

## Why do least developed countries in Asia not benefit more from transfers of technology?

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Technological progress is a critical factor driving economic development and inclusive growth.<sup>1</sup> Together with capital accumulation and an increase in labour, it boosts national productive capacities by increasing total factor productivity, drives structural changes and increases competitiveness.<sup>2</sup> For Asia's least developed countries (LDCs) in particular, technological progress is vital to ensure economic growth, poverty reduction and inclusive development.

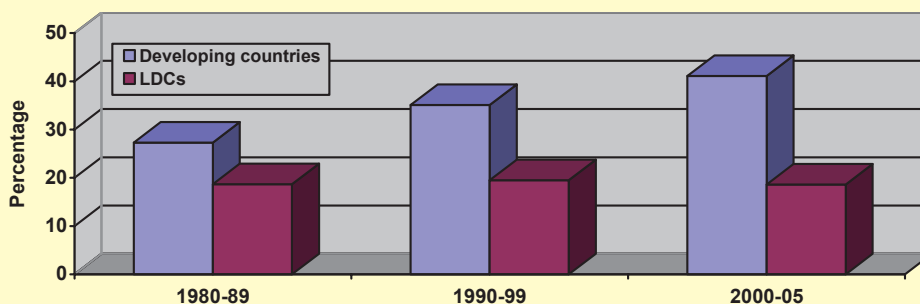
The key to technological progress in Asia's LDCs is technological catch-up, and since these countries have little capacity to develop technology on their own, such catch-up requires access to the international knowledge pool. This process includes transfer of technology (TT). The importance of TT can be illustrated by the success of the Republic of Korea and Taiwan, Province of China in developing their technological base. In their early phase of development, they mostly acquired technologies from abroad. Now, having successfully assimilated foreign technology, they are not only among the most advanced economies in the developing world, but are also major world suppliers of high-technology goods

such as cars, machinery and electronic household goods.<sup>3</sup>

In assessing why LDCs in Asia do not always benefit from TT, this paper focuses on three channels of TT: (a) foreign direct investment (FDI); (b) imports of machinery and other capital goods; and (c) exports of manufactured goods. These are the most important channels of TT for developing countries, as they involve continuous interaction between the acquirer and the supplier of technology. Indeed, tacit knowledge is a component of virtually all technologies, but is very difficult to transmit between different agents unless there is sustained contact with the supplier of technology.<sup>4</sup>

The hierarchy of the three channels mentioned cannot be established precisely, since their respective importance varies depending on a country's stage of development and its ability to take advantage of TT opportunities. In addition, the success of TT through these channels depends to a large extent on trade and investment policies, especially in more open economies.

**Figure 1. Capital goods imports increased in developing countries but stayed flat in least developed countries (as a percentage of total merchandise imports)**



Source: United Nations Conference on Trade and Development, 2007.

<sup>1</sup> For a review of inclusive growth see, for example, I. Ali and J. Zhuang, 2007.

<sup>2</sup> Asia's least developed countries are Afghanistan, Bangladesh, Bhutan, Cambodia, the Lao People's Democratic Republic, Myanmar, Nepal, Solomon Islands and Timor-Leste.

<sup>3</sup> See also, for example, S. Yusuf, 2003.

<sup>4</sup> United Nations Conference on Trade and Development, 2007.

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## Role of foreign direct investment

As trade and investment regulations are progressively liberalized, more companies are internationalizing their production by out-sourcing overseas as well as regionally diversifying sources of supply and building regional production networks. In Asian developing countries as a whole, policy changes towards trade and investment liberalization have been enacted since the 1980s, and FDI penetration has grown substantially since the 1990s. However, the rate of FDI penetration varies significantly between developing countries and LDCs in the region. Asian LDCs still lag behind other Asian developing countries in formulating policies to attract FDI, such as the development of infrastructure, and fiscal and other incentives. By contrast, South-East Asian countries such as China, Indonesia, Malaysia and Thailand, have been utilizing incoming FDI not only in export-oriented industries, but also in some import-substituting industries.<sup>5</sup>

However, in general, there is little evidence that FDI significantly contributes to TT to these countries. This is mainly due to the following factors. First, there is a lack of integration of FDI induced by Transnational Corporations (TNCs) into host economies. This is especially true for TNCs in the mineral extraction sector, which is highly concentrated geographically and uses a high import content. Most operations in that sector are wholly owned by foreigners rather than through joint ventures with local firms. They tend to operate as enclaves, with few forward and backward linkages with host economies. With this type of operation, important TT channels from TNCs to domestic firms, such as production linkages through subcontracting, joint ventures and labour turnover, are largely absent.

In contrast, FDI in the manufacturing sector has potentially greater TT effects, since that industry is not geographically concentrated, and is relatively more labour-intensive (which means that more people learn new technologies on-the-job than in capital-intensive industries, which employ less people). In addition, it is easier for foreign firms to establish subcontracting links with domestic firms in manufacturing than in the mineral extraction sector. Thus, FDI will contribute more or less to TT depending on the sector to which it goes.

Second, the priorities of the host countries in enacting policies regarding TT from TNCs to domestic firms differ widely. The governments of only a few countries, mainly in South-East Asia (such as Indonesia and Thailand), have been very active in encouraging production links through subcontracting arrangements between TNCs and domestic firms, mainly in automotive, electronics and machinery industries. However, in Asian LDCs, subcontracting practices between TNCs and domestic firms are still rare.<sup>6</sup>

Third, FDI is likely to have a positive impact on local firms through TT only when the local firms have enough absorptive capacity, i.e., they must have human resources with adequate skills and basic technical knowledge. Without these factors, technological transfers usually fail to materialize and TNCs can crowd out domestic firms where the technological gap is too wide to bridge.

<sup>5</sup> F. Kimura, 2006.

<sup>6</sup> T. Tambunan, 2007 and 2008.

## Role of imported capital goods

Firms believe that the most important source of technological progress in developing countries by far is new machinery and equipment, according to an extensive survey conducted in 2007 for the United Nations Conference on Trade and Development. Most of the machinery and equipment operated in developing countries, including LDCs, is imported, since such countries have very little capital and intermediate goods manufacturing capacity.

In Asia, the share of capital goods imports, measured by the ratio of total capital goods imports to total merchandise imports, varies significantly between developing countries and LDCs. The former group of countries (which includes China, India, Indonesia, Malaysia and Thailand) import more capital goods than Asia's LDCs. This difference is explained by the fact that Asian developing countries are more liberal in their trade while their level of industrialization is higher than that in the LDCs. In addition, as shown in figure 1, the gap between developing countries and LDCs is increasing because the share of imports of capital goods in merchandise imports of LDCs has stayed flat during the 25-year period from 1980 to 2005.

## Role of exports of technology-intensive goods

The possibilities available to firms in Asian LDCs for upgrading their technological capabilities through exports of technology-intensive goods or other high value-added goods (for which modern technologies are required) depend on the linkages that they develop with their downstream foreign customers in developed countries as well as on the technological effort that they make to learn through those linkages. This is especially true given the changes in international production systems, distribution channels and financial markets, accelerated by the globalization of product markets and the spread of information technologies.

Global value chains are increasingly present in many Asian countries as a result of trade and investment liberalization. They often represent one of very few options, or perhaps the only option, for local firms and suppliers to secure access to larger (international) markets and to innovative technologies. However, whether TT to firms in LDCs is likely to result from the relationships with foreign buyers depends on a number of circumstances that may or may not arise. Indeed, buyers and chain leaders are becoming increasingly demanding, but they do not necessarily provide support or transfer of knowledge.

While many developing countries have increased their specialization in some value chains since the mid-1990s, they have not managed to significantly upgrade their specialization within those chains. In quantitative terms, downgrading has been more prevalent than upgrading. In almost all cases, developing countries have increased their specialization in relatively basic products at a low stage of processing. These export patterns indicate that little technological upgrading has taken place,

especially among LDC firms, irrespective of their participation in global value chains.

Among the Asian and Pacific developing economies, or even within the developing world, only the Republic of Korea, Singapore, Hong Kong, China and Taiwan, Province of China are known for their success in upgrading their domestic technology thanks to their exports. For example, the Republic of Korea's economic ascent in the post Korean war period was driven by export-oriented manufacturing industries, mainly provided by large firms. In the 1960s and 1970s, active export promotion by the Government allowed the country to aggressively participate in the world market, thus stimulating rapid economic growth and full integration into the world trading system. This, together with other efforts to obtain advanced technologies from abroad (e.g., technical licensing agreements, subcontracting or joint ventures with FDI-based firms, imports of capital goods, education and training abroad), has made the Republic of Korea a major world supplier of advanced technology.<sup>7</sup>

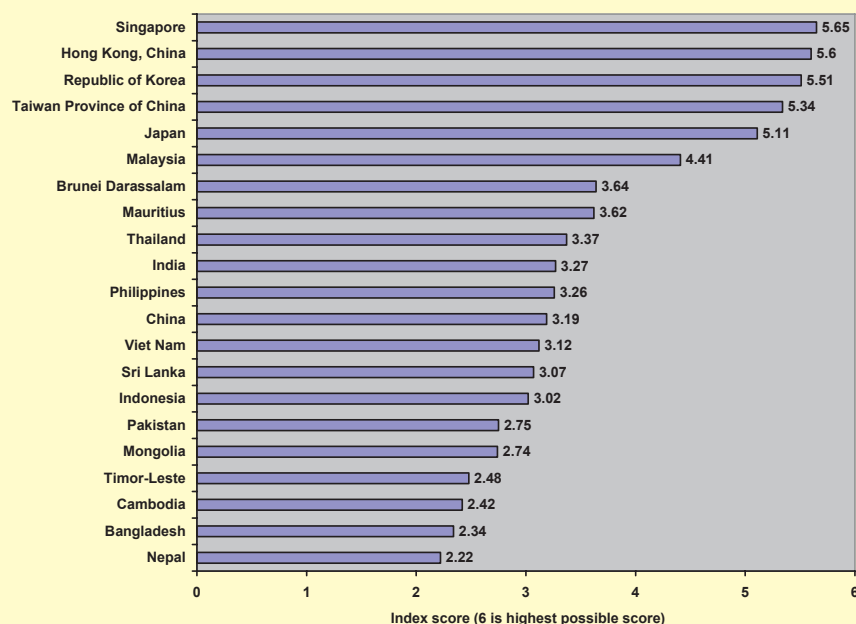
These economies' successes in absorbing foreign technologies are also reflected in the Global Competitiveness Report 2008-2009, published by the World Economic Forum. According to the report, there are 12 pillars of economic competitiveness, including technological readiness. The index of technological readiness is constructed based on the availability of the latest technologies, firm-level technology absorption and the role of FDI in technology transfer. The report shows that within the surveyed Asian and Pacific countries, LDCs scored much lower than developing countries (figure 2).

## Policy recommendations for Asian least developed countries

The intensification of FDI, capital goods imports and exports will not by themselves guarantee effective TT. Policy actions at the national level are required to ensure that this transfer takes place. Policy makers in Asian LDCs can benefit from the lessons learnt by other developing countries in the region in this regard. Their experiences suggest the following policy recommendations for Asian LDCs:

- (a) **Science and/or technology policy.** To benefit from TT, trade and investment liberalization should be accompanied by science and technology as well as human resource development policies. The reinforcement of key institutions, the development of science and technology infrastructure, the development of information networks/centres, and incentives for industrial and agricultural development should all be part of development or adjustment plans. Furthermore, human resource development policies should include opening the education service sector to foreign technical schools to train a workforce capable of absorbing foreign technologies;
- (b) **FDI.** With regard to FDI, trade and investment liberalization policies must be accompanied by policy actions to allocate incoming FDI to high value-added manufacturing activities instead of to natural resource extraction and low value-added manufacturing industries such as textiles, apparel and footwear. (Although these industries are labour-intensive and create high employment, they involve few skills). Policy actions are also necessary to:

Figure 2. Technological readiness index scores of selected Asia-Pacific countries, 2008-2009



Source: World Economic Forum, 2008.

<sup>7</sup> Min Gyo Koo, 2006.

- (i) Increase skills of domestic workers through training;
- (ii) Encourage links between FDI and domestic firms through subcontracting arrangements or joint ventures;
- (iii) Encourage the return of workers to domestic firms after they have acquired skills in foreign companies; and
- (iv) Promote collaboration in research and development between foreign and local firms by measures such as easier procedures, removal of restrictions on royalty or technical fee payments, and a good patent system.

China is a good example of how to acquire technology from advanced countries by encouraging foreign research and development investment, particularly in information technology-related industries. The Government of China offers a range of incentives that include tax rebates, construction loans and access to modern facilities. As a result, most of the world's leading computer and telecom companies have research and development investments in China. By contrast, since the 1960s Thailand has exploited FDI to acquire technology by encouraging partnerships, especially in the form of subcontracting between domestic firms and TNCs. The Government of Thailand has used fiscal incentives, training programmes and other support measures (e.g., incubators and science parks) to facilitate the partnerships;

- (c) **Capital goods imports.** With regard to imports of capital goods, trade and investment liberalization policies should be accompanied by measures to reduce the cost of importing capital goods, increase access to credit (including foreign finance) and – since the development of capital goods imports is strongly associated with levels of industrialization – promote the development of high value-added manufacturing industries;
- (d) **Exports.** Finally, with regard to exports, trade and investment liberalization policies should be supported by other policies in order to:

- (i) Reduce the cost of exporting by providing cost-sensitive export facilities (including efficient distribution systems and procurement of raw materials/inputs);
- (ii) Increase access to finance;
- (iii) Develop supporting industries;
- (iv) Support export marketing promotion; and
- (v) Support innovation.

These policies should also include government measures to promote the export-orientation of industries, facilitate their trade and enable small companies to engage in trade with the idea that they can, over the long term, upgrade their technologies, human resources and production capacities.

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