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Prologue Two: Transfer of Technology

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1. A contextual approach of transfer of technology

Economic growth is directly attached to the extension of research and development (R&D) investments once that worldwide changes and progress are attributed to the translation of scientific and technological knowledge into actual innovative products and processes. In this sense, it is major to maintaining a healthy system of knowledge diffusion and application of innovative R&D results to encourage the advent of innovations leading to economic ripple effects [1].

The rise of the knowledge-based economy has increased the notoriety of institutions that create and disseminate knowledge, policymakers, and companies once the effective management of technology as a source of competitive advantage is of vital importance for many organizations [2]. In this sense, the transfer of technology is a managerial process that causes a wide range of positive impacts across society, such as improved human capital, knowledge capital, and entrepreneurship [3].

Widely accepted as essential for enhancing the economy and wealth in changing the competitive landscape, technology is the basic theme of the transfer process. Technology refers to the different types of knowledge, which may be embodied in the form of machinery, equipment, information, know-how, software, as well as their associated management systems [4].

Transfer of technology is defined as the broad set of processes which aims to achieve the equitable sharing of the technological know-how from one organizational setting to another, such as governments, private-sector entities, financial institutions, non-governmental organizations, and research-teaching institutions [1]. The basic obligation among the transferors to the recipient is to identify and implement administrative, institutional, and government structures that enable private and public sector transfer of technology and cooperation, bearing also into account existing work of international organizations [5].

Technologies have been the driver of economic and social development worldwide, but many organizations in developing countries, with technological infrastructure and R&D resources reduced, require assistance with developing human capital, developing appropriate institutions and networks, and acquiring and adapting specific technological know-how. Therefore, developed countries must operate on a broad front to facilitate the transfer of technology into developing countries, finding new paths for economic growth as a whole [6, 7].

Transfer of technology among stakeholders can be realized by a large number of pathways. They vary depending on the type of technology, sectors, and country condition. Pathways may be different for more developed technologies and for technology innovations still in the development phase. Common pathways include licensing, joint ventures, foreign direct investment (FDI), government assistance

programs, exchange of scientific and technical personnel, franchising, sale of turn-key plants, contract research, further development, internal start-ups, meetings, mobility scheme, monitoring of activities of the science base, publications, regional technology centers, reverse engineering, science parks, and spin-offs [8, 9].

While the technology transfer process can be complex and interconnected, five general phases for effective actions can be identified (**Figure 1**) [8, 10]. Transfer of technology process starts at new technology development through research, development, and international cooperative partnership initiatives. This phase considers the current state of the art of technology development, the major barriers, and possible mechanisms for overcoming them through public and private actions, including partnerships [11].

The identification of transfer opportunities regarding technological improvements developed through R&D investments stands at the actual beginning of the transfer of technology. At this phase, the research results will be regularized and protected. In addition, the verification of the potential of technology transfer and search for industrial partners are realized [10, 11].

Arrangements for undertaking the actual transfer are taken in the next phase. For proprietary technology, the existence of an enabling legal environment is a key issue during this stage. The identification of transfer needs and opportunities, through appropriate access to and exchange of information with regard to the existence of technologies and their potential for application, is an important initial step in the transfer process [10].

Considering the market differences, input prices, and supplier vendor infrastructure, the adaptation and diffusion of the transferred technology to local cultural, social, and economic conditions are a determining phase for an effective transfer of technology. Insight into the technology adaptation process, its inhibitors, and stimulators help transferor to diffuse their new products and processes more effectively [12].

A number of social, economic, management, and policy implications influence the flow and quality of the transfer of technology. The key elements of successful transfers include the exchange of information, contracting parties' awareness, sound regulatory frameworks and economic policy for capacity building and the

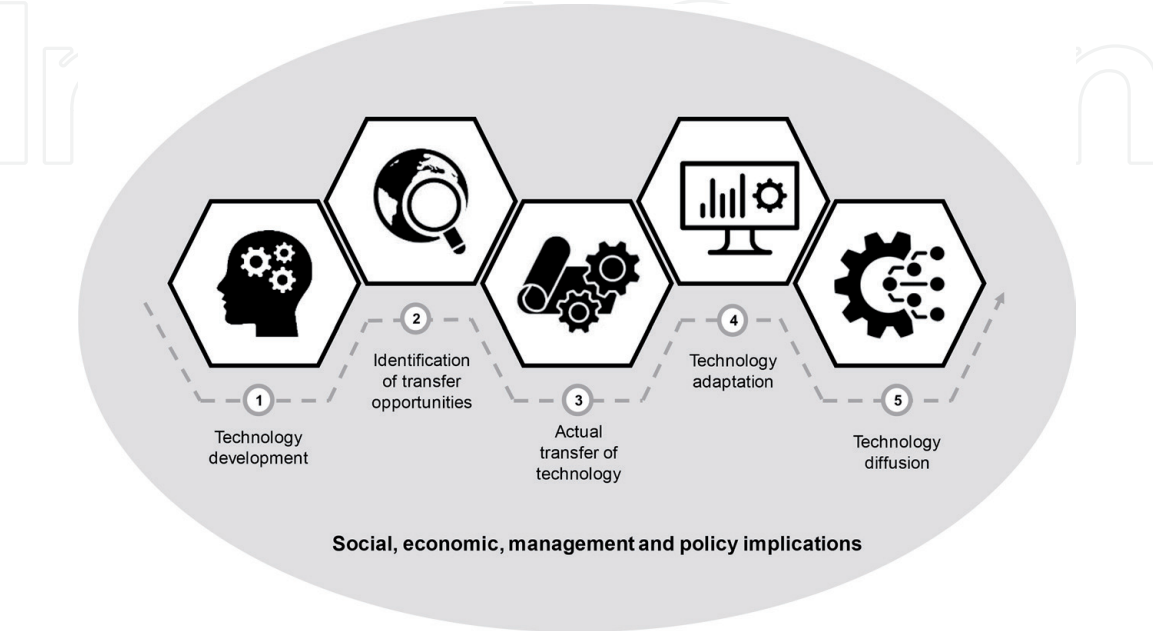


Figure 1.
Phases of transfer of technology.

diffusion of these technologies, and availability of a wide range of technical, business, management, and regulatory skills locally. Transfers of technology that satisfy local demands and priorities have more probability to be successful. But there is no preset answer to improve this process. Interactions and barriers vary according to the sector, type of technology, and country, and recent trends in international financial flows that drive the transfer of technology are altering the relative capacities and roles of different stakeholders. Policy actions, therefore, must be linked to the specific context and interests.

This book provides global trends that enhance the practice of transfer of technology to developing countries and policy, legal and regulatory implications that affect this process. The book is addressed to research scientist of innovation from a variety of disciplines, including management, economics, and human resources whose work has commercial applications.

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References

- [1] Min JW, Vonortas NS, Kim Y. Commercialization of transferred public technologies. *Technological Forecasting and Social Change*. 2019;**138**:10-20. DOI: 10.1016/j.techfore.2018.10.003
- [2] Phaal R, Farrukh CJP, Probert DR. Technology management process assessment: A case study. *International Journal of Operations & Production Management*. 2001;**21**:1116-1132. DOI: 10.1108/EUM00000000005588
- [3] Guerrero M, Urbano D, Fayolle A, Klofsten M, Mian S. Entrepreneurial universities: Emerging models in the new social and economic landscape. *Small Business Economics*. 2016;**47**:551-563. DOI: 10.1007/s11187-016-9755-4
- [4] Günsel A. Research on effectiveness of technology transfer from a knowledge based perspective. *Procedia - Social and Behavioral Sciences*. 2015;**207**:777-785. DOI: 10.1016/j.sbspro.2015.10.165
- [5] Viñuales JE, editor. *The Rio Declaration on Environment and Development: A Commentary*. New York: Oxford University Press; 2015. Available from: 10.1093/law/9780199686773.001.0001
- [6] Roffe P. Transfer of Technology: UNCTAD's Draft International Code of Conduct. *The International Lawyer*, Spring. 1985;**19**:689-707. Available from: <https://www.jstor.org/stable/40705630>
- [7] United Nations Department of Economic and Social Affairs (UN DESA). *Climate change: Technology development and technology transfer*. New York NY: UN. Available from: https://sustainabledevelopment.un.org/content/documents/1465back_paper.pdf [Accessed: 25 August 2019]
- [8] IPCC, Intergovernmental Panel on Climate Change. *Methodological and technological issues in technology transfer*. Metz B, Davidson OR, Martens J-W, van Rooijen SNM, McGrory VWL, Editors. Special Report prepared by IPCC Working Group III. Cambridge, UK: Cambridge University Press; 2000
- [9] Lavoie JR, Daim T. Technology transfer: A literature review. In: *R&D Management in the Knowledge Era*. Cham: Springer; 2019. pp. 421-438. DOI: 10.1007/978-3-030-15409-7
- [10] Djoghla A, Freeman J. Third review of the effectiveness of the financial mechanism of the convention on biological diversity. Available from: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.178.2408&rep=rep1&type=pdf> [Accessed: 25 August 2019]
- [11] Fernandes CR, Machado AGC. Technology transfer capability: Development dynamics in higher education institutions. *Brazilian Business Review*. 2019;**16**:1-15. DOI: 10.15728/bbr.2019.16.1.1
- [12] Robertson TS, Gatignon H. Competitive effects on technology diffusion. *Journal of Marketing*. 1986;**50**:1-12. DOI: 10.2307/1251581