Concept and Models of Technology Transfer in Bangladesh

Naquibuddin Sarkar

Introduction

Bangladesh is a late industrializing developing country that is still growing. It does not have a lot of ability, capacity or financial capability to do internal research and development. Because of this the country needs to rely on technologies that other countries have developed. This process is called technology transfer. In basic terms it means that developing companies or countries can get technologies and knowledge from already developed countries.

In Bangladesh, key sectors such as ready-made garments, pharmaceuticals, power, and energy have expanded mainly through the adoption of foreign technology, skills, and quality standards. Apparently, technology transfer has become a crucial mechanism for industrial growth and structural transformation in Bangladesh, particularly in the context of national development (Pal & Sarker, 2023).

Conceptual Background

Technology transfer is broadly defined as the movement of knowledge, know-how, skills, and equipment from one organization or country to another for productive use. In practical terms, technology transfer can involve hardware (machines, tools), software (blueprints, designs, formulas, procedures), expert knowledge, along with organizational processes and practices.

Managing technology is not about machines. It is about everything that goes with it like training and management and institutions (Khalil, 2000). When we talk about developing countries, technology transfer is like a process of learning for a lifetime (Abdullah, 2001).

Technology transfer is not properly complete if local companies cannot use the technology on their own. They need to be able to operate it and adapt it. This shows that it is very important for local firms to build up their skills and experience with technology over time. In broader context, foreign firms must provide more than equipment. They must transfer skills, maintenance procedures, quality control and know-how to local partners for a meaningful technology transfer.

Mechanisms of Technology Transfer

Technology transfer can take place through different channels or models. Each model differs in how technology is transferred, how much control foreign firms have, and how much

learning occurs for local firms. This section explains the main technology transfer models relevant to Bangladesh, with practical examples.

Licensing: Licensing is a technology transfer model in which a foreign firm allows a local firm to use its technology, such as drug formulations, production processes, or patents, in exchange for fees or royalties. Ownership of the technology usually remains with the foreign firm (Khalil, 2000).

A clear example of the licensing in Bangladesh is the case of Beximco Pharmaceuticals Limited, which received sublicenses from the Medicines Patent Pool to locally manufacture the Covid-19 drugs Molnupiravir (developed by Merck and Co Inc.) and Paxlovid (developed by Pfizer). Through these licensing agreements, Beximco gained legal rights and technical know-how to produce patented medicines locally, while ownership remained with the original developers. (Beximco Pharma Ltd., 2022)

Franchising: Franchising involves transferring an entire business format, including brand, operating procedures, supply systems, and quality standards. The local firm operates under strict rules set by the foreign franchisor (Khalil, 2000).

In Bangladesh, Transcom Foods Limited operates international restaurant brands such as KFC and Pizza Hut under franchise agreements. (*Transcom Foods*, n.d.), (*Bangladesh - Franchising | Export.Gov*, 2018).

Foreign Direct Investment (FDI): Foreign direct investment occurs when foreign firms invest directly in production facilities in the host country. They bring capital, technology, and management practices along with them as well (Khalil, 2000).

The Matarbari Deep Sea Port is a notable example of FDI in Bangladesh. This is a Japan-backed strategic investment in Bangladesh, funded by Japanese Official Development Assistance (ODA) and led by the Japan International Cooperation Agency (JICA). It is forming the core of the Moheshkhali–Matarbari Integrated Infrastructure Development (MIDI) initiative, which is embedded within Japan's broader BIG-B initiative for regional connectivity and industrial development in the Bay of Bengal region. (Naha et al., 2025).

Joint Ventures (JVs): Joint ventures involve shared ownership between foreign and local partners. This model allows closer interaction and learning between firms (Khalil, 2000).

Grameenphone Ltd. is a well-known example of a joint venture in Bangladesh. The company was established with foreign participation from Telenor Mobile Communications (Norway) and local participation from Grameen Telecom. (*Company Profile | Grameenphone*, n.d.).

bKash is another example of a joint venture. It combines local banking leadership from BRAC Bank with foreign equity, capital, and digital payment technology from partners such as Money in Motion LLC, Ant Group, International Finance Corporation, Bill and Melinda Gates Foundation, and SoftBank Vision Fund. (Ahmed et al., 2025)

Turnkey Projects: In turnkey projects, a foreign contractor designs, constructs, and hands over a fully operational facility to the local authority or firm (Khalil, 2000). Turnkey projects allow rapid infrastructure development.

A leading example of a turnkey project in Bangladesh is the Rooppur Nuclear Power Plant, implemented by Russia's Rosatom. Under the turnkey model, Rosatom is responsible for the plant's design, construction, technology supply, installation, testing, and commissioning, and will hand over a fully operational nuclear power facility to Bangladesh upon completion. (Ashraf & Islam, 2018)

OEM/Contract Manufacturing: Original Equipment Manufacturing (OEM), also known as contract manufacturing, refers to production arrangements in which local firms manufacture goods according to designs, specifications, and quality standards provided by foreign buyers.

The ready-made garments (RMG) sector in Bangladesh operates largely under OEM or contract manufacturing arrangements. Bangladeshi garment factories produce apparel for international brands by following buyer-provided designs, technical specifications, and compliance requirements. Case studies of firms such as Square Fashions PLC and Northern Toshrifa Group Limited show how production processes, quality control systems, and supply chain practices are transferred through long-term buyer–supplier relationships (Nipa, 2024).

Sectoral Evidence from Bangladesh

This section examines how different technology transfer mechanisms have been applied in key sectors of the Bangladeshi economy. The analysis focuses on the ready-made garments (RMG) sector, the pharmaceutical industry, the power and energy sector, and the ICT/mobile telecommunications sector:

Ready-Made Garments (RMG) Sector: The ready-made garments (RMG) sector represents one of the most successful outcomes of technology transfer in Bangladesh. Initially, the country had very limited experience in large-scale garment manufacturing. Through OEM / contract manufacturing arrangements, foreign buyers transferred production techniques, quality control systems, compliance standards, and factory management practices to local firms.

Over time, Bangladeshi manufacturers learned how to manage large workforces, meet international buyer requirements, and operate within global supply chains. Case studies of firms such as Square Fashions PLC and Northern Toshrifa Group Limited show that repeated buyer interactions led to gradual improvements in productivity, factory organization, and supply chain coordination (Nipa, 2024).

Recent studies also note that digital supply chain tools and automation technologies are being introduced in the RMG sector, although adoption remains uneven due to skill shortages and cost constraints (Khatun et al., 2024).

Technology transfer transformed Bangladesh from a minor apparel producer into one of the world's leading garment exporters. The RMG sector became the backbone of the national economy, generating large-scale employment, export earnings, and industrial experience.

Pharmaceuticals: The pharmaceutical sector is one of the strongest examples of successful technology transfer in Bangladesh. In the early stages, the country depended heavily on imported medicines. Over time, local firms adopted foreign technology through licensing, technical collaboration, and advanced manufacturing systems.

Incepta Pharmaceuticals Ltd. achieved a breakthrough in vaccine technology when its vaccine unit received oral cholera vaccine production technology from the International Vaccine Institute (IVI). This enabled local production of the Cholvax vaccine in Bangladesh (IVI and Bangladesh, n.d.).

During the COVID-19 pandemic, Beximco entered into an agreement with the Serum Institute of India to distribute COVID-19 vaccines in Bangladesh. This arrangement allowed Beximco to provide vaccine without owning the original patent or conducting vaccine research (Beximco Pharma Ltd., 2020).

Since 2012, Novo Nordisk, a leader in treating diabetes worldwide, began manufacturing human insulin in vials with Eskayef. while more advanced pen-filled insulin was still being imported from Denmark. A major shift occurred in 2018 when both firms signed a collaborative licensing-based technology transfer agreement to locally produce advanced insulin. (Khatun et al., 2024)

Technology transfer helped transform the pharmaceutical industry from an import dependent sector into a largely self-sufficient manufacturing industry, improving medicine availability and export potential.

Power & Energy: Technology transfer in the power and energy sector has mainly occurred through foreign collaboration, foreign direct investment (FDI) and project-based arrangements.

The Rosatom built Rooppur Nuclear Power Plant involves transfer of design, construction technologies, and operational expertise to Bangladesh through a bilateral cooperation framework. This includes training of operators and technical staff, which is a form of high-end technology transfer. (Ashraf & Islam, 2018)

The Matarbari Coal Power Plant in Bangladesh, reflects significant example of foreign direct investment, with an estimated project cost of roughly $2.4 billion. It is a key project within the framework of Japanese Official Development Assistance (ODA) and the Bay of Bengal Industrial Growth Belt (BIG-B) initiative (Alam et al., 2025).

In renewable energy, the Bangladesh–China Renewable Energy Company Ltd. (BCRECL) was established to implement renewable energy projects in Bangladesh with Chinese technical and investment participation reflecting an example of joint venture that supports the transfer of solar and renewable energy technologies (*Company Profile | BCRECL*, n.d.).

Technology transfer in the energy sector improved electricity generation capacity, system reliability, and infrastructure development.

ICT & Digital Services: The ICT and telecommunications sector demonstrate technology transfer through joint ventures and foreign participation.

As discussed earlier, Grameenphone Ltd. is a well-documented joint venture involving foreign participation from Telenor (Norway) and local participation through Grameen Telecom.

As mobile infrastructure expanded, it created the foundation for digital services, mobile connectivity, and ICT-based economic activities.

bKash is another strong example in Bangladesh's digital services sector. bKash pushed the country to digital finance by introducing global fintech systems, operational models, and institutional practices that reshaped financial inclusion, payments, and service delivery. It disrupted everyday economic life in a positive way by making digital transactions fast, accessible, and widely adopted (Ahmed et al., 2025).

Technology transfer transformed telecommunications from a limited service into a nationwide digital infrastructure. It enabled widespread mobile access, supported digital services, and contributed to the growth of ICT-related entrepreneurship and service innovation.

Barriers to Technology Transfer

One big problem with getting technology to work well in Bangladesh is that there are not enough people with the right skills. Many companies do not have employees who know how to use and understand technologies, which makes it hard for them to use them properly and learn from them. This means that companies are slow to start using technology and they do not get as much benefit from it as they could. Many companies in Bangladesh still need to rely on experts, even after they have installed new technology. This is a problem because technology transfer is supposed to help Bangladesh companies become more independent and productive.

Technology transfer is really held back by negotiation and institutional capacity. Firms and public agencies often do not have the experience to negotiate contracts that focus on training, documentation and knowledge sharing. This means they usually end up with agreements mostly about buying equipment rather than with a knowledge transfer as well.

Financial constraints and over-reliance on imported equipment create additional challenges. Many firms, particularly small and medium enterprises, face difficulties in training, process improvement, and research activities, which slows technology adoption and scaling (Mahmud & Roy, 2021).

Consequently, excessive dependence on imported machinery without sufficient learning perpetuates long-term reliance on foreign suppliers.

Role of Policy and Institutions

The government in Bangladesh plays a significant role in how technology is shared and used. They have plans like Smart Bangladesh Vision 2041 that show technology is very important for the country's development. This plan says that using technology and coming up with ideas are key things that need to happen for Bangladesh to grow and improve its industries in the long run. In some areas like making medicine the government has made rules that help local companies use technology from countries more effectively (Pal & Sarker, 2023).

The private sector in Bangladesh is important when it comes to adopting technology transfer. Mostly through Foreign Direct Investment or Joint Venture these companies bring technology, management skills and ways of producing things to local companies in Bangladesh. This helps companies in Bangladesh to learn from them. Technology transfer mostly happens in factories and through people moving from one job to another. Also, when local companies supply things to these foreign companies (Bairagi, 2025).

However, the contribution of universities and public research institutions remains limited. Weak university–industry linkages and low commercialization of research outputs keepss innovation, technology adaptation, and the development of long-term technological capabilities limited to a certain point (Bhuiyan et al., 2020).

Evaluation of Models

Evidence from Bangladesh shows that joint ventures, licensing, and selective foreign direct investment (FDI) are the most suitable technology transfer models for long-term capability development as well as in learning perspective.

Joint ventures have worked well in sectors such as power and energy and ICT, where continuous operation and management involvement are required. This model supports gradual learning and capability building through close interaction between foreign and local partners.

FDI has been important in capital-intensive sectors such as energy and large projects by introducing advanced technology and management systems. However, technology spillovers are limited unless mutual agreements encourage training and local participation.

Licensing has been effective in the pharmaceutical sector by allowing firms to access established production knowledge without high R&D costs. Although it may limit innovation if learning remains focused only on manufacturing.

Turnkey projects and OEM/contract manufacturing have delivered quick results. Turnkey projects improve infrastructure rapidly, while OEM production supports exports but keeps firms at low value-added stages unless upgrading occurs (Khatun et al., 2024).

Overall, Bangladesh benefits most from TT models that combine foreign technology access with learning mechanisms. Joint ventures and licensing, and well-designed FDI policies, are best suited for sustainable industrial upgrading.

Conclusion

Bangladesh's industry has grown a lot because of technology transfer. If we look at the sectors, we can see that technology from developed countries has helped Bangladesh improve its infrastructure and increase its exports. This has happened even though Bangladesh does not do a lot of its research and development but mainly because of the technology transfer.

The study shows that selective foreign direct investment, joint ventures and licensing are one of the best ways for Bangladesh to acquire new technology. These methods let Bangladesh get technology and help our human resource to learn new skills. On the other hand, turnkey projects and OEM can give faster results but they do not help Bangladesh learn new technology in the long run unless they upgrade themselves to improve.

To scale these gains, Bangladesh needs stronger human capital development, better contract negotiation capacity, and improved coordination among government, industry, and academia. Aligning technology transfer strategies with national priorities such as the Smart Bangladesh Vision 2041 will be essential for sustainable industrial upgrading.

References

1. Books

Khalil, T. M. (2000). *Management of Technology: The Key to Competitiveness and Wealth Creation*. McGraw-Hill.

https://books.google.com.bd/books?id=AXsrAQAAMAAJ

Khatun, F., Saadat, S. Y., Richi, A. F., & Aurchi, A. U. (2024). *Technological readiness of Bangladesh's pharmaceuticals industry: Preparing for LDC graduation*. Friedrich-Ebert-Stiftung (FES) and Bangladesh and Centre for Policy Dialogue (CPD).

http://collections.fes.de/publikationen/1885805

2. Journal Articles

Abdullah, M. (2001). View of Strengthening Technology Transfer Process: Some Options for Bangladesh Economy. *BANGLADESH JOURNAL OF PUBLIC ADMINISTRATION*.

http://journals.bpatc.gov.bd/index.php/bjpa/article/view/322/223

Ahmed, J. U., Khan, S. A., & Faroque, A. R. (2025). bKash: Transitioning from Mobile Financial Services to Digital Microfinance in Bangladesh. In T. Endress & Y. F. Badir (Eds.), *Business and Management in Asia: Finance and Investments in the Digital Age* (pp. 121–137). Springer Nature.

https://doi.org/10.1007/978-981-96-3452-1_8

Ahmed, T., Hasan, N., & Akter, R. (2023). Journey to Smart Bangladesh: Realities and Challenges. *International Journal of Qualitative Research*, *3*(2), 178–187.

https://doi.org/10.47540/ijqr.v3i2.980

Alam, M. J., Ali Reza, S. M., & Jahan Bhuiyan Shafin, M. E. (2025). Infrastructure sustainability in Bangladesh: The case of Japanese official development assistance to ensure SDGs. *SN Social Sciences*, *5*(12), 224.

https://doi.org/10.1007/s43545-025-01263-x

Ashraf, A. S. M. A., & Islam, Md. S. (2018). Explaining Public Policy Choices: A Case Study of the First Nuclear Power Plant in Bangladesh. *Strategic Analysis*, *42*(5), 503–523.

https://doi.org/10.1080/09700161.2018.1523076

Bairagi, A. (2025). FDI and the Innovation Ecosystem in Bangladesh: Evaluating the Spillover Effects of Foreign R&D on SMEs' Innovation Capacity. *MANAGEMENT AND ECONOMICS REVIEW*, *10*(2), 457–470.

https://doi.org/10.24818/mer/2025.02-12

Bhuiyan, A. B., Ali, M. J., Zulkifli, N., & Kumarasamy, M. M. (2020). Industry 4.0: Challenges, Opportunities, and Strategic Solutions for Bangladesh. *International Journal of Business and Management Future*, *4*(2), 41–56.

https://doi.org/10.46281/ijbmf.v4i2.832

Khatun, F., Saadat, S. Y., & Mahbub, A. (2024). Readymade Garments Industry in Bangladesh: An Analysis of the Value Chain. *Centre for Policy Dialogue*.

https://cpd.org.bd/resources/2024/04/Readymade-Garments-Industry-in-Bangladesh-An-Analysis-of-the-Value-Chain-1.pdf

Mahmud, H., & Roy, J. (2021). Barriers to Overcome in Accelerating Renewable Energy Penetration in Bangladesh. *Sustainability*, *13*(14), 7694.

https://doi.org/10.3390/su13147694

Naha, A., Nandy, D., & Al-Mamun, A. (2025). Strengthening South Asian Ties: Japan's Strategic Move Through Bangladesh's Matarbari Deep Seaport. *Jadavpur Journal of International Relations*, *29*(1), 101–130.

https://doi.org/10.1177/09735984251359414

Nipa, N. J. (2024). Successful Information and Communication Technology (ICT) Implementation in Readymade Garments factories in Bangladesh: Case Studies of SQUARE Fashions PLC and Nothern Toshrifa Group Limited, Bangladesh. *International Business Research*, *17*(4), p79.

https://doi.org/10.5539/ibr.v17n4p79

Pal, S. K., & Sarker, P. C. (2023). SMART Bangladesh Vision 2041: Concept of a Sustainable Developed Country. *Environmental Management and Sustainable Development*, *12*(1), 67–81.

https://doi.org/10.5296/emsd.v12i1.20666

3. Websites / Reports

Bangladesh—Franchising | export.gov. (2018). Retrieved January 14, 2026, from https://legacy.export.gov/article?id=Bangladesh-Franchising

Beximco Pharma Ltd. (2020, August 28). *Beximco Pharma and Serum Institute of India announce intention to cooperate on a COVID-19 vaccine*. Beximco.Com. https://beximco.com/news/beximco-pharma-and-serum-institute-of-india-announce-intention-to-cooperate-on-a-covid-19-vaccine

Beximco Pharma Ltd. (2022, January 20). *Beximco Pharma gets license for oral anti-Covid drug*. Beximco.Com. https://www.beximco.com/news/beximco-pharma-gets-license-oral-anti-covid-drug

Beximco Pharma Ltd. (2022, March 18). *Beximco to produce Pfizer's Covid-19 drug locally*. Beximco.Com. https://beximco.com/news/beximco-produce-pfizers-covid-19-drug-locally

Company Profile | BCRECL. (n.d.). Retrieved January 14, 2026, from http://www.bcrecl.com.bd/company-profile

Company Profile | Grameenphone. (n.d.). Retrieved January 14, 2026, from https://www.grameenphone.com/about/about-grameenphone/company-profile

IVI and Bangladesh. (n.d.). *IVI*. Retrieved January 14, 2026, from https://www.ivi.int/who-we-are/ivi-and-bangladesh/

Manufacturing Facilities. (n.d.). Retrieved January 14, 2026, from https://www.beximcopharma.com/about-us/manufacturing-facilities

Transcom Foods. (n.d.). Retrieved January 14, 2026, from https://www.transcombd.com/businesses/restaurant-franchise/transcom-food-ltd/undefined/businesses/restaurant-franchise/transcom-food-ltd/