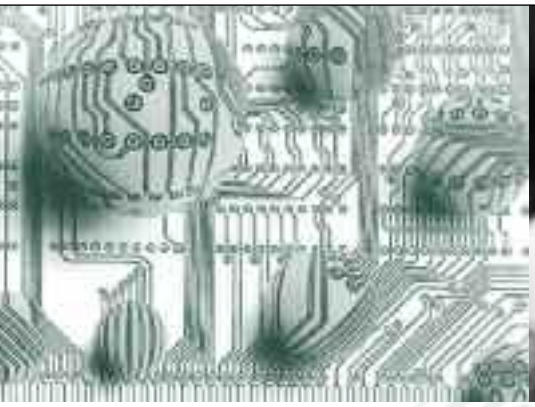
SCIENCE FOR COMMERCE

WE HAVE REACHED A STAGE IN GLOBAL DEVELOPMENT WHEN EVEN THE POOREST COUNTRIES CAN READILY DERIVE MATERIAL BENEFITS FROM INVESTMENTS IN SCIENCE AND TECHNOLOGY, SAYS HENERI A.M. DZINOTYIWEYI (TWAS FELLOW 1988), MINISTER OF SCIENCE AND TECHNOLOGY DEVELOPMENT IN ZIMBABWE. IN LIGHT OF THESE TRENDS, ALL DEVELOPING COUNTRIES SHOULD TAKE AGGRESSIVE MEASURES TO COMMERCIALIZE THE KNOWLEDGE THAT IS BEING CREATED BY THEIR SCIENTISTS.



For decades, scientists in developing countries have urged their governments to pay special attention to science and technology (S&T). Their main arguments have centred on the belief that, through S&T, countries could ultimately chart a path towards sustainable economic growth. That belief has been confirmed by recent trends in the developing world – most notably, the rapid development of Brazil, China, India and other emerging economies.

Governments in the developing world have nevertheless responded in different ways to the challenges posed by S&T-based development, primarily due to the circumstances that they face. More immediate problems – the very problems that S&T promises to overcome over time – historically have often impeded investments in S&T.

The issue, simply put, has been this: How can governments in poor countries invest in S&T when the spectre of hunger and poverty looms so large in the daily lives of their people?

For similar reasons, when governments in developing countries embrace S&T, they have often displayed a clear preference for applied science. Scientists, of course, have been quick to emphasize that strong links exist between basic and applied science. Indeed they have contended that the lines between

the two have become increasingly difficult to discern.

In this sense, the scientific community has argued that all aspects of science should be supported. Such discussions have been commonplace at scientific meetings ever since the 1980s, often wrapped around the adage that "without basic science there is no science to be applied".

Despite the urgings of the scientific community to think otherwise, government officials in developing countries, for the most part and at least until recently, have tended to view science as a long-term endeavour that may ultimately impact society and the economy but that will do little to mitigate today's critical problems.

This perception, however, is now changing. The success of countries with emerging economies has influenced the thinking of many. Yet concerns about the delayed benefits of basic science still hold sway in many of the world's poorest countries.

It's not that the countries have turned their back on basic science. It's just that their leaders strongly believe that they must first face other, more immediate, challenges.

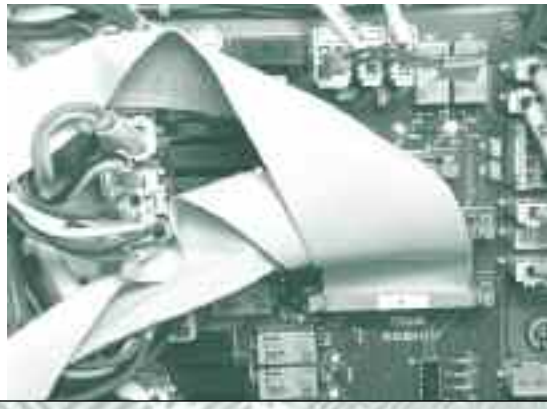
The good news is that S&T now generates substantial benefits in the short term that can help grow and transform every national economy. The best way to demonstrate these benefits, however, is through the commercialization of scientific findings so that knowledge is turned into goods and services that benefit society. Revenues generated through commercialized goods and services can then be used to support S&T activities as part of a virtuous circle that helps advance both science and society.

TARGETS AND PROGRESS

For several decades, beginning with discussions at the UN Conference on Science and Technology for Development held in Vienna in 1979, international organizations have urged developing countries to dedicate at least 1% of their gross domestic product (GDP) to S&T. It is also the goal that the African Union (AU) has encouraged its member states to strive for.

While such targets are welcomed, they are not enough to ensure social and economic progress, especially if countries turn a blind eye to the targets once they have been announced. The critical question is this: regardless of the levels of investment that are made in S&T, how will the knowledge that is created be transformed into products and services that reduce poverty and grow the economy?

That is why I would like to make the following proposal: That all countries, no matter how poor, embark on a broad strategy to commercialize the knowledge that is acquired and generated by their scientists. And, moreover, that they



adopt methodologies capable of assessing the impact that applications of S&T have on the GDP. At least 20% of the growth in GDP that can be attributed to science and technology should be reinvested to advance S&T even further.

If such a national accounting system is to be sustained, it must be managed on an ongoing basis. Developing countries, in fact, must be prepared to continue to support S&T even in years when the GDP is not growing. This can be accomplished by creating an S&T investment fund where an expanding pool of money can be deposited during periods of economic growth and then withdrawn during periods of economic downturn.

The ultimate goal is to ensure a steady stream of funds for S&T during good times and bad. With sufficient foresight and astute management, the ebbs and tides of GDP should not stymie investments in S&T.

ABIDING PRINCIPLES

The policy itself, however, must be based on a number of abiding principles.

All stakeholders, including scientists, must agree that S&T activities should focus on the creation of goods and services that promote economic and social development.

Political leaders must be willing to turn to the scientific community as a source of unbiased information and as an arbiter in helping to determine which policy proposals will actually make a difference in the economic and social well-being of the nation. Scientists, in turn, must be willing to serve in such capacities.

Scientists must be allowed to dedicate a portion of their time on initiatives designed to commercialize their research, including efforts to establish technology parks and incubators. Similarly, scientists and the institutions for which they work must view such an investment of time as valuable for individual researchers and the institutions as a whole.

Intellectual property rights must be safeguarded in the interests of both individual scientists and their institutions. Benefits must flow not only to society, but also to those responsible for their creation.

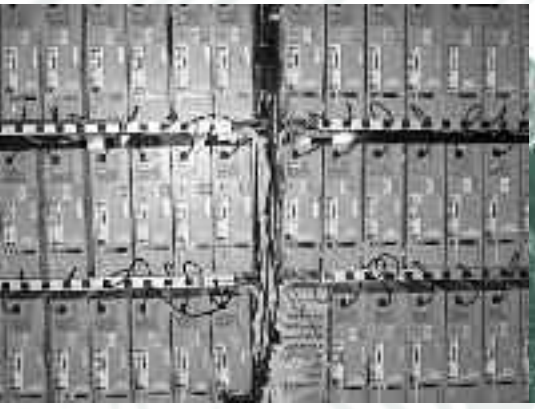
All countries, and particularly countries in the South, must allow their scientists to freely travel to and work in countries where it is easier to apply and commercialize scientific findings. This would help to expand the long-standing principle of scholarly and scientific exchange to collaborative initiatives between academic institutions and com-

mercial enterprises. Equally important, it would provide an important framework for turning knowledge into products and services with market value.

Poor countries need to foster innovation both in science and business. The scientific community can play a critical role in this effort by collaborating with indigenous businesses that are currently serving only local markets but that have the potential to reach customers in both poor and rich countries. Scientists should apply their expertise to help ensure that products and services available in the country meet international standards so that they can be sold abroad.

Countries should take steps to identify and support young students who display talent in business and entrepreneurship. They could do this, for example, by creating "olympiads" in business, innovation and entrepreneurship similar to the "olympiads" that have been created for science and mathematics. Scientists should be willing – indeed eager – to serve as organizers and judges at such events.

Scientists and businesspeople should work together on strategies that promote higher end goods and services as a means of allowing their countries to move up the value chain and become less reliant on low-cost labour and the export of resource-based commodities as the primary engines of their economies. China and India offer excellent examples of how strategic investments in S&T can not only reduce poverty and increase economic opportunities in the short-term, but also provide a pathway for building a knowledge-based economy over the long term.



S&T NOW

The past three decades have witnessed the emergence of a growing number of examples of successful strategies for science-based development in the developing world. An increasing number of countries can serve as models for others.

This success is also visible in terms of a broad range of fields. Information and communication technologies (ICTs) have revolutionized the way that knowledge is communicated, and access to ICTs has helped to place developing countries on a more equal footing when it comes to acquiring information that is the lifeblood of insight and discovery.

The same is true of biotechnology, which is providing opportunities for dramatically increasing crop yields without placing additional pressure on global resources. Biotechnology, in fact, has revolutionized agriculture, producing higher yielding crop varieties that can withstand harsh environmental conditions and enhance nutrition. It also holds great promise for helping to advance medical research and improving public health.

But biotechnology is not without its critics. Those with concerns contend that widespread applications of biotechnology could ultimately render irreversible damage to global biodiversity.

Scientists should play a central role in public debates over biotechnology, offering expert information and insights on the benefits and risks posed by biotechnology

and advice on the regulations that should be enacted to ensure that applications of this technology not only reap immediate benefits for society but are safe for the future well-being of the planet.

Nanotechnology is another scientific frontier that holds great promise for improving social and economic conditions in the developing world.

A number of developing countries – for example, Brazil, China, India, Iran, Morocco and South Africa – are making substantial investments in nanotechnology. Their hope is that this technology, which allows materials to be built at the atomic and molecular level, will help improve water quality, enhance the effectiveness of pharmaceuticals and brighten the prospects for the widespread use of solar energy.

However, like biotechnology, nanotechnology has its critics who contend that insufficient research has been done to assess the potential environmental and health risks posed by microscopic nanoparticles. Again scientists can play a key role in this debate by offering research-based information and insights into the benefits and possible risks posed by nanotechnology.

LONG-TERM SHORT

Many developing countries, including poor developing countries, have developed a degree of scientific capacity – at least in a limited number of scientific sectors – for example, space science in Nigeria, nanotechnology in South Africa and agricultural science in Malaysia. Such capacity, moreover, is bound to grow in the years ahead.

The promise of science, in fact, has never been brighter. Its impacts are no longer on the horizon but are within our reach. The key to grasping the opportunities afforded by these developments lies in efforts to successfully commercialize scientific knowledge.

In this sense, the definition of scientific capacity building in the poorest developing countries must be expanded to include not just knowledge acquistion but notions of innovation, entrepreneurship and marketing. The good news is that there is now a sufficient number of developing countries that have done just that.

By following the example that these countries provide – and adapting it to their own circumstances – there is every reason to believe that all developing countries will be able to embark on a path to science-based sustainable development in the years ahead.

Such trends will not only benefit these countries but also the entire global community where greater economic and social well-being and equity will make for a more peaceful and harmonious world.

In short, it's now time to break down the walls between science and commerce and to start building bridges instead. ■

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