Acquisition of machinery

The acquisition of machinery and equipment represents a major source of knowledge for innovation in firms. The technological know-how embodied in machinery enables firms to employ more efficient production processes and thus raise the quality of their own products and processes. Embodied technology diffusion is about the introduction into production processes of machinery, equipment and components which incorporate new technology developed in other firms either domestically or abroad (Papaconstantinou et al., 1996). Disembodied technology diffusion, in contrast, refers to the transmission of knowledge, technical expertise, or technology in a way that does not involve the purchase of a product incorporating the new technology, for example through licenses.

While the reliance on machinery as a source of innovation differs across industries, a large share of manufacturing and service firms indicate in innovation surveys that the acquisition of machinery and equipment is their primary source of knowledge for innovation (Sheehan, 2006). In terms of types of machinery and equipment, the importance of information and communications technology (ICT) has increased over time, becoming the most dynamic component of fixed capital investment during the last two decades. The OECD input-output tables are useful for the analysis of the diffusion of embodied technology across industries and countries (Yamano and Ahmad, 2006).

International trade of capital goods has also increased in most countries and contributes to international technology transfer not only through embodied technology but also through knowledge, practices, and processes linked to the use of and maintenance of machinery. Since most countries import the bulk of their equipment, policies that raise the relative price of imported capital goods (like tariffs or import quotas) have highly detrimental effects on technological progress and economic growth (Hendricks, 2000).

In developing countries, imports of machinery and equipment represent a critical engine for technological transfer and economic catching-up. However, there is evidence to suggest that a large number of firms in developing countries tend to invest not in the most recent but in outdated technologies, because the level of available experience limits the sophistication of capital goods a firm can use in production (Hendricks, 2000). The key is to match imports of technology embodied in capital goods with the level of local skills, searching for the most appropriate technology. Appropriate technologies are those which better respond to the needs and capabilities of developing countries. Along these lines, although trade policy in developing countries often discriminates against imports of secondhand goods, Barba Navaretti et al. (1998) argue that second-hand, used machines may be an efficient channel for technology diffusion when there is complementarity between skills and production technologies, and the skill base is poor.

References

- Barba Navaretti, G., Soloaga, I., Takacs, W. (1998) “When vintage technology makes sense: matching imports to skills”, Policy Research Working Paper Series No. 1923, World Bank http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/1998/05/01... [1]
- Hendricks, L. (2000) “Equipment investment and growth in developing countries”, Journal of Development Economics 61: 335–364.
- Papaconstantinou, G., Sakurai, N., Wyckoff, A. (1996), “Embodied Technology Diffusion: An Empirical Analysis for 10 OECD Countries”, OECD Science, Technology and Industry Working Papers, 1996/01. http://dx.doi.org/10.1787/686654085563 [2]
- Sheehan, J. (2006) “Understanding service sector innovation”, Communications of the ACM 49(7): 43-47 http://delivery.acm.org/10.1145/1140000/1139946/p42-sheehan.pdf [3]

Related Link: Technological trajectories
Environmental and safety regulations
Production capabilities
Technology Transfer and Commercialisation

Links
[1] http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/1998/05/01/000009265_3980928162535/Rendered/PDF/multi0page.pdf
[2] http://dx.doi.org/10.1787/686654085563
[3] http://delivery.acm.org/10.1145/1140000/1139946/p42-sheehan.pdf