

Technological Skills to Win the World

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Technology is the key for socio-economic development

Technology can be regarded as the key for economic development of a country. Successive technologies and innovations in the past have contributed towards the development of underdeveloped countries. The fourth technological revolution in the platform of technology will be characterized by many forms of technology or multidisciplinary through the entry of digital, physical and biological technologies. Only countries which have prepared themselves to infuse this new technology and take advantage of this technological revolution will be able to rise above the rest.

Technology at present, is a vital element in globalization and competitiveness. It has brought wealth to nations, companies and individuals and studies of varied subjects show that there is a positive correlation between technological advancement and economic growth. According to Robert Solow, the technological

change accounted for about 2/3rd of growth of the U.S. economy. Three pillars out of 12 in the preparation of the 'Global Competitiveness Index Report' published by the World Economic Forum are higher education and training, technological readiness and innovation. This indicates the significance of technological skills, innovation, and technological sophistication to enable a country to emerge as a globally competitive nation.

One of the key strategies in the national development agendas of emerging economies (BRICM countries) and newly industrialized countries such as Malaysia, Thailand and Indonesia was to enhance technological capacity and sophistication by means of importing foreign technology, reverse-engineering, transfer of cross border technology, technology licensing, backward linkages with foreign companies and foreign direct investment (among others) *etc.* Eventually, they have been able to win the global market by introducing competitive products to it, thereby contributing significantly to GDP through high tech exports. However, a country

cannot continue to depend on foreign technology alone. A nation that invests more on scientific and technological research will tend to develop faster than countries that depend on accumulating more capital but investing less on Research & Development and development of technology. Inventions and innovations have also significantly contributed for rapid economic growth in a given country. This is clearly evident from fig.01 which shows how China's patent profile with its exponential or rapid growth through the year 2015 had overtaken the USA and Japan.

Challenges for developing economies to retrace a rapid economic growth

New technological developments such as computer modeling and simulation or imitations, have speeded up understanding of science and the process of research and development. Accordingly, the time interval between the conception of an idea and its transformation to a marketable product as well as recognition as a scientific discovery to commercial application, is decreasing. Modern ICT has also facilitated the retrieval of new knowledge and its

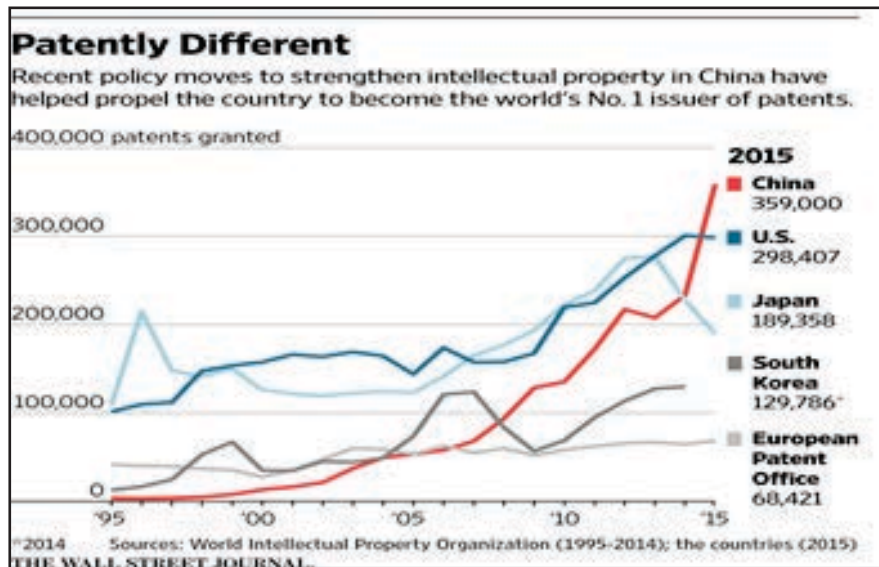


Fig.01 : Patent profile of some of the leading economies

dissemination. Hence, imparting the workforce with knowledge and skills on computer modeling and simulation through ICT and other emerging technologies, will enable them to tap the rapidly growing global knowledge or global talent pool and thereby be part of the global value chain to gain benefits for the country. When analyzing global trends in trade, it can be clearly seen that production and introduction of medium to high technologically manufactured exports have been increasing over the past few years. Hence, if a country continues to export primary commodities, it will lose the competitiveness as well as global market opportunities eventually. Therefore, enhancing technological capability and skills supported by more investment in Research & Development to manufacture and export high technology goods is an absolute necessity. Implementation of international trade agreements such as GATT (General Agreement on Tariffs and Trade), level of tariff and non-tariff barriers have failed in many countries. Developing

countries have liberalized their trade policies particularly to attract highly skilled labour from around the world in selected disciplines. This indicates magnitude of importance of technological skills for a nation to become globally competitive. Sometimes, such international trade agreements tend to bring a competitive pressure even to the domestic markets. Therefore, the challenge for the developing countries is to formulate appropriate strategies to regulate the level of openness to global competition at the same time while nurturing their own skills and development towards production of globally competitive products/services.

Re-determining national policies on educating and skill development of youth

It is instructive for the workforce to acquire and upgrade their technological skills not only to contribute to the knowledge economy but also to enable them to grasp emerging economic opportunities in the global market.

Transformation of the labour force into a skilled workforce should not be a static or slow process, it should also be highly adaptable, flexible and responsive to the global needs and the changing environment. Skill development takes place through informal and formal mechanisms. Carrying out a systematic analysis is worthwhile to determine whether the existing skill development schemes are adequate to face global challenges effectively or whether revisions are needed to cater to national and global needs. Accordingly, a national level skills development initiative will be required to upgrade skills to be on par with international standards and to be responsive to the demand of innovation.

Education leading to creation of knowledge is as important as application and technological skill-development

Technology and innovation driven development is not just the creation and use of new knowledge. It also requires quality of education, training, technological skill-development, networking with institutions, intellectual property protection, learning of new technology of foreign countries and public-private partnerships in order to show people's knowledge. For example, the Republic of Korea invests mostly in Research & Development as well as in higher education. It is interesting to see the case of Singapore on how it leapfrogged from a cheap unskilled labour market to a leading knowledge based economy. Singapore attracted foreign investment by investing heavily on secondary and technical tertiary education,

thereby upgrading technological skills of the workforce to remain competitive. Malaysia and Thailand being newly industrialized countries have invested more on Research & Development as well as on education, particularly in tertiary education. It is important to think not only on Research & Development and creation of new knowledge, but also it is necessary to have strategies and negotiation skills, adaptation and assimilation of new knowledge which prompts the necessity to have a human resource base with relevant technological skills. Even adaptation of technology to suit local conditions needs personnel with relevant skills.

Research and Development leading to inventions and innovation however, is not a simple process. It needs a range of skills which include, technology assessment, negotiation skills, economics, technopreneurship, intellectual property considerations, social science, law, fiscal measure such as duty payment and taxation and more importantly deployment of personnel with Research, Development and right qualifications and experience and skills at the right time.

Another example of harnessing technological skills to win the world is Taiwan. Taiwan had a strong industrial and trade policy in which they promoted import substitution within the country through tariff and non-tariff barriers. Taiwan's technology and industry strategy was so robust that enabled the country to attract expatriates working in high-tech industries around the world. This deployment of persons with right skills enabled

Taiwan to transform itself from an electronic assembling country to a chip manufacturing country and become its own brand player in the global market.

India was globally recognized for its engineering talents which generated highly skilled software engineers. India has been able to attract globally renowned multinational companies (MNC) to establish MNCs supported with advanced Research & Development centers, demonstrating the availability of high level human capital within the country.

China's technology and trade strategy was directed at promoting FDI, while leveraging its own innovations with enhanced investment in Research & Development. China has also invested in human capital like Japan and Korea. Therefore, the secret behind China's super-power success in innovation driven economic development was the human capital factor with right technological skills.

NSF Technology Grant Scheme and Technology Innovation Support Center (TISC) foster technological skills and capacity

The Prime objective of the NSF Technology Grant Scheme "Support for Technology Development (Tech-D)" is to foster Research & Development findings, commercialization, technology development and for technology driven innovation for technological competitiveness towards socio-economic advantage of the country. It provides financial support for researchers and inventors to take their research outputs/inventions which have commercial

potential beyond laboratory levels to marketable level. This grant scheme is open for state sector organizations such as Universities and Research & Development institutions, non-state sector (industry) and individual researchers and inventors. It also promotes harnessing of our technology as import substitutes, reverse-engineering, technology adaptation and technology transfer. The researchers and inventors are always encouraged to carry out their technology development projects in collaboration with the relevant industry to ensure synergy. This grant scheme not only facilitates enhancement of technological skills of different individuals in the innovation ecosystem, but also it upgrades innovative capacity of institutions and industry. More information on the grant scheme is available on www.nsf.ac.lk/index.php/researchers-a-academics/tech-d-grants/212.html.

In the context of knowledge economy, Value of Intellectual Property (IP) has seen an increase. Therefore, building knowledge and skills on acquisition of IP followed by commercial exploitation, are necessary and timely. The TISC Center of the NSF provides guidance for researchers, inventors and technology developers on patent information search, patenting process, patent drafting, patent filing, and even applying for patents under Patent Cooperation Treaty (PCT). They can also seek and acquire knowledge on preparing non-disclosure agreements, technology licensing agreements as well as conducting technology transfer/licensing negotiations. The services provided by the TISC Center enable researchers and inventors

facing challenges in protecting and commercializing their own IP to be served effectively.

Success story of NSF NSF Technology Grant Output delivers Value Added Healthcare Services with “e-Health KIOSKS”: Benefits for patients with Modern ICT

Health information systems and healthcare practices in Sri Lanka largely rely on paper work and manual procedures that are often complicated and time consuming. At present, regardless of government or private healthcare, patients have to visit hospitals and stay long hours in queues to obtain a channel number and consult a doctor. This is a very inconvenient practice and has led to frustration among patients. Besides, especially during peak hours, it is difficult for the hospital staff to ensure quality healthcare-delivery as they have to attend to the needs of patients individually. Administrative costs of hospitals are also high because of the heavy dependency of documentation and time consuming process in the existing healthcare practice. Therefore, many enterprising institutions are focusing attention on developing e-Health devices (i.e. self-service kiosks) as a solution to these problems. East Link Engineering Company (Pvt) Ltd with financial support under the Technology Grant Scheme of the National Science Foundation (NSF) has invented an e-Health solution titled “e-Health KIOSK” to address such problems in Sri Lankan healthcare industry.

“e-Health KIOSK” automates routine activities of Sri Lankan healthcare sector covering patient-check-in, consultations with



Fig.02 : e-Health KIOSK developed with NSF financial support

doctors and the completion of prescriptions at hospitals. It is an interactive self-service system designed for public use for delivery of information on channeling services, OPD services, clinic services, specialist care services, visits of doctors, consultation hours, channeling charges et al without having to wait in hospital queues for registration and the like. This tool thus improves the quality of healthcare services and bring satisfaction to patients. Facilities of this device is also extended to a level where a patient can make payments for channeling services, payments to the pharmacy or obtain test reports through an e-Health KIOSK. In addition to the services to patients, e-Health

KIOSK also provides a series of benefits to hospitals by way of reduction of administrative costs and paper work, saving valuable hours of the day of the working staff, a better management of patient-queues, enhancing communication efficiency, quality of care, improving data quality and safety as well as establishment of consistency of healthcare service, progress and effective management decision-making.

As a result of its special benefits, there had been a great demand of the e-Health device from both government and private hospitals. Two e-Health KIOSK machines, developed by the East Link Engineering Company (Pvt) Limited with financial support of the NSF are deployed at the Nawaloka Hospitals PLC and the Colombo National Hospital.

Ensuring equity and sustainability Disruptive technological changes have macroeconomic impacts on productivity, growth as well as on inequality, human health and safety of the environment. Such situations have occurred in some of the emerging economies. Therefore, it is vital to be cautious when formulating development agendas in order to ensure that innovation driven development is economically sound, socially responsible and environment friendly.



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