

**SPEECH BY H. E. PAUL KAGAME, PRESIDENT OF THE
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THE IMPORTANCE OF SCIENCE AND TECHNOLOGY IN AFRICA

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- LORD MARTIN REES, PRESIDENT OF THE ROYAL SOCIETY;
- SIR DAVID KING, CHIEF SCIENTIFIC ADVISOR TO HER MAJESTY'S GOVERNMENT;
- PROF. NEIL TUROK, CHAIR OF MATHEMATICAL PHYSICS, UNIVERSITY OF CAMBRIDGE;
- DISTINGUISHED LADIES AND GENTLEMEN

It is my pleasure and honour to be here at the Royal Society, one of the greatest scientific institutions that over centuries have been associated with great minds and intellect in a variety of fields.

And so, it is fitting that I address this august audience on the theme of “The importance of science and technology in Africa”. For I have no doubt in my mind that you have the capabilities of making a significant contribution to the training of African scientists as well as to assist in capacity building of your counterpart institutions on our continent.

My thesis today is a simple one: We in Africa must either begin to build our scientific and technological training capabilities or remain an impoverished appendage to the global economy.

We all know that the application of science and technology is fundamental, and indeed, indispensable in the social and economic transformation of our countries. Productive capacities in modern economies are not based merely on capital, land, and labour. They are also dependent on scientific knowledge and sustained technological advances.

DISTINGUISHED GUESTS

Before addressing the African challenges in science and technology, let us first reflect on other regions and how they have successfully managed these challenges.

Let me begin with the acknowledgement that the importance of science and technology in development is not a new phenomenon.

It is my view that science and technology are as “old” as life itself – for human beings, even in the smallest of villages, have always sought to innovate and improve their environment through some form of “science and technology”.

But as historians tell us, it is the industrial revolution in this very country in the late 18th and early 19th centuries that constitute the most profound breakthrough in the application of science and technology as measured by the sheer scale of socioeconomic and cultural change.

Science-based technological breakthroughs led to the mechanisation of textile industries, the development of iron-making techniques, trade expansion, improved infrastructure, including railways, introduction of steam power, and the development of all-metal machine tools. All these came together to dramatically increase productive capacities to levels previously unheard of. The industrial revolution, in a variety of forms, was to later spread to North America and Europe in the 19th century, and subsequently, to the rest of the world, including especially to Asia in the early 20th Century in what is often termed “the Asian Miracle”.

The principal lesson from the industrial revolution or in its late name “the Asian Miracle” is simple. Economic transformation and growth prior to industrial revolution or the Asian Miracle was much slower; in the aftermath of these revolutions, productive capacities to create and distribute wealth to improve lives increased spectacularly.

This is especially true where the application of science and technology was embraced as part of development strategies from the 1950s. The cases of India, South Korea and China amply illustrate this.

Following independence in 1947, the great Indian leader Nehru established the Indian Institute of Technology with the premise that science and technology would help to provide the absolute necessities of life that every human being should possess. That ‘Science must think in terms of a hundred million persons in India.’

As we now know, the investment in science and technology has reaped massive rewards for that country. Not only are Indian Institutes of Technology among the best in the world, science and technology capacities have contributed significantly to India’s social, economic and cultural transformation.

The South Korean story is also well-known. The Korean development strategy since the early 1960s included the following:

- Investments at all levels of education with emphasis on science and technology;
- Investments in universities and other educational and training institutions to create a highly skilled workforce; I am told that the percentage of graduates of science and technology in the South Korean labour force is on par with the UK, Germany and France;
- Funding research and development to the extent that 3% of Korean national budget is allocated to this function.

As a result, in a single lifetime, South Korea has joined the ranks of the most prosperous nations by any social and economic indicators.

The Chinese trajectory is almost a replay of that of Korea, in terms of consistent and sustained investment and mainstreaming of science and technology as the basis of socioeconomic transformation. This has supported the dramatic growth of the Chinese economy with an average growth in excess of 7% Gross Domestic Product per year in the last decade.

LADIES AND GENTLEMEN

Let me now turn to the topic at hand – the importance of science and technology in Africa.

As I was saying a moment ago, science and technology are not only important, they are fundamental to development – and in Africa it is no exception. That said, it is readily evident that we are currently lagging behind, and a few highlights may illustrate the depth of the challenge we face.

First, due to various factors, among them a non-holistic approach to education in the past decades, tertiary educational and training institutions on the continent have declined.

The selective approach to education, based on the false notion that primary and secondary school are more important to socio-economic development than tertiary education has been disastrous for the African continent. This philosophy, it should be emphasized, was shared by African governments and the international development community alike. The World Bank in February 2006 acknowledged this fact, and indicated that from 1985 to 1989, 17 percent of its world-wide education sector spending was on higher education, in sharp contrast to 7 percent between 1995 and 1999.

The decline of tertiary education is especially evident at the African university which continues to experience a large scale brain drain. African scientists and technologists in the continental knowledge institutions have “voted with their feet” so to speak, resulting in an estimated 23,000 academic professionals leaving Africa each year.

It has even been suggested that there are more African scientists in the United States alone than in Africa. Besides, there is now no single African university in the top 200 in the world, as recently confirmed by the Times Higher Education World University Rankings. In the Webometrics ranking of World Universities, only two African Universities, both from South Africa, appear in the list of the top 1,000 universities.

The reality is that we have to quickly build African knowledge institutions. We have to build domestic and regional capacities to produce a mix and a critical mass of knowledge if we are to render science and technology tools of

socioeconomic and cultural transformation. There are simply no shortcuts, neither are there alternatives.

Second, in terms of research and development, Sub-Saharan Africa lags way behind the rest of the world, with South Africa leading with just 300 researchers in Research & Development per one million people, while other countries barely manage double digits. By comparison, Japan leads the way with over 5,000 researchers in Research & Development per one million people, closely followed by the USA; countries such as Korea and UK have 2,500 researchers per one million people.

MR CHAIRMAN

The question before us is this: If this is where we are in Africa today, where are we headed, and what needs to be done to give science and technology their due weight in our development processes?

We must first recognize, at both continental and national levels, the fact that we are not where we should be with regard to science and technology, whether in terms of our education and training, or in terms of incorporating science and technology in building our productive capacities through research and development.

At the continental level, we have a vision, one that is, in fact, being complemented by our development partners. Devised from continental consultations by the African Union and the New Partnership for Africa's Development (NEPAD) "Africa's Science and Technology Consolidated Plan of Action" calls for commitment by member states "to bridge the technological divide between Africa and the rest of the world". The Consolidated Plan of Action looks towards an Africa that is "free of poverty and well integrated into the global knowledge economy".

The Commission for Africa report, aptly referred to as "Our Common Interest", and initiated by the British Prime Minister, Tony Blair and his government, calls for multi-sector partnerships from such countries as India and Brazil, the World Bank and national and regional stakeholders to work in partnership to develop science and technology capacity.

The report contains a number of recommendations on ways of unlocking Africa's potential for generating and applying the science and related technological innovations needed to reduce poverty, accelerate economic growth, and enter the global economy. The recommendations include the strengthening of existing Centres of Excellence in Science and Technology and building new ones, as well as reinforcing Africa's higher educational institutions.

In the Gleneagles Summit of 2005, the G8 group of industrialized countries explicitly pointed to the focal role that centres of excellence could play in “helping develop skilled professionals for Africa’s private and public sectors”. They specifically encouraged the establishment of networks of excellence between African and other countries’ institutions of higher education, and centres of excellence in science and technology institutions.

LADIES AND GENTLEMEN

It is not as if we do not know what it takes to bridge the science and technology gap between Africa and the developed world. In fact, a number of regional Africa initiatives are already underway in building scientific and technological capacities on the continent.

One such venture is the Africa Institute for Science and Technology (AIST), which is a Sub-Saharan Africa initiative and part of the Nelson Mandela Institution for Knowledge Building and the Advancement of Science and Technology in Sub-Saharan Africa. AIST is designed as a world-class institution based on the very successful model of the Indian Institute of Technology (IIT), US leading institutions of excellence in science and engineering, and other models of excellence around the world.

Another such initiative is the African Institute for Mathematical Sciences (AIMs), and associated African Mathematical Institutes Network (AMI-NET), which is supported by Cambridge University and has the aim of strengthening Africa's capacity in the mathematical sciences with particular emphasis on the aspects of mathematical science which are relevant to development. The building up of a critical mass of mathematical scientists, connected via the internet and working in collaboration across Africa is among the aims of this programme.

DISTINGUISHED LADIES AND GENTLEMEN

Let me now turn to the situation in our country, Rwanda. Educational and training patterns in post-colonial Rwanda do not significantly differ from those in the rest of Africa, especially with regard to the centrality of science and technology or research and development. Our situation was exacerbated by the 1994 genocide, which led to the loss of our meagre human and infrastructural resources in our science base.

But we now have a vision on science and technology, which we have embraced as the surest route to developing our nation. Our Vision 2020 envisages Rwanda as "a modern nation, able to generate and disseminate technological knowledge and innovation", and as "a centre of excellence at a regional level in the area of technologies, particularly with ICT."

Building on that Vision, we have recently developed a National Policy on Science, Technology and Innovation. The principle objective of this policy is: "To integrate Science, Technology, Scientific Research and Innovation in the context of the issues facing Rwanda."

In terms of specific actions in Rwanda, we are already embarking on an ambitious, but actionable plan, for the strengthening of science and technology across all sectors of our educational system. These measures include the

establishment of a legal and regulatory framework governing Science, Technology and Research, together with numerous proposed interventions within education and across all sectors to strengthen the capacity for science, technology, and research.

A Centre for Innovation and Technology Transfer (CITT) has also been set up, building on the success of the Kigali Institute of Science and Technology, which has won two international Ashden awards.

Post-graduate courses are being established at the National University of Rwanda, including courses in Agro-Forestry and Soil Science, Information and Communications Technology, and Water Resource and Environmental Management.

Let me emphasize, however, that we in Rwanda are embarking on our scientific and technological course from a particularly challenging position. Some of the challenges we face include the following:

- First, we must create interest in science and technology as early as primary school;
- Second, we must retain interest in science and technology as our young people move into secondary schools;
- Third, we must pay more attention to vocational training and include science and technology subjects, as a means of training competent artisans and technicians to support our national development needs;
- Fourth, in our tertiary sector, theoretical and practical training courses that target future scientists in medicine, engineering, agriculture, ICTs, among others, are an imperative that is well overdue.

If we embark on this journey on a sure footing, and learn from those that have travelled this path ahead of us, we can leapfrog at least the mistakes others made, while drawing good practices, as opposed to “reinventing” the technological wheel. But we must also appreciate the implications of our starting position – only 0.4 percent of our population has tertiary education.

DISTINGUISHED LADIES AND GENTLEMEN;

In conclusion, I fully recognise that there is a catalogue of good intentions both at continental and national levels. But intentions are not enough to enable science and technology to become a developmental resource. It is action on the ground that will make the difference. It is important, therefore, to focus on the achievable plans that clearly assign responsibilities so that Africa, together with our partners, can achieve our vision of science and technology-based knowledge economies. I

am also aware that to date only a small fraction of what needs to be done to effectively harness the power of science and technology in Africa has been done. But we have made a modest start. There is no reason to believe that Africa cannot achieve what others have achieved in these fields.

Thank you for your kind attention!