

*“In the final analysis it is basically mastery and utilization of modern science and technology that distinguishes the South from the North.”*  
Abdus Salam, the late Pakistani Nobel Laureate in  
Physics in 1979

## **EDUCATION, SCIENCE, AND TECHNOLOGY WORKSHOP**

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### Summary Statement:

The Horn of Africa group should convene a panel of stakeholders including policy makers, from government, local experts and civil society, the Diaspora, donors and other international experts. Broadly speaking the charge of the panel would be to conduct a study of the status of education, science and engineering in the Horn of Africa countries. The outcome of the panel should be published in a report that would be widely accessible to policy makers, educator and donor countries as well as all other stakeholders. The panel should conduct on-site visits, meetings with the public and other officials using face to face meetings and cyber infrastructure. In addition to addressing the specific charge such a study will plant the seed for the creation of a stable institution such an East African Academy which will study and formulate recommendations concerning strategic issues and challenges facing these countries. This will bring local perspectives in defining development strategies and will truly empower all people of the region with their own destiny.

### **Background**

It is widely known that the Horn of Africa is challenged with recurring famines and regional conflicts, low literacy and widespread poverty. The region is highly dependent on foreign aid. Ethiopia which has the second-most populous country in Sub-Saharan Africa. The 2006 UNDP human index development (HID) Report ranks Eritrea and Ethiopia 157 and 170<sup>th</sup> respectively out of 177 countries. According to UNDP report forty-four per cent of Ethiopia's 67 million people live below the national poverty line, and repeated droughts have contributed to regular food shortages and famine. Other challenges include stemming HIV/AIDS, reducing discrimination against women, building infrastructure and creating jobs.

In light of this situation it is important to keep in mind that a strategy for human resource development which includes education and training, and science and technology must serve the region with overcoming the following long term and short term challenges:

- Eradicate extreme poverty and hunger
- Achieve universal primary education

- Promote gender equality and empower women
- Reduce child mortality
- Improve maternal health
- Combat HIV/AIDS, malaria and other diseases
- Ensure environmental sustainability
- Develop a global partnership for development
- Achieve universal primary education

Overcoming these challenges requires commitment and partnership of all stakeholders: the government, the international donor countries, and the Diaspora. Governments seem to be constrained by limited capacity, low domestic revenues and consuming regional conflicts. The countries also receive millions from the Diaspora in the form of remittances. On the international arena there seems to be a more supportive international aid environment. In Ethiopia alone, foreign aid financed 37% of public expenditure, totaling US \$1.4 billion in 2003. This is in addition to international debt relief.

Another dimension is globalization. Globalization opens up unprecedented opportunities for third world countries (Horn of Africa) in terms of access to the markets of advanced countries and investment. However, success in the global village implies that a stiff global competition between people with different level of human resource development pour countries like the Horn countries and advanced countries such as the US. Success in the “flat” world requires a very highly skilled workforce that will be challenged by competition from all over the world. This brings us to the issue human resource development based on education training and science and technology.

The education and training of a future workforce that is globally competitive at all levels of the enterprise is a crucial and perhaps this is even the most important factor in overcoming the ills of the region. T Many broadly accepted indicators show that this is the most important factor that differentiates the most economically developed countries from those at the lowest scale of the index. Possession of raw materials in itself is certainly not the only factor. Statistics from the World Bank presented at this workshop clearly indicate that “... 80% of world wealth is produced by 29 high-income countries, relying on inputs from human resources.”

Education and training of the future generation should be designed to equip future generations with a solid foundation in scientific disciplines. It should allow flexibility and adaptability to ever changing market situations. However, education and training for the horn should also to nurture the future generation of scientists and engineers who will empower the region over the natural resources and creation of knowledge based on the rich natural local resources. It should provide people of the region to have their impact on the international agenda. As ones stated by Abdus Salam, the late Pakistani Nobel Laureate in Physics in 1979, “In the final analysis it is basically mastery and utilization of modern science and technology that distinguishes the South from the North.”

The comments submitted above are a bit too preliminary and I would like to refrain from making a full recommendation concerning a development strategy for the Horn at this

time. However, I do concur it is an excellent idea and should be followed through. The best approach is for the Horn of Africa committee to convene a panel of stakeholders, including leaders from government, local experts and civil society, the Diaspora, donors and other international experts. The Horn of Africa group should draft a specific charge for the panel. In a broad brush stroke, the panel would conduct on-site visits, meetings with the public and private sector officials as well as educators scientists. Meetings could be face to face meetings and/or using cyber infrastructure. This could be one/two years long study at the end of which the panel will publish a report and recommendations. Such a report will be broadly available to all stakeholders. Funding for such an activity can top the \$100 K but a specific budget will need to be developed. The proposal is modeled on the recent study of the National Academy of Science and Engineering. The NAS report entitled ‘Rising above the Gathering Storm Energizing and Employing America for a brighter Future’ (<http://www7.nationalacademies.org/gatheringstorm/>). The report discusses the challenges the US is facing due to globalization and makes recommendations to the US. A similar study for the Horn would be credible and useful. It would have broad acceptance. It will clear the ground for future cooperation between all stakeholders. In addition it may also be the seed for the creation of a stable institution such an “East (Horn) African Academy” which will address long term issues and challenges facing these countries. Such an academy would bring the best minds of the region and outside the region in providing guidance to all stakeholders independent of which side is the holder of the reigns of power. It will truly empower the region of its own destiny.

In conclusion, based on a brief assessment of the prevailing conditions in the Horn, I believe that a study panel with a well thought out charge and timeline is the most important recommendation at this time. It will be instrumental in developing a sound approach to developmental issues in education, science and technology.

### **Some noteworthy information and ideas**

[from SHAPING THE FUTURE OF PHYSICS IN SOUTH AFRICA REPORT OF THE INTERNATIONAL PANEL APPOINTED BY THE DEPARTMENT OF SCIENCE AND TECHNOLOGY NATIONAL RESEARCH FOUNDATION SOUTH AFRICAN INSTITUTE OF PHYSICS APRIL 2004]

Below we are listing some indicators supporting these views:

Among 192 countries a World Bank study shows that 63 are classified as raw material exporters, and contribute 5% to world wealth. At the other end of the scale, 80% of world wealth is produced by 29 high-income countries, relying on inputs from human resources. East African countries certainly do not belong to latter group neither are they major raw materials exporting countries at least not yet. Their contribution to the global economy is minimal. They are ranked at the bottom of the poorest countries in the world. With exploding young demographics it is clear that for now their main asset is their human capital. It is

therefore crucial to develop this human capital with broad based education which includes not only technological and vocation-based training, but also education that provides a key to thinking about fundamentals, and to dealing with complexity. As stated by Abdus Salam, the late Pakistani Nobel Laureate in Physics in 1979, "In the final analysis it is basically mastery and utilization of modern science and technology that distinguishes the South from the North." It is certainly not the possession of raw materials.

In 2003, a prominent CEO from South Africa declared "In SA we are living in a colonial knowledge economy era. My engineers will produce designs and make progress based on imported Intellectual Property, but I can't re-export that IP. It's the scientists who contribute to IP that is owned by South Africa, and for that reason I employ them. We need to generate unique technology in niche areas." A young student added: "We need to grow, to compete globally, and not just be users. It is very important for us to be trained as inventors."

The report of the international advisory panel on Physics in SA states: "We believe .... That people originating on the African continent should not be restricted only to problems evaluated by someone else as "relevant"; Africans (including South Africans) should contribute to the global advancement of science."

The economically more successful countries have a greater R&D spending per unit of GDP than is the case for poorer countries, with the "top" countries investing as much as 2% of their GDP in R&D. Unless there is some increased spending in this area, the East African countries will at best stagnate if not spiral down into further poverty. (Actually, we need to include some statistics here. What fraction of the budget do these countries invest in education? We may find out that in terms of %GDP these countries spend a higher fraction of their GDP than the advanced countries. )

World wide, technological regions can be put into 3 categories: "innovators" (10 patents or more per million of population), "technology adopters" and the "technologically excluded", East African Countries belong to the last group and steps have to be taken to get out of this situation.

What can be done?

Create the environment that nurtures an educational system that liberates the creative minds of the millions of young people.

Educate the population at all level from literacy to tertiary and postgraduate education.

Encourage research and systematic study of the environment, biodiversity and raw materials.

Use the biodiversity as a driver for the nations to become contributing partners in the global enterprise

Develop cooperation between scientists within the region and with other in similar geographic and socio economic environment.

Create regional centers of excellence, and user facilities to bring expensive and yet critical expertise to the region as well as tools and infrastructure that cannot be afforded or justified by the needs of one country alone.

Think of a flagship project that will capture the imagination of all in the region. Like the athletes have done in Ethiopia and Kenya

Create think tank groups that transcend political hostility and focus on common interest of the region, example, i.e. East African Science Academy.

Develop attitude that embraces all stakeholders.

In education:

Build a cadre of educators that can relate to the local population

Make appropriate use of technology (use opportunities created cyber infrastructure to get access to knowledge at the frontiers)

Develop partnership with institutions in developed countries.

Specific to governments:

Relax control on information highway

Improve connectivity with education and research institutions world wide: Create a dedicated internet broad band backbone for education and research

Use Diaspora as a resource for leapfrogging into modern education/ research using cyber infrastructure

Organize East African summer school for math, science, materials science.

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