Innovate or perish – who cares about tomorrow?

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Investment in research and development (R&D), science and technology can stimulate sustainable and longer-term economic growth of a country – be it an advanced country or a developing country. Technological development arising from R&D activities plays a critical role in increasing the productive capacity of an economy.

The traditional factors such as land, labour and financial capital are still contributing to economic growth of a country. However, productivity or efficiency with which resources are used in production is the result of continuing research – technological, non-technological and organisational. Knowledge creation and its diffusion have become important drivers of innovation, economic growth and social wellbeing in a modern society. This necessitates a reasonable level of investment in R&D, science and technology.

R&D is money turned into knowledge and innovation is knowledge turned into money. Who does not want to make money? Today's advanced economy is knowledge-based where technological innovation is considered to be a critical determinant of economic prosperity and a solution to many challenges facing a nation – climate change, population growth, ageing, health and the way government services are provided to the citizens. Bangladesh is no exception to this if it wants to progress into being a middle-income country in the foreseeable future.

Although technological innovation occurs primarily in large corporations in developed economies, a significant amount of innovation is generated by small and medium-sized enterprises (SMEs), particularly in the high-tech sector such as biomedical, information technology, telecommunications, pharmaceuticals, biotechnology and nanotechnology. However, there are enormous opportunities for private companies and public sector research institutions in developing countries like Bangladesh to contribute to technological innovations. As it currently stands, the research infrastructure in Bangladesh is fragile and fragmented and does not appear to be capable of responding to big challenges confronting the nation.

Investment in science and technology education and research and development (R&D) ultimately improves the quality of human resources that lie at the core of all economic and social activities. Scientific research results in new inventions which have commercial value in that the research results could be translated into new products, processes, devices and services for sale in the marketplace. This provides opportunities for creation of next generation of industries. Any new innovative activity has the potential to generate positive spillover effects into other activities including employment generation and income earning activities.

Technological superiority of the West

As mentioned above, education and scientific research is a key to longer-term and sustainable economic growth and prosperity of a country. This is obvious if we look at the current economic status of the advanced countries such as the United States, Canada, European countries, Australia and Japan. This is also becoming evident with the rising nations including China, India and Brazil where significant investments are being made to generate new knowledge and technologies to drive economic growth on a sustainable path. There is a causal relationship between high levels of education, technology development and economic prosperity. Education and training increases skills and functional knowledge of the workforce which, in turn, improves productivity and increase standard of living of people in a society.

The old adage "knowledge is power" is universally true and is not bound by time or borders. The dominance of Western countries in world affairs is mainly because of their superior scientific knowledge and technology achieved through scientific research and

development. This has helped them to develop technologies required for elaborately transformed manufactures and high-value products for domestic consumption and export sales. Increased productivity in any sectors of the economy – agriculture, manufacturing or services – emanates from the application of new or improved technology and high skills of workers.

The superior military power of many Western countries is also due to the results of their large investments in science, R&D, engineering and technology.

Government's role

It is recognised that the science and technology infrastructure in a developing country like Bangladesh is deficient and is of poor quality, and has not advanced much compared to a developed country. For obvious reasons, Bangladesh is dependent on overseas technology for its educational and development needs, including the development of physical infrastructures. Any remarkable scientific and technological inventions are rare in the country, and no benign environment has ever been created to promote and support scientific and technological breakthroughs.

The government has a role to play in establishing and supporting an appropriate educational, research and business environment conducive to technological innovations and this is needed if the country wants to successfully compete in an open and global economy now and also into the future. It is not always a good thing to be considered a least developed country to receive preferential treatment in exporting goods to some advanced economies.

While it is the private sector, especially the big companies, which should invest more in R&D, the government should play a catalyst role by setting up the right infrastructure through encouraging science and technology education and training geared to the business and development needs. To conduct research and development, companies need skilled scientists, engineers and technicians and other support services such as adequate and uninterrupted supply of utility services.

I think what needs to be done by the government is to take stock of the current state of affairs relating to science and technology education and the industry needs in the context of development goals and targets of Bangladesh. Piecemeal and ad hoc approach to science and technology education will be of little use unless a comprehensive science infrastructure, including science education and research, is developed and nurtured by the government in right earnest.

The government should encourage the private sector, especially the large companies and corporations, to invest in scientific research and development for longer-tern business gains. Companies should also understand that some level of local R&D capabilities is good for indigenous technology development and growth of new business. This will contribute to increased productivity, competitiveness and profitability for companies in the long run.

Collaborative research between private companies and the public sector research organisations such as universities can be beneficial to the business sector of the country. Dependence on cheap labour may not be enough for the development and growth of new industries, especially the export industries, and this dependence may ultimately erode export and import competitiveness. Some local businesses can go bust because of cheap imports from other countries such as China and India which have greater labour and multi-factor productivity in production and can export a variety of goods at a price cheaper than the domestic price of a similar product.

The challenge is for the government to create an environment in which opportunities for technological innovations arise within the country by developing a stronger education and research infrastructure, and other necessary facilities. This can be done through an appropriate consultative process involving all sections of people in the country - students, teachers, the science community, researchers, businesses and corporations. A creative culture cannot be developed without any national agenda for the improvement of science

and technology education and R&D in the country and without credible political commitment for its implementation.

Areas of government intervention

The Bangladesh government has established a number of science and technology universities in the country over the last two decades. This has expanded the capacity of science education at higher level. However, I believe all levels of education should provide due attention to science and technology education if the country wants to achieve real outcomes from its education investment.

Primary and secondary education should receive appropriate attention from policy makers in relation to science and technology learning. Emphasis should be placed on both theoretical and practical aspects of science education so that students remain enthusiastic about their learning and feel committed to pursuing science at later stages of their academic life.

To strengthen the practical aspect of science education, more investments need to be made by the government in establishing, operating and maintaining science laboratories in public sector educational institutions, especially at secondary school and college levels. Such investment is needed in the private educational institutions as well. This investment should include, among other things, the procurement of advanced scientific instruments, equipment and other materials for scientific experimentation by students and teachers.

Teacher training and availability of science books at advanced level in Bangla are also critical to spreading, improving and strengthening science education in the country. Integration of science with engineering is also necessary which will facilitate developing new products, services and processes, and also for improving existing products and processes.

Science prizes for teachers at all levels of education for their outstanding achievements in respective fields can act as an incentive to attract talented science graduates to teaching. Achievements should include research undertaken by teachers, especially at tertiary education level.

While information technology has received some patronage from the government in recent years in terms of financial and other support, basic and applied science education still largely remains ignored I suspect. Of late, we have seen mushrooming of private universities in Bangladesh, most of which offer information technology (IT) and business management, finance and accounting courses and do not generally provide science and technology education.

The relative absence of science education in the private universities is very conspicuous. Is it because the demand for science education is low compared to IT and business management? Or is it because the costs of procuring necessary scientific equipment and materials and establishing laboratories are prohibitively high, and there is a shortage of qualified science teachers in the country?

Another issue is that science and technology education at higher levels need to be linked with practical application otherwise it would be a wasteful investment in terms of time, money and energy of students in particular and the society in general. This presupposes improvements in higher education to be linked with economic opportunities so that knowledge and skills gained through education can be applied to practical purposes while pursuing career paths by graduates.

Trading and commerce sectors of the economy employ sizable number of unemployed people. However, it is the productive sectors in agriculture, manufacturing or services that can create more jobs for the vast pool of the unemployed in the country. It is already clear that applied scientific and technological research has the potential to create new knowledge and ideas that can translate into new products, processes and services. And this can create new businesses and jobs in the economy, with potential for improved standard of living.

A key point I would like to emphasise is that persistent and perpetual dependence on industrial technologies developed in other countries bears a risk in that it does not help develop local technologies. This situation has a negative impact on the utilisation of local talent which is simply wasted.

Incentive for local technology development

A viable and practical public-private partnership is a prerequisite for development of science and technology and business innovation in any country. Creating links between knowledge generation done through research and commercialisation of research results (e.g., development of new products or business enterprises) are what the country needs and this should be facilitated by the government.

If Bangladesh wants to promote the development of local technology, then the government needs to establish an appropriate incentive structure which could range from tax benefits to grants programmes for research and development and commercialisation of research outcomes by the private sector companies. Inventors and innovators in the country need to be rewarded someway or other in order to create an innovation culture in education and business enterprises in particular and the society in general.

The use of technology by small and medium enterprises should also be supported through some incentive mechanism with a view to encouraging business development and improvement that will have a positive impact on employment generation, production and social development in the country.

In any case, if Bangladesh wants to catch up with some of its neighbours such as India in science and technology education and R&D, it must invest more in this field to achieve sustainable economic growth, improve export competitiveness, fight diseases and repair environmental damages, to name a few problems.

Is the country ready for short-term pains for long-term gains? Or should we subscribe to the famous Persian poet Ferdousi saying, "O Saqi, give my wine today, who cares about what will happen tomorrow?"

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