

## FEATURE

# Learn to Earn

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The key to economic prosperity is turning innovation into profits. A growing number of countries in the developing world are showing how this can be done. Their societies are benefitting as a result.

Leaders in Africa and other developing countries face huge challenges in meeting the basic needs of their people and competing in the global economy. Yet, unlike their predecessors, who had to make do with limited technical knowledge, they have a wealth of scientific and technological know-how at their disposal. Innovation is at the centre of economic growth. The challenge, however, is not so much to build from scratch as to use expanding technological opportunities to their advantage. This does not mean that developing countries should avoid investing in basic research and development (R&D), but rather that R&D should be guided by the need to adapt

existing knowledge to local markets.

This was the path followed by Japan, South Korea and Singapore, and the one being followed by emerging economies such as Brazil, China, India, Malaysia and Thailand. Developing countries seeking to emulate them should note that these countries' rapid economic transformation has depended in each case on several key factors: building basic infrastructure, investing in higher education, encouraging private enterprise and tapping the global market.

The priority is infrastructure. No country will progress far without public utilities such as power, telecommunications, water, sanitation,

irrigation and waste disposal, without social infrastructure such as schools, housing and hospitals, without transport networks such as roads, railways, ports, waterways and airports, and without laboratories and other research facilities.

All these are complex to build and organize, and require considerable understanding and cooperation among engineers, managers, government officials and others. Those designing infrastructure projects should ensure that the people involved are trained to handle such complexity. At the same time, governments need to make certain that universities and research

institutes are adequately equipped to provide the necessary skills and qualifications, in particular in engineering and materials science.

Higher technical education is increasingly recognized as critical to development, especially with the growing awareness of the role that science, technology and innovation (STI) play in economic growth. International donors have focused on primary and secondary education for decades, but have only recently viewed higher education and research as essential. The impact of AIDS and other infectious diseases on Africa's labour force has made the training of skilled technicians even more pressing, along with the need to make higher technical education more accessible to women.

#### DEVELOPMENT HUBS

As well as providing training and expertise, universities and research institutions are well placed to aid development through their involvement with local business, industry and society.

There are several things universities and institutions in developing countries can do to make the most of their potential as development 'hubs'.

First, they can focus some of their technical training on specific development needs. For example, Ghana's University of Development Studies offers training aimed at improving the welfare of the community in which it is located. The African Rural University for Women in Uganda, the first of its kind in Africa, uses a similar approach.

Second, they can concentrate on building entrepreneurial skills among students to help them develop the capacity to transform ideas into business proposals, and actual products and services. For example, students at the Pontifical University of Rio de Janeiro are encouraged to

create their own business and social enterprises. Other Brazilian universities are following its lead.

Third, they can integrate into their local communities and help to promote local economic transformation. Most of the universities that exist in developing countries were originally designed to support nation building. The challenge today is community development.

The aim of this new species of university should be to produce entrepreneurial graduates who are likely to generate jobs in their communities while adding to the growth of the economy. This would be a departure from the present system, which focuses on providing technical skills to people who fill jobs rather than create them. All this will require those who regulate higher education to be proactive and flexible.

One of the biggest challenges will be to bring research, teaching and community outreach closer together, for example, by integrating medical schools into hospitals, giving agricultural research stations a strong teaching role, and forging strong links between universities and the business community. Strengthening such connections works both ways: the community benefits from the university's expertise, and students benefit by being able to try out their skills in real-life situations, which is critical in rapidly changing technological fields.

Building links between higher education and local communities is key to another foundation of development: the nurturing of small and medium-sized private enterprises (SMEs). These can contribute significantly to poverty reduction, and sustainable social and economic growth. Economic change is largely about transforming knowledge and innovation into goods and services through business. This is the most important challenge facing developing countries.

#### ROLE OF OTHERS

To encourage the commercialization of innovation, governments need to offer suitable incentives. They can do this by using simple measures such as tax rebates, low-interest loans and public-procurement programmes, in which governments and public bodies buy the services offered by local enterprise. For example, Kenya could spur innovation in health by purchasing insecticides made locally from the plant pyrethrum for use in malaria control; currently, the country exports the bulk of the insecticide it produces and then imports drugs for treating malaria. Government officials should also do all they can to support new business and technology incubators, establish special economic zones to stimulate the export market, and help technology entrepreneurs to sharpen their business skills.

Banks and financial institutions need to play their part. For example, governments could encourage banks to provide venture capital for the commercialization of new technologies. Financial markets have played a critical role in creating SMEs in developed countries. Venture capitalists do not just bring money to the table, but can also help to groom business start-ups into multinational institutions. In this way, venture capital can play an important role in a country's social and economic development.

Once a country has begun translating knowledge into enterprise and is producing goods, the next step is to find an international market for its products. Developing countries, particularly in Africa, have had little success in bringing innovation to the global marketplace. The reason is the high tariffs imposed by importing countries on processed products. For example, while the UK tariff in 2004 on raw cocoa beans was 3%, the tariff on finished chocolate bars was 16%. This is a major disincentive for countries like Ghana that would like to invest in technology for chocolate production. High tariffs discourage developing countries from investing in innovation.

The globalization of technology happens in three ways. The first is when a company sells locally produced goods abroad, exploiting a gap in foreign markets for certain innovative products such as computers and other electronic equipment. The second is when a company — usually a multinational corporation — manufactures a technology in several countries at once, as with automobiles. The third is through collaboration. This typically occurs when two companies, often in different countries, establish joint ventures or agree to develop technical knowledge and goods together while maintaining their respective ownership. In recent years, collaboration has become an increasingly important method of reaching global markets.

Moving from a local to a global market can be a step too far for many developing countries. One solution is regional economic communities. In Africa, for example, bodies such as the Common Market for Eastern and Southern Africa (COMESA) could play a key role. This 20-member free-trade area was launched in 2000, and includes approximately 400 million people



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with a combined gross domestic product (GDP) of about \$300 billion. The idea is to improve economic integration and business growth among member countries by reducing tariffs, encouraging investment, improving infrastructure and standardizing customs procedures. COMESA will launch a 'customs union' on 31 December 2008. The East Africa Community, comprising Burundi, Kenya, Rwanda, Tanzania and Uganda, holds similar promise with its market of 120 million people and a combined GDP of \$42 billion.

Once a country has established an infrastructure and a higher education system that is in touch with local communities, and has a flourishing private sector that is tapping into regional or international markets, it has the tools in place for long-term economic growth. There are plenty of success stories. Finland became a leader in the mobile-phone industry by taking this route. China is following a similar strategy in the telecommunications industry. Countries such as Mexico that have not invested in these areas have seen their industries stagnate or even decline.

One concern often raised by those investing in the technical capacity of developing countries is the migration of skilled workers to industrialized nations. The World Bank has estimated that although skilled workers account for just 4% of the sub-Saharan labour force, they represent 40% of its migrants. Many studies have looked at how best to curb this brain drain. Yet they miss the point. It is far more useful to figure out how best to tap the expertise of those who join the diaspora, rather than to engage in futile efforts to reverse migration.

The challenge is to find ways in which expatriates can contribute to the economies of their country of origin. A number of countries are experimenting with different ideas, often with considerable success. The most notable example is Taiwan, which has a diaspora that played a crucial role in developing the Taiwanese electronics industry after the government actively built links with Taiwanese engineers and investors in the USA. Meanwhile, the Swiss government has converted part of its consulate in Cambridge, near Boston, Massachusetts, into a focal point for interactions between Swiss experts in the USA and their counterparts at home. The Swiss House was created with the knowledge that it would be well placed to tap into what is possibly the world's most important region for life sciences and biotechnology. In addition to Harvard University and the Massachusetts Institute of Technology, the Boston area is home to more than 50 other colleges and universities and a cluster of biotechnology ventures.

Similarly, the National University of Singapore has established a college at the University of Pennsylvania in Philadelphia to focus on biotechnology and entrepreneurship, and the Singapore-Philadelphia Innovators' Network (SPIN) serves as a channel linking entrepreneurs, investors and advisers in the Greater Philadelphia region with those in Singapore. India is trying other methods to increase the contribution of



its diaspora to national development, including allowing Indians working in countries of strategic interest to have dual citizenship.

One reason that most developing nations are not effectively tapping into the expertise of their expatriates is because their universities and research institutes remain digitally isolated from the rest of the world. African universities the size of, say, Manchester Metropolitan University have the Internet capacity of a single UK household. This is equivalent to 30,000 people trying to use a single connection. Bandwidth can be exorbitantly expensive, and services are often unreliable. The result is that faculty and students rarely have access to the latest knowledge, and universities cannot form effective partnerships with academics and institutions in other countries. High-speed access to the Internet — at a minimum of 1 gigabyte per second — would serve as a lifeline for universities and help to drive a country's economic renewal. It should be afforded the same priority as other critical infrastructure services such as roads, electricity and water supplies.

**GOVERNMENT RULES**

One of the key lessons with economic development is that governments must take the lead. It is crucial that the governments of developing countries play an active role in all areas of development. Rather than being merely a provider of services, the state needs to be an enabler and promoter of business development. Developing countries should become entrepreneurial states, the main function of which is the promotion of human welfare through private enterprise.

To achieve this, STI must be integrated into policy-making at all levels and in all areas of government. This will require more than just political commitment: it will take leadership from

heads of state, who must ensure that advice on STI is routinely included in policy-making. They might need to rethink the way in which their governments are organised. The structure of many developing-country governments is merely a continuation of the colonial model, designed to make it easier to control local populations rather than promote economic transformation.

Whatever model they choose, the provision of advice on science and technology at all levels should be written into the government's mandate, and the office responsible for giving the advice should have its own operating budget and access to credible scientific information from government, national academies and international networks. Civil servants must also be provided with training to help them integrate scientific and technological information into decision-making.

Developing countries face major challenges, from providing for the basic needs of their citizens to improving their system of governance and participating in the global economy. Yet, the rapid advances taking place in STI present them with unprecedented opportunities. Low-cost, high-technology solutions now exist for many problems.

How well they harness the available knowledge and turn it to economic use will depend largely on their success at building physical infrastructure, reforming higher technical education, stimulating business and participating in international trade. Crucially, leaders in government, industry, academia and civil society will have to be adaptive and flexible, and able to learn at every step of the way. ■

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