questioned university learning methods that emphasized memorization of facts which he termed as unfortunate.

Question

*What is the ministry doing in supporting creativity exhibited by young students at science congress?
What is the government doing to encourage the young upcoming scientists?*

Answer

Professor Mwiria said as a ministry enough was not being done but he was glad that the problem in the development of science and technology was being talked about as a starting point since everyone can then be part of the solution. He stated that the government would make sure it recognized young Kenyan scientists before foreigners did. He also said it was important to organize more science congresses, and provide more facilities, resources, exhibitions and exchange programs to encourage young upcoming science students.

Question

A participant wanted to know why models found in the developed nations are not applied in the developing countries. He said for example, in the developed nations in the west, politicians has a team of advisers or economists that work with them for formulation of policies which was non existent in Kenya. He wanted to know if it is possible to adopt such mechanisms and if it can have a place here in Kenya.

Answer

Professor Mwiria stated that Africans should be aware of their priorities and create a way of getting out of the problems in Africa. particularly since the linking of science to development in developing countries, is very significant and governments can play a role in this. He however admitted that scientists currently had little influence in policy decisions and there was little knowledge about science and science teams to advise the government.

Question

In the area of research, what is the government doing to upgrade scientific/research equipment and facilities as most of what is still there is no longer up to date and is worn out or spoilt.

Answer

Professor Mwiria advised that there was need to maximize partnerships with the private sector and try to attract resources from external partners. He said that to get out of box, a lot of money is needed to carry out Research and Development and urged participants to regard themselves as part of the solution.

Comments by Dr Osita Ogbu

Dr Ogbu restated that the government has a critical role to play in making sure science is translated into products and services. Dr Ogbu argued that a million dollars of research grant would be of little use if the innovation is not translated into invention. He illustrated this using an example from Nigeria which is the leading producer of cassava explaining that bread was comprising of 10% of cassava flour was secretly served to the Nigerian president. The president not only liked it but also did not notice any difference from the usual bread. After summoning other bread makers in Nigeria, who ate the same bread but could also not detect the cassava flour in the bread. The president then orchestrated the passing of a law that required all bread in Nigeria to be baked with 10% of cassava flour.

This illustration, Dr Ogbu explained was to underline the importance of state support to science and development. He gave another example of the support the Finnish government gave Nokia, a private sector player, in growing mobile phone telephony innovations into the market place. The Finnish government linked the private sector and knowledge institutions that came up with inventions that revolutionized Finland's, economy.

Dr Ogbu challenged scientists, government and private sector in Africa to emulate this example and declared that ATPS would like to play a role in bringing all players together.

2.3 Keynote Address: Prof Christian Borgemeister, Director-Genegal, ICIPE

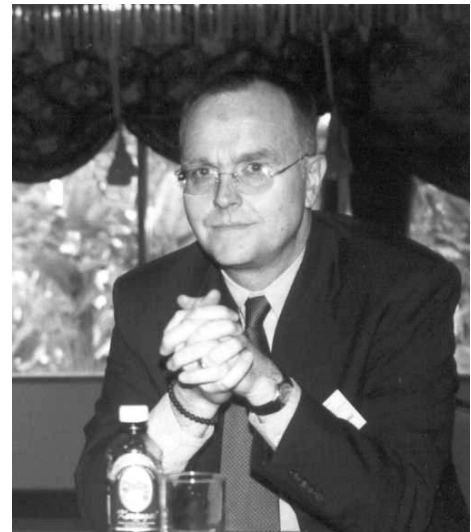
What gives an innovation value in the marketplace? Successful case studies from ICIPE.

The Director General, International Centre of Insect Physiology and Ecology (ICIPE)

Prof Christian Borgemesiter gave a thought provoking presentation titled: *What gives an innovation value in the marketplace? Successful case studies from ICIPE.*

Prof Borgemeister began by pointing out that The silk worm in Uganda, The honey bee in Mwingi and The Neem tree in the coastal region were successful case studies at ICIPE.

He began by giving a brief overview of ICIPE which was founded in Africa for Africa and concentrated on working with Environmental, Human, Plant and Animal health commonly referred to as the *ICIPE 4H* paradigm.



He was resolute that knowledge and research should be able to benefit the public by commercializing innovated new improved products, processes and services. He stressed that innovation and technological changes were the main drivers of economic growth at organizational, sector and economic levels, furthermore, he asserted that a strong well developed innovation system and culture would underpin the economic growth and social wellbeing in Africa.

The Director General took time to explain the difference between radical and incremental innovations whereby radical innovations are often a major departure from the usual or a major breakthrough in a sector. Radical innovations also have high potential but are risky and rare from a market perspective as they often require long term research and development. Incremental innovations on the other hand usually depict a marginal change from the common standard and are more often embraced effortlessly by industries as a key strategy for growth.

Prof Borgemeister further expounded that the demand for innovation is often determined by the quality of the innovation achieved through research and adoption of quality assurance procedures. He then highlighted the determining factors that give innovation value in the market place as:

- Affordability of the innovation
- Acceptability of the innovation (perception)
- Competitiveness of the innovation
- Marketing strategies used to introduce the innovation

The ICIPE, Director General stressed the importance of linking product research to the private sector by using the example of ICIPE which in the mid 1990ies started the Africa Bioscience Innovation Centre. This was an incubator for new, bioscience-based companies that were interested in producing products for human, animal and plant health.

A practical example of research industry linkages is the strategic partnership between ICIPE and Bridgeworks, a specialist bioscience commercialization company that seeks to translate research outputs into products.

Prof Borgemeister explained that the alliance between ICIPE and Bridgeworks has resulted into various advantages for both parties. Bridgeworks, for example, has a right of first refusal to commercially exploit ICIPE research results moreover, ICIPE has the first option to provide further development services to Bridgeworks commercialization projects, ICIPE on the other hand gets insulated from financial risks and potential liability associated with commercialization activities and gets income from a proportion of Bridgeworks commercialization revenue paid into a trust fund for furthering research and development. Bridgeworks additionally provides strategic guidance to some of ICIPE'S commercial ventures like Biop, AfriCert and the envisaged *Bt*-biopesticide factory.

Prof Borgemeister then got into details of ICIPE'S innovative strategy of marketplace development using the honey bee, the silk worm and the neem tree experience to develop honey bees and silkworm based products using the bottom up approach for development of appropriate technologies.

This was done through successful mainstreaming of ecosystem conservation and adoption of collaborative management to result into income-generating activities for the local communities that resulted in the Vinstar silk worms in Uganda and Langstroth bee hives in Mwingi, Kenya.

The process, Prof Borgemeister explained, involved integrating a strategy for sericulture and apiculture technologies through the ICIPE research and development arm, which then had a two fold task of firstly, facilitating regional demonstration sites for training to farmers, NGOs, NARS and Extensionists. The second task was facilitating regional sites for commercial production. This subsequently led to market place development of the silk and honey based products both locally and internationally.

Prof Borgemeister was proud to note that through research and development (R&D), ICIPE went ahead to innovate new products beyond honey such as the Royal Jelly (RJ) production system using African bee races of *Apis mellifera*. This was done through selective breeding and artificial insemination of local honeybees; *A.m.scutellata* & *A.m.monticollato* enhance RJ production.

Prof Borgemeister bragged that the honey and silkworm experience has resulted in marketplaces for silk and honey production established in Bushenyi, Uganda and Mwingi, Kenya respectively. Additionally, Kenyan silk at Naromoru is being used in a variety of ways to suit different consumers and purposes.

The beneficiaries of this programme were over 4,500 silk farmers and over 5,800 beekeepers in Uganda and Kenya. Over 12,000 farmers have also been trained in commercial insect production in Eastern, Central and North Africa

According to Prof Borgemeister, the general achievements of this programme are:

- Improved beekeeping
- Sericulture with domesticated & indigenous silk moths, which are being cultivated and turned into products by local communities
- Income generating activities
- Women became self reliant
- Household income of farm families increased several folds
- Biodiversity conservation in several forests and semi-arid regions in Kenya, Uganda and several African countries

2.3.1 Neem Tree Experience

The neem tree, *Azadirachta indica* (Meliaceae) originated from India and Burma and has been abundant in East and West Africa for up to 100 years. Neem is a fast growing, drought-tolerant & evergreen tree (often used for shading) and grows mainly in semi-arid areas in the Kenyan Coast. Asian farmers have used it for centuries in agriculture, human and animal health.

According to Prof Borgemeister, the research on Neem products was catalysed by:

- Increase in demand for safer alternatives to synthetic pesticides.
- Consumers becoming more concerned about quality, safety and reliability of products they buy.
- European market for fresh fruits and vegetables issuing strict regulations in food safety, requiring certain minimum pesticide residue limits (MRLs)

In 1993, ICIPE with grants from the European Union and the Finnish government begun a multi-pronged neem promotion production programme that had four main components of research, awareness, training, and commercialisation of the neem products. Through research and development, ICIPE had found out that Neem seed extracts contain several active compounds for controlling agricultural pests; most important Azadirachtin (AZA). AZA influences the hormonal system in insects and propagates anti-feedant properties in the insect. Furthermore AZA has comparatively high selectivity and has low to no mammalian toxicity.

Prof Borgemeister further said that neem's effectiveness in controlling important crop pests like maize stock borers, parasitic nematodes, thrips, brown plant hoppers and dozens of other damaging pests had been extensively documented and recorded in the past.

He further explained that with funding from GTZ, ICIPE joined forces with Saroneem Biopesticides Ltd., a local agrochemical company to establish a neem processing facility at ICIPE, Techno Park in Duduville aiming towards product development and commercialisation of neem based products in 1996. Saroneem Biop was subsequently replaced by Biop Co. Ltd.

Prof Borgemeister enumerated the several agricultural, human and animal health products that have been developed from neem extracts, registered and commercialized such as, healthcare and pet care products, Neem cake powder against nematodes, bollworms, leafminers and Neem extractives for use in horticulture and agriculture against bollworms, thrips, DBM etc. He declared that the demand for neem-based products is increasing in East Africa as markets become aware of the assured availability of good quality products. The 'problem' now with the neem based products has become supply rather than demand.

Prof Borgemeister noted that the project had been very successful in terms of income-generation to the local community members at the Kenyan Coast. He said that the neem farmers had been trained in neem seed collection and processing which are then sold to Biop

Ltd who processes the neem seeds into different products. In 2005 for example, Biop Co. Ltd required 300 Tonnes of neem seeds per year from the community at Kenya Shs 30.00 per kilo.

Prof Borgemeister at the end of his presentation proposed the following suggestions for these projects to remain sustainable and economically viable:

- Proper understanding of bio-diversity distribution and value by local communities for honey and silk based products to succeed in the market. Local communities should realize how the bio-diversity of silkworms and honeybees features in their lives and aspirations and know how to manage bio-regions to meet their needs without damage.
- Appropriate technology and training, local communities should be empowered to maintain their own business activities reducing the role of middleman and allowing silk farmers and beekeepers to improve their livelihoods.

Prof Borgemeister concluded his presentation by saying that low technology approaches that are easily adaptable in local circumstances combined with social and market support can produce economically viable activities that can be replicated in different areas in East Africa, as proven by the neem, silk-and honey based experience with ICIPE.

2.3.2 Question and Answer Session

Comments from Dr Ogbu

The ATPS Executive Director commended ICIPE for demonstrating to scientists that it was possible to transform science inventions from the lab to commercially viable goods in the market place. He urged ICIPE to externalize their knowledge, experiences and frustrations with fellow scientists and researchers in the scientific community to stimulate the replication of such occurrences in Africa.

Question

Despite commercialization being the major output of the research process at ICIPE, it has not had a special impact in areas where ICIPE has major research activities. ICIPE has major impacts on some areas and have left out others and many NGOs are asking people to grow NEEM trees. How will ICIPE be able to reach all these people? What is ICIPE doing about integrating other researchers into what they are doing? Is there integration of other products?

Answer

If Non Governmental Organizations are promoting the growing of NEEM tree among the locals, then the NGOs must be able to help them find commercially viable use of the NEEM tree for income generation because ICIPE has not asked the locals to grow any trees. Prof Borgemeister said although neem tree makes a nice shade it definitely does not make good timber or for fuel.

Question

Is there integration of other products from the neem tree? Has ICIPE conducted further research about the use of the whole tree?

Answer

In embracing other aspects of neem use, many products have been made and are still very new in the market. Prof Borgemeister insisted that ICIPE is primarily a research institution but still hopes to come out with many more products as research continues.

Chapter 3: Conference Plenary and Policy Presentations

3.1 Vimal Shah - Managing Director, BIDCO Group

The Role of Industries in Supporting the Creation and Application of Technological Innovation for Development

Mr Shah began by pointing out the overwhelming documented evidence that portrayed Africa as poor. He stated that Africa contributes less than 1% of the world's current wealth and is not attracting direct foreign investment as much as the South East Asian countries like Russia or China. Despite all this, he noted that the same foreign investors are scrambling for resources in Africa. He continued to state that over 300 million people in the continent live on less than a dollar per day and have to cope with diseases like malaria and HIV/AIDS.



Mr Shah declared that Africa continues to lack appropriate technology to accelerate economic development despite the fact that technological advancement is now the most powerful tool for domination and competitiveness in the private sector. He explained that most successful companies around the globe recognize the application of innovative technology as a key driver in business development. This includes better production lines, processes and technologies as they engage in business.

Mr Shah explained to the participants that firms are not only competing on quality and price but also on new innovative methods of service and products. He said that unlike the past where industry was more cost conscious; the private sector is currently willing to invest in new technology that makes them more competitive that would ultimately result a better import margin, job creation and mass production in the country.

He emphatically pointed out that there are no current linkages between industry and science, research and development institutions in Kenya.

The Managing Director of Bidco Group mused that the problem could be because most of Research and Development is project based whereby western based Non Governmental Organizations avail funds for certain pre-set research notions. He complained that a lot of theoretical project based research was currently going on which made little or no impact on local industries and the society on the ground.

Mr Shah questioned the validity of such researches and would rather the scientists and researchers developed innovations that could be used as tools to alleviate poverty or reduce the cost of doing business. He restated that new innovative and need, based products are critical in addressing the poverty issues in Africa and reiterated that technology and competitiveness are intertwined especially since competitiveness is the platform for any company, country or continent to succeed.

Mr Shah challenged researchers and scientists to consider competitiveness while conducting research to come up with new innovations. He further called for need-based research and encouraged industry, government and other stakeholders to mobilize resources to support research. The government could for example provide legislative support and incentive schemes to encourage the scientists. Mr Shah emphasized that the role of industry was to apply, up scale and market the technologies produced by research and development institutions and further called on such bodies to collaborate with industries to create, action oriented, need based and demand based appropriate technologies for Africa.

He also challenged industries to:

- ❑ Create strategies to develop capacities for technical universities in Africa through sponsorship of specific research projects
- ❑ Participate in joint specific research projects
- ❑ Sponsorship of exceptional students
- ❑ Strive to attract African talent practicing in the diaspora
- ❑ Direct recruitment abroad
- ❑ Provision of project based attachment for African students in the diaspora

He ploughed through the background of science and technology in Africa, and said that at independence, African countries focused on industrial expansion that emphasised import substitution and protectionism and Job creation and mass production as a crucial goal to rapid development.

Mr Shah noted that, in the quest for industrialization, most governments did not invest in modern technology and few industries actually set up functional research development (R&D) units charged with the advancement of technology and creation of new products. According to him, this coupled with poor political leadership and a small and unsophisticated domestic market in the 1980,s crippled Africa's technological and economic advancement. Mr Shah declared that it was was evident that today's richest companies and countries control majority of new scientific and technological knowledge leading to competitive advantage wealth and power.

Mr Shah suggested that Africa must increase its application and commercialization of technology for sustained economic development to catch up technologically with the rest of the world. He affirmed that the private sector can spearhead this process and new industries can emerge from these innovations such as those relating to bio-technology which has grown to become one of the fastest growing industries today. The managing director of Bidco, further advised African industries to therefore collaborate with research development bodies to create new products and services to address the immediate needs in Africa .

As a way of increasing competitiveness, Mr Shah observed that R&D could collaborate with the private sector in researching on new alternative sources of energy such as wind power. He challenged Africans to use their core competencies and avoid underutilization of resources such as wind, power and water, land. He restated that Africa must adapt available technology to suit readily available raw materials and subsequently reduce the cost of doing business.

Mr Shah advised scientists and researchers to set specific goals while conducting research development and also encouraged them to think outside borders by selling the ideas and innovations worldwide, since ideas are borderless. Mr Shah declared that there are opportunities for African scientists to spearhead science R&D in the global scene.

Mr Shah complained that Africa's export competitiveness was lacking and questionable and advised African industries to focus on export led growth that would lead to cutting edge

market competition fought on the technological edge. According to him, improved export competitiveness would curtail dumping of goods in the domestic market and would overtake countries in the Far East like India and China whose products have long dominated the market. He reiterated that technological innovation is critical in penetrating the new export markets. He further challenged scientists and researchers to spearhead the process of improving Africa's export competitiveness.

Still on competitiveness Mr Shah explained that Africa's competitive advantage lay in agriculture and agro processing. Scientists and researchers therefore should focus on research aimed at increasing higher yields per acre for example through the use of high yielding seeds. He also emphasized the importance of value addition to primary raw materials to increase Africa's wealth and would rather Africans export a shirt than cotton under AGOA. While on the issue of cotton, he challenged researchers and scientists to develop sustainable, self sufficient, suitable technology to develop cotton that will support cotton industries to reap maximum benefits from the extended AGOA agreement.

Mr Shah restated that this can be possible through scientific farming methods, and technologically innovative low cost solutions to reduce the cost of doing business in terms of, power, transport, telecoms, cost of living and non-tariff barriers.

Mr Shah called for a knowledge based economy which he said was critical for faster development of technological innovations in Africa. He said Information, Communication and Technology (ICT) had reduced the barriers to knowledge sharing and increased the speed of information travel. African industries must therefore embrace ICT as a tool for advancing technological innovation

He also encouraged players in the private sector especially African industries to effectively embrace ICT and e-commerce to eliminate geographical barriers, eliminate paper work, and facilitate abundance of critical information as a tool for advancing technological innovation.

Mr Shah called on the government to support industries as Industries need government support to efficiently lead technological advancement; industries need to operate in predictable conditions. Government should therefore:

- ❑ Create specific policies that will remove any market distortions and encourage R&D
- ❑ Hasten public enterprises reforms for competitiveness
- ❑ Invest heavily on industrial support infrastructure, bandwidth, roads, legislate new innovative financing methods fro new projects e.g. Incubators etc
- ❑ Create incentives for venture capitalists to operate
- ❑ Ensure that investment is not frustrated by shortage of skilled manpower especially in science and technology
- ❑ Create a framework for safeguarding, property rights, including patents and intellectual rights
- ❑ Remove unnecessary barriers that hinder efficiency and profitability in the private sector.

At the conclusion of his presentation, Mr Shah highlighted the following opportunities for industries:

- ❑ Industries could work with science institutes to strengthen industrial research and develop indigenous technology
- ❑ Setting up of strong institutional machinery for managing industrial technological advancement. This includes identification and implementation of new projects and intensification of local efforts in R&D
- ❑ Establish relevant training programs in within their operations

- ❑ Adapt, improve and master technology in their own systems of operations. The above must be interlinked to scientific institutions through constant and market driven collaboration.

Mr. Shah concluded by stating that a collaboration between industries and scientists that would see research and development tackle the escalating cost of doing business in terms of power, transport, cost of living would certainly attract venture capitalists to the country and without a doubt increase the economic performance of the country and the continent.

3.2 Mr Stephen Wainaina, Director of Economic Planning, Ministry of Planning and National Development, Kenya

Mr Wainaina began by highlighting the main chapter of the Economic Recovery Strategy (ERS) that called for equity in poverty reduction by firstly empowering people and secondly by building capacity. He added that the ERS further called for a participatory approach in planning such that stakeholders can contribute in production and wealth creation.

He cautioned the poor against expecting handouts because such measures were short lived, but rather encouraged participants to view poor people as assets to involve in the wealth creation process.

Mr Wainaina declared that science and technological policies have been in existence since independence and were geared towards accentuating the role science can play in development in the after independence period. He further explained that in 1977, The Science Act was put in place and later revised in 1979 to incorporate key institutions like The Kenya Medical Research Institute (KEMRI), The Kenya Agricultural Research Institution (KARI), universities and polytechnics.

Mr Wainaina admitted that there was a problem in implementing most of the articulated policies, which are often not implemented due to poor coordination. This has regularly prevented science and technology from making greater strides in Africa. He gave an example of the hybrid maize which was initially grown in the 1960s and has now become a success as an example of successful science and technology policymaking. The same technology has been used for coffee and sugar cane.

Mr Wainaina confessed that the ERS document does not tackle Science and Technology exhaustively however it highlights the following key science based issues:

- ❑ Use of Information Communication Technology (ICT) to improve production in the private sector.
- ❑ Use of e-government strategy, internet to improve the environment industry operates in.
- ❑ Non-renewable energy as key to industrial reformation which can play a part in the private sector to play a part in helping improving competitiveness.
- ❑ National research agenda

3.3 Dr Margaret Karembu, ISAAA Africenter

Dr Karembu began by expressing gratitude to ATPS for being consistent in providing a forum for recognizing local scientists and researchers to share experiences and frustrations in the utilization of the fruits of science and technology. She acknowledged that a lot has been done and admitted that there was a problem in recognizing local capabilities at the expense of western ideologies that are sometimes inapplicable in Africa.



Dr Karembu explained that research has proven that technology creates positive economic impact with increasing speed as the years rush by for example within 25 years, most problems could be solved if bio-technology was integrated into policy in development processes.

She quoted the UNDP Human Development Report 2001 that states people all over the world have high hopes that new technology will lead to healthy lives, greater social freedom, increased knowledge: and more productive livelihoods.

Dr Karembu pointed out that in the African context, 60 percent of the population is comprised of small scale farmers who farm in small farm units, so increased productivity per unit of land is an issue of great importance to them. She further explained that the farmers possess limited capital and are motivated to meet basic family needs. These farmers moreover have maintained cultural practices and appreciate new technology.

The challenge, Dr Karembu posed to scientists and researchers therefore was how to enhance the capacity of such people, so that they could benefit from agricultural bio-technology

Dr Karembu proceeded to define bio-technology as any technique that uses a living organism or parts of those organisms to make or modify products. She highlighted the merits and demerits of bio- technology as follows:

Merits:

- ❑ Eliminates pests and diseases from crops thus providing clean planting material
- ❑ Can produce large quantities of plant within a short period of time hence superior planting material and uniformity in marketing.

Demerits:

- ❑ It is expensive so credit comes in handy.
- ❑ Somochromonal variations which is sometimes good because new products are innovated.
- ❑ Viruses are not excluded so there is need for viral indexing.

She further defined tissue culture (tc) as the regeneration of plants from very small plant parts, tissues and cells under sterile conditions in the lab and was quick to clarify that Tissue Culture does not involve genetic modification.

Dr Karembu described how the tissue culture banana project started with the identification of needs at the grassroots such as lack of clean planting material, lack of appropriate technologies in banana farming and degradation of the environment that had already led to

reduced yields. She explained that the project was introduced through priority settings with the farmers.

Dr Karembu said the banana Tc technology was identified in other banana growing regions like Israel, South Africa, Costa Rica where it had been successfully carried out and resulted in farmers getting bigger bunches with better fingers and uniformity in growth.

Dr Karembu enumerated the advantages that came with the success of the project to the local farmers whereby more families were having enough food and taking it to the market. It also resulted in uniformity of fruiting, predictability in market (very important), bigger branches and banana sizes. She was proud to observe that this subsequently led to higher productivity per unit of land increasing hence less encroachment into to unproductive land.

Dr Karembu criticized the government for not providing a facilitating environment for people to do what they do best. She held that Kenyans and East Africans are very good workers but was adamant that they need a facilitating environment especially with distribution mechanisms. She noted that enterprising people had seen an opportunity in distribution with the tc bananas but had suffered low profit margins due to infrastructure and transport problems.

Dr Karembu said there were great opportunities in product diversification and value addition with the tc banana which at present were largely unexploited in Kenya . She gave examples of Tanzania and Uganda where they have developed banana wine, banana beer and banana juices which have been commercialized such that several entrepreneurs from Uganda and Tanzania who were interviewed by ISAAA claimed they were unable to meet the demand. She challenged Kenyans to take up the Scientific Revival Day forum as an opportunity to share ideas and add value to the products of this technology.

As she wound up, Dr Karembu called for the establishment of local tissue culture labs and beckoned policy makers to provide incentives to the private bio-technology sector. She concluded by saying the *tc* banana project had been a pioneer venture and hoped it would open new opportunities for bio-technology to benefit farmers with the support of policy makers.

4.3.1 Questions and Answers

Question

The participant agreed that farmers need micro-credit but at the same time pointed out that farmers need more than micro-credit as they need infrastructure to be put in place s in terms of roads and other facilities.

Answer

Mr Stephen Wainaina said infrastructure was key in addressing the problem of agriculture production in the country. He said the government is advocating for a participatory approach as well as partnership for the implementation of the program for improvement of the state of infrastructures. He said the new document on Bt cotton has many areas and government will help to revive the cotton industry but still government cannot produce all resources so there was need to lobbying the government on this issue and collaborate with other players.

Question

A participant declared that he was hoping to hear from the Mr. Wafula of the African Center of Technology Studies (ACTS) that Bt cotton was already in production as a success story but it appeared to be still an idea. He felt that spending scarce resources on two bio-tech projects (Tc banana and Bt cotton) was untenable and did not benefit farmers.

Answer

Mr David Wafula of ACTS said there have been many trials of Bt products for example Bt maize and Bt cotton had been done at KARI. He said that the collapse of the cotton industry in Kenya could be attributed to a wide range of factors and decline in cotton production was just one of them. He explained that Bt cotton was introduced because of its high yield and due to the fact that it has better resistance to the boll worm pest. On the issues of introduction of BT cotton Mr Wafula said that bt cotton would be available to the farmer in 2-3 years time upon determination of its efficacy and bio-safety then the relevant bodies will be at liberty to commercialize this invention.

Question

Are the bio -tech foods fit for consumption and what measures has been put in place so that farmer does not have problems in getting seedlings for the next planting season?

Answer

Dr Margaret Karembu of ISAAA said researchers are ensuring that there is food safety and that bio-tech modified foods will be favorable to natural products. She explained that the slow rate of adoption of Bt technology could be due to an inadequate bio-safety law and sensationalism and misinformation disseminated to the public. She further clarified that genetic modification is a higher level and involves removing genes from unrelated species. She said a researcher also needs some kind of bio-safety law that will protect them in case of product abuse and misuse and the bio-safety draft policy was due to be discussed in parliament soon. She called for help from the government and media to support initiatives that support public education on bio-technology to take this technology to the next level.

3.4 Prof Moni Wekesa

Intellectual Property Rights in the Process of Technological Innovation

Prof Wekesa began with a light touch by describing intellectual property rights as the only farm an intellectual or scientist owns that can be converted and marketed into real Kenyan shillings. He declared that scientists through scientific innovation own much more than this country affords.



Prof Wekesa highlighted the different types of intellectual property rights as:

1. Patents
2. Copyrights
3. Trademarks
4. Trade names

He chose to expound on patents which he felt would be of more interest to scientists and researchers using an example of the Aids drug **Fasiol (SP)** as an illustration. He defined a patent as a bundle of rights given to someone who has invented something equivalent to a land title deed.

Prof Wekesa explained that for the patent to be offered, the invention must be something that can be mass produced for the betterment and benefit of mankind. He said that the cure of HIV for example would warrant a patent because the researcher or scientist would have expanded the amount of goods and services in the public domain.

Prof Wekesa said the Kenya Industrial Research and Development Institute(KIRDI) gave protection for patents which avail knowledge to the largest majority. He however explained that patents are premised on the western idea of individual property ownership that was alien in African culture and has continued to cause trouble especially on land issues where communal family land is now being sub-divided and registered to different individuals. He said that an invention belongs to an individual according to western notions that have been gladly adopted in Africa today.

Prof Wekesa went on to clarify that when a scientist invents, they are liable to enjoy protection for up to 20 years, after which, anyone else can use the invention.

He further divulged that this Intellectual Property Right is contained in the Industrial Property Act and involves the right to exclude other people from selling or importing or making the product. He warned that the law can be used to obtain an injunction to restrain others from unlawfully using this invention and to claim compensation from those who infringe on the researcher's right or use the inventions illegally or without permission.

Prof Wekesa gave further details about **T-20 or Feison (SP)** which was the latest ARV-Aids drug on the market and stated that all inventions are preceded by a flurry of scientific activity as with **Feison**. He further explained that besides the work of the scientist, investor support by way of sponsorship is critical to translate ideas in the scientist head to what can be retailed in supermarkets and other retail outlets.

Prof Wekesa drew attention to the disheartening AIDS/HIV statistics whereby averagely 600-700 Kenyans die of HIV related complications per day and over 3 million Kenyans are HIV positive. He verified that over 300,000 people need Anti-Retroviral drugs while only 9,000 people can access them in Africa.

The professor expressed hope as he told of an Eldoret based herbalist who tried his "concoction" on 300 HIV patients under observation at the Moi Referral and Teaching Hospital. After 3 to 4 months, the mean CD4 cell count in the HIV patients which was at 195 increased to 351 while the viral load which was very high at 390×10^3 plummeted to 98.5×10^3 particles per mm.

He hypothesized that if the drug is put on the market at 10 shillings that would be 300 shillings per month multiplied by the 28 million people in sub-Saharan Africa who are HIV positive, times monthly, times yearly translates into a goldmine.

Prof Wekesa emphatically stated that Africans are sitting on a goldmine and this incident shows there is potential in the environment to invent and market products. He proclaimed that there was money sitting on the heads of many people. The professor also gave an example of the rolling part of a ball point that allows ink to flow during writing that was patented. He assumed that if an individual used on average of 10 ballpoints per year retailing at ten bob multiplied with the approximately 15 million literate Kenyans who can write. The sky would be the limit.

Prof Wekesa concluded by challenging scientists to come up with inventions to benefit local people at the ground which will lead to scientists smiling all the way to the bank.

Question and Answer Session

Question

How many patents do we have?

Answer

Professor Wekesa said anyone with a patent can register anywhere to seek protection, over 98.9% of patents registered in Kenya are foreign owned. He had no figure off the top of his head but said little innovation is going on locally.

Question

There is a lack of knowledge amongst the old school scientists and researchers that hinders the innovation process. Please comment.

Answer

Professor Wekesa decried tradition and backwardness which he said was dragging the country in the wrong direction. He challenged old school scientists to wake up before the system kicked them out.

Question

What is the possibility of introducing intellectual property rights as a course at university and other knowledge institutions?

Answer

Professor Wekesa said he longs for such progress and challenged Vice Chancellors to embrace new ideas and realize that investing in intellectual property could translate into billions of shillings.

Question

Who should own patents? The person who funds the research or the person who does the research?

Answer

Professor Wekesa referred to it as a Catch 22 situation and advised scientists and researchers to closely examine clauses when raising funds from donors. He advised scientist to look out for clauses such as, "all intellectual property accruing from this research belongs to us (the donor)" before accepting proposals as this clause usually ties the hands of the researcher in terms of intellectual property rights. He encouraged scientists and researchers to seek the advice of KIPPRA and other lawyers before signing donor documents.

Chapter 4: Panel Discussions

The fourth session of the 2005 Scientific Revival Day took the form of panel discussions.

4.1 Prof Robert Okalebo, Moi University

Role of Knowledge Based Institutions in Improving Technological Competitiveness

Prof Okalebo identified the importance of technology in simplifying daily life activities like a wheel and axle to lift water. He also recognized the need of technology to solve specific problems like medicine for the sick and fertilizer for the land to increase yield.

Prof Okalebo made out that anyone, anywhere including children at science fairs can develop technology and gave examples of the *Jua Kali* sector that has come up with a wide range of affordable products that are widely used in daily life. He noted that children were also involved as innovators through arts and crafts where musical instruments are often made and for high school students who participate in science congress competitions up to national and international levels.



He challenged universities and other institutions of higher learning to come along to develop and refine these technologies with their numerous training resources like its qualified personnel and human resources to work towards technological transfer and development. According to Prof Okalebo, institutions are well equipped to partner with technological and development agencies because they have a wide range of disciplines dealing with large technologies such as medicine, agriculture, and architecture which makes it easier for them to demonstrate the technologies at the grassroot level.

He added that universities and knowledge based institutions were able to facilitate staff flexibility and movements in order to have access to players in the grassroots such as extension staff, NGO, s and other technology end users at the grassroots level.

He emphasized that outreach activities are a MUST towards technology competitiveness and advised institutions to have mechanisms in place to monitor the performance of their products over time and hence sustain competitiveness. He identified the news media as a tool to help advertise, promote and convey detailed information about a specific product amongst end users. He further said that tools and products made to perform specific jobs, such as hoes can be displayed for sell in the market across the country and be exhibited during agricultural shows, conferences and workshops.

Prof Okalebo sought to clarify that for technology to reach its target, the innovation must be competitive and supported by promotional activities. He further said that in research some activities are commonly pursued for the development and formulation of theories to explain specific processes e.g. absorption of plant minerals by plant roots.

Prof Okalebo called on institutions to team up with technological and development agencies in order to come up with competitive purposed innovations that can be demonstrated at the grassroots level.

Prof Okalebo encouraged knowledge based institutions to focus on the use of effective low cost technology that is affordable to many end users because this would enhance the popularization and selling of the technology.

Prof Okalebo gave the following examples of technological partnerships between Moi University and its collaborators:

- ❑ The development of a simple and affordable foot pump used to irrigate small areas of land to produce high value crops, the well-known “Money Maker”, a valuable tool at on-farm level, to produce tomatoes.
- ❑ The Snap (French) bean variety developed is suitable for the Highlands.
- ❑ The development of the PREP-PAC, that is a low cost soil fertility replenishment product. This is a competitive product that has been field tested in western Kenya and eastern Uganda.
- ❑ A collaborative Moi University-KARI-SACRED Africa NGO-ICIPE etc effort to identify *striga* weed management technologies, e.g. the use of IR-maize hybrid.

Prof Okalebo concluded by saying that knowledge-based institutions in Africa were well-placed to improve technological competitiveness because:

- ❑ They have qualified personnel capable of developing and perfecting technologies.
- ❑ They have a wide range of study topics from which they can develop technologies/products that will compete favorably with the current technologies.
- ❑ They have accessibility to partners/collaborators and product end users which enhances competitiveness.
- ❑ They have advanced communication mechanisms to promote the use of their products. They are also able to demonstrate their technologies during field days at the grassroots.

4.2 Kevit Desai, Director of Engineering, Centurion Systems

Tapping Creativity and Innovative Potential of the Youth to Create Employment and Alleviate Poverty

Dr Desai began by pointing out that it was difficult to stigmatize innovation especially to such an enthusiastic youth in the continent today. He explained that innovation can be used to solve the problems seen on a daily basis especially problems in the industrialization sector related to condition monitoring to enable industrialists to tell when a major failure is about to occur at critical application plants.

He pointed out that students require data to analyze information and effectively carry out research for designing such systems.



Dr Desai noted that computer based systems had generated a lot of interest amongst the youth and also pointed that mobile applications show great promise for their future provided the young people come up with systems and applications that can catch up with the latest trends.

Dr Desai admitted that tapping innovative creativity to make a world of difference amongst the youth is a huge challenge for all. He noted that often in industry, former technology students employees who are employees in industry work within specific departments where more emphasis is laid in maintaining existing systems/environment and little innovations is carried out.

The Director of Engineering at Centurion Systems complained that some of the country's most talented technologists often end up as industry captains which he believes is a huge loss in terms of the capacities they possess. Dr Desai further complained that there was little activity and challenge in the technological sector besides the challenge of setting up science and technology parks and incubators programs at a few universities.

Dr Desai strongly stated that Kenya can make a world of difference if many technological organizations and innovative companies in the country were allowed to partner with talented technology students. He foresaw a situation where the students provide technical research and know-how while the company/institution provides marketing assistance, business experience and exposure to ensure the innovated product is marketable.

Dr Desai advised that a good starting point would be to help the youth understand the potential of their school talent. He further suggested that a financial deal between a dedicated youth and a technological company can be struck whereby a student gets 80% and company gets 20% of net returns. The ultimate goal would be for the student to develop his/her own business.

Dr Desai believes such an approach would present a fast track opportunity for Kenyan youth to fully articulate concepts into industry and market in a big way. He confessed that teaching a young person just out of engineering class on how to be entrepreneurial could be a daunting task.

He advocated for a cost effective approach, whereby with proper funding from international organizations committed to promoting youth, a young engineer could produce a proper concept in about 6 months. The technological companies would provide marketing support and in the next 6 months he hypothesized that the youth would be ready come up with something. He explained that the financing from organizations committed to developing a development culture was critical to ensure the youth has enough to live on in order to dedicate themselves to the ideas, enable him to buy kits, and obtain necessary licenses.

Dr Desai believes this is the way forward and maintained that at Centurion they had engaged the youth in creating a culture of innovation aimed at tapping creativity in collaboration with like-minded existing organizations.

As an entrepreneur, Dr Desai declared that he would be happy to cultivate a culture of innovation and to support these initiatives in the country, He acknowledged that running an organization is one thing but it was equally important for him to ensure that a legacy that can grow into many different directions would be very satisfying and promising to him.

4.3 Patrick Muiruri, Director, Kenya Industrial Research and Development Institute (KIRDI)

Transferring Technology from Laboratories to the Business Community and Consumers

Dr Muiruri largely addressed issues on dissemination of technological research findings and stated that certain issues and components need to be put in place in the dissemination of scientific and research findings.

He indicated that the needs of the end user of the research findings from Jua Kali, multi-nationals, government should be considered while disseminating the findings depending on target and beneficiaries of research.

Dr Muiruri explained that there was often proactive/reactive dissemination of research findings whereby the end user is sometimes aware and sometimes unaware of the dissemination process. He further stated that programs and practices must be adapted to meet organizational needs since the users could be at different knowledge, perceptions, academic, technological perception levels. He said it would be important to put up programs and practices that meet the aspirations of each group.

He posed the following questions:

- Are those who do research involved in dissemination?
- What are the different existing channels for dissemination?
- What and how will dissemination take place?
- What is the relevance of the research and who are they relevant to?
- What are the aims of dissemination?
- In what direction will research outflow?
- What are the aims of the dissemination?

Dr Muiruri told the participants that some of the research done in Kenya has the potential to not only benefit Kenya but the whole E.A region however the constraint comes in addressing how the information gets to the end user. He called on scientists and researchers to identify the potential blockages to information and understand the facilities, in terms of time energy and money needed for dissemination.

4.4 Shem O. Wandiga, Chairman, Kenya National Academy of Sciences (KNAS)

Prof Wandiga began by pointing out the importance of recognizing the pattern in every patent. According to him, pattern patent recognition is very important as it helps an individual to improve and register their own patents by using something as simple as a replacement of a chip or a block on an innovation. It is the recognition and the innovation that needs to be conveyed in this country.

Prof Wandiga commenced by calling for the establishment of a strong science technology and innovation policy in Kenya whose goals and objectives would be the formulation of a national innovation system.



Prof Wandiga gave an anecdote of colonial times, whereby people who were able to make a gun were arrested and their hands chopped off.

He regretted that this pattern was unfortunately sustained by the Kenyan government up to today. He gave an example of the Young Etiang who tried to fly but was “rudely shocked” when the Director of Aviation forbade him saying “ I’ll never allow you to fly on my airspace.”

He encouraged scientists and researchers to apply knowledge to development. since many countries have developed through science and technology.

The Professor yearned for a strengthening of industrial research and called for the accommodation of ideas by scientists and researchers which often originate from young people, universities, The *Jua Kali* sector and the streets. He explained that these ideas can be sharpened at industrial research institutes, after which an incubator period would be necessary before entering the market . He insisted that an innovation village would be very useful in the country and called for the development of technology parks in the country. He further pointed out that the development of science, technology and innovation villages (Parks) is an area where Africa has lagged behind.

Prof Wandiga suggested the establishment of innovation parks, life sciences, diagnostic centers, that will not only result in new products but will also improve the quality of products available in the continent. He also urged the scientist and researchers to identify new products that can brand Kenya.

Prof Wandiga expressed hope that each of these options would create new linkages and prompt the renovation of education curriculum. These options would be more viable if their cost will be less than two percent of the national GDP and would help harness and achieve the human and technological capacities.

He also advocated for the clustering of institutions and organizations to help maximize co-operation between the private sector, universities, research institutions and government.

According to Professor Wandiga, the government’s role is to provide financial resources to enable the development of such villages. He further advised all the constituting institutions to work together to realize this recommendation.

Prof Wandiga was optimistic that once this is adopted, Kenya would be branded as a diagnostic nation that will consequently result in economic improvement and a technological renovation in a short time.

Prof Wandiga noted that, Kenya’s economy currently relies on agriculture, natural resources, tourism and service he argued that the income from these sources cannot cope with the rapid population growth experienced in Kenya.

He also pointed out that the education and research systems were directed at satisfying the needs of the above economic drivers and noted that policy change required revitalizing the economy

Prof Wandiga believes Africa got into a poor economic situation by over reliance on agricultural commodities alone which is insufficient. He reminisced that a car could be gotten for 1 tonne of coffee when he was young; but there is a big change now since currently it would take several tones of coffee or tea to buy a car. Professor Wandigah stressed that there was need to move from producing commodities, and move towards renovating thought processes to do something different.

He also censured the government and the private sector for the limited support they had offered to science, technology and innovation and had subsequently contributed to the collapse of STI infrastructures in the country.

He urged the government to step in and give glue in terms of policy, incentives, branding, that will bring the scientific community and the private sector together.

Professor Wandiga concluded his presentation by restating that reliance on agriculture and natural resources and tourism is insufficient, and there was need to jumpstart the economy through science technology, innovation which would subsequently leap frog Africa into economic development.

4.5 Question and Answer Session

Question

The participant sought to know what proportion of research grants originates from the government. He also felt that there was "implementation paralysis" when research is used to solve a problem since the public does not appreciate research nor does the research apply to problems in the grassroots.

Answer

Dr Patrick Muiruri on answering the question on government grant said that he was not talking about the money designated for research. He said in his institution which is state corporation takes money from the 1line budget. This 1 line budget helps them to apply other requirements like Operations and Management and other essential services. He said that it is within this 1 line budget that they delegate some of the money as grants for research projects. The government also allows them to utilize the account and auditing appropriation which is in built in the budget.

Question

How can this challenge be taken up by universities and knowledge institutions so that we can have more deliberation coming from the institutions?

Answer

Dr Kevit Desai said the capacity we give to the youth should not only be designated to the institutions of higher learning. He lamented that we still maintain the colonial legacy and mentality that every thing that originates from the west is the best. Dr Desai said time had come when to jump start the situation because it was getting too late and it was taking too long for the youth express themselves. He said one possible way is to create a win- win situation with the existing organization. He said that it is no longer "cool" amongst young people to work in large organizations like Coco-Cola, and BMW. He divulged that it was much "cooler" for a youth to express themselves and market their ideas. Dr Desai insisted that the youth have the ability but they need to be defined and the quickest way would be through partnership.

Question

A participant who was a beneficiary of KIRDI, s baking equipment project sought to know how a small scale entrepreneur can be helped with certification and standardization of their product since the market demands goods to have standardization and certification.

Answer

Dr Patrick Muiruri said that in order for any one to sell their goods in the market they had to be certified and standardized which was outside of KIRDI's mandate. he advised that this was th emandate of the Kenya Bureau of Standards.

4.6 CLOSING REMARKS

Alex Gachuhi- National Coordinator, ATPS-Kenya Chapter

The ATPS Kenya Chapter, National Coordinator, Mr Alex Gachuhi wound up by calling for a cataloging of all scientist, researchers and innovators in the continent in order to know who is doing what and recommended that the network of innovators be extended to villages, districts, NGOs and farmers. He wanted to know where these innovations are and why no one has bothered to upscale them for commercialization. He further suggested the formation of innovation scouts to scout for innovation in the continent. He also reiterated that segmentation was important since it helped scientists to avoid repetition and redundancy.

Dr Ebby Chagala-Odera, Deputy Director, Kenya Forestry Research Institue (KEFRI)

Dr Odera concluded by thanking all the participants for staying and contributing to discussions until the end of the meeting. She proposed for publication and commercialization of inventions to raise the level of innovativeness in the continent and called for industries to play their part by upscaling innovations.

The participants were divided into groups and each group commissioned with different duties and responsibilities:

1. The Technology Group
 - ❑ The issues of S&T are sounded every now and then, How critical are government policies in this area
 - ❑ How will scientists work with government for the development of science and technology
2. The Research and Institutions group
 - ❑ Carry out scientific research method so that products can be made here
 - ❑ Defuse the information you have so as to avoid pockets of wrong information's for the public.
 - ❑ Address market oriented strategy
3. Entrepreneurs
 - ❑ Conduct extensive survey on consumer needs and how applicable it is to Kenya
 - ❑ Explore the possibility of exports for example what does the export market need and how can these needs be met. Move away from what is already in the market demand and find new ground
 - ❑ Ask mind bugging questions like, what can we extract from coffee that can give the nation more foreign income
 - ❑ How can the twelve aspects of coconut be used to meet market

Annex 1: Scientific Revival Day Programme

2005 SCIENTIFIC REVIVAL DAY - 30 JUNE 2005, SAFARI PARK HOTEL, NAIROBI

THEME: HARNESSING EMERGING TECHNOLOGIES TO ALLEVIATE POVERTY

- 9.00** **Chair of the session: Prof Norah Olembo, Chair, ATPS Board**
Welcome address
Dr Osita Ogbu, ATPS Executive Director
- 9.15** **African Union, science, technology and innovation**
Dr Modibo Traore, Director, AU/IBAR
- 9.30** **UNESCO's support for science, technology and innovation to alleviate poverty**
Prof Joseph Massaquoi, Ag. Director, UNESCO, Nairobi Office
- 10:00** **Keynote address: What gives an innovation value in the marketplace? - The honey bee, silk worm and the neem tree experience**
(ICIPE/BIOF Group)
- 10:45** **Official opening of the workshop**
Guest of Honour, Dr Kilemi Mwiria, Assistant Minister for Education, Science and Technology, Kenya
- 11:00** Tea Break/Press conference
- 11.15** **Discussions**
- 11:30** **Chair of the session: Prof Judi Wakhungu, Executive Director, ACTS**
Role of agricultural biotechnology in alleviating poverty: the case of banana in eastern Africa
(ISAAA Africenter Group)
- 12:00** **Role of industries in supporting the creation and application of technological innovations for development**
(Mr Vimal Shah, MD, the BIDCO Group of Companies)
- 12:30** **Discussions**
- 1:00** Lunch
- 2:00** **Chair of the session: Prof GBA Okello, Executive Director, AAS**
Intellectual property rights in the process of technological innovation
Dr Patricia Kamari-Mbote, Programme Director, International Environmental Law Research Centre (Kenya)
- 2:30** **Discussions/questions**
- 2:45** **Panel Discussion**

- ❑ The role of knowledge-based institutions in improving technological competitiveness, **Prof Robert Okalebo, Researcher, Moi University, Eldoret**
- ❑ The contribution of technological innovation in small and medium-scale enterprises in alleviating poverty, **The Intermediate Technology Development Group (ITDG-EA)**
- ❑ Tapping creativity and innovative potential of the youth to create employment and alleviate poverty, **Dr Kevit Desai, Director of Engineering, Centurion Systems Ltd**
- ❑ Transferring technology from laboratories to the business community and consumers, **Dr Patrick Muturi, Director, Kenya Industrial Research Development Institute (KIRDI)**

4.00 **Discussions**

4.30 **Wrap-up and way forward**

Mr Alex Gacuhi, National Coordinator, ATPS Kenya Chapter

Annex 2: List of Participants

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