Process of technology transfer and commercialisation

Technology transfer

There are many definitions of technology transfer. The Association of University Technology Managers (AUTM): “Technology transfer is the process of transferring scientific findings from one organization to another for the purpose of further development and commercialisation.” The process typically includes:

- Identifying new technologies
- Protecting technologies through patents and copyrights
- Forming development and commercialisation strategies such as marketing and licensing to existing private sector companies or creating new startup companies based on the technology

Technology transfer is usually the first step in technology commercialisation. This also implies that unless a technology is actually used, it has not been successfully transferred and will not ultimately provide public benefits. A “technology” may be an invention, a prototype, finished device, or know-how.

Policy conditions necessary for technology transfer include:

- Sustained research funding to provide pipeline of great ideas
- Ensure that intellectual property rights (IPR) are protected
- Encourage policies that attract investment capital support
- Support public funding through grants and other translational initiatives

Studies show that the bulk of technological progress in developing countries has been the absorption and adaption of preexisting but new-to-the-country or new-to-the-firm technologies, rather than the invention of new-to-the-world technologies (World Bank 2008). Advice given to most developing countries and sectors is that R&D should focus on the adoption and adaptation of preexisting technologies, not on efforts to expand the global technological frontier. The transition from such technology diffusion to technology commercialisation, or indeed the relevance of technology commercialisation for developing countries is less understood.

Technology Commercialisation

A common definition of technology commercialisation is that it is the process of taking an idea to market and creating financial value -- typically through licensing an invention, developing a new product or service, or creating a new business (what some refer to as “mind-to-market”). Products or services created through commercialisation may be "new to the world" or "new to the region or country."

Technology commercialisation does not necessarily refer to moving a specific finished technology to the market, but rather a much earlier stage development. This is an important difference. On many

occasions attempts will be made to commercialise (market) a finished technology which simply does not fulfill any market need, or is not capable of creating a new market, or has competing products with established market presence. Also, a customer company may not be interested in a finished technology because it does not fit into their product development cycles, but may value the know-how, intellectual property, or expertise associated with the technology.

Innovation, or a new and better way of doing something leading to positive change, may refer to incremental or radical changes in thinking, decision making, or the way in which business is conducted and products produced in an organization, and is at the heart of technology commercialisation. A distinction is usually made between innovation and invention – the latter being the first attempt to reduce an idea to practice.

Technology adaptation is the process of importing a finished technology and changing it to fit a users' environment or adapting it for a new use. Research, as typically carried out at a university or research institute, may generate ideas which can then be commercialised. Research and development (R&D) as typically carried out in a company, may generate ideas for new products and services.

Typical processes

The process to commercially exploit research may involve IP licensing and IP exchange agreements, establishment of joint ventures and partnerships between universities and research institutes with industry to share both the risks and rewards of bringing new technologies to market, creation of spin-off firms, shared labs, and cooperative R&D agreements - either involving industry funding for research at universities or research institutes or agreements where each party pools their research without any exchange of funding.

Many countries have laws similar to the 1980 US Bayh-Dole to provide additional incentives for research exploitation. In addition to formal regulations, informal channels of technology transfer and commercialisation include exchanges of staff between research institutions and industry, personal relations among academic and industry researchers, and networks. These channels are activated through:

- R&D collaboration between science institutions and the industry
- IP licensing and sales by universities and PRIs
- Spin-off firm creation
- Consulting and extension services
- Placements and sponsorships

The commercialisation process may begin with an idea or concept for a new product, service, or process, as noted above. Ideas may come from universities, businesses, or individual inventors. Few of these ideas will ever reach the market stage through the, usually lengthy, multi-step technology commercialisation process. The process has many stages including:

- Carrying out "market intelligence" to look for competitor or competing products and trying to see if the resulting product will satisfy a known market demand or might create a new market.
- Carrying out a feasibility study and/or developing a prototype or bench model to figure out if

the final proposed product is likely to work and as a demonstration to potential users and investors.

- Identifying and deciding whether and how to protect associated intellectual property (IP) – which may involve significant costs.
- Seeking finance and expertise for each stage of the commercialisation process, and the resulting licensing, sale, or new business creation (a "spinoff" company).
- Negotiating with potential users and customers.

Linear and non-linear models

"Technology transfer does not evolve naturally and linearly from research and the discovery of scientific solutions. Rather, the process often faces unfavorable economic incentives and an inadequate supply of complementary services to translate new ideas into technological and economically viable innovations. Technology commercialisation is a multi-stage process involving different stakeholders: researchers, faculties, coordinating/managing organizations, private/public technology transfer intermediaries, and recipients (firms or public sector institutions). There are five basic stages of the technology commercialisation process.... This process is not necessarily linear, as industry-science links can exist from the start and science-firm interactions may arise at any stage, from conception through development" (Zuniga and Correa, 2013).

In the early days of transfer and commercialisation, the process was considered to be a linear progression from invention disclosure, additional research and development, new product or process development, for which marketing divisions of companies were responsible for selling.

It is now understood that the process in highly non-linear. Feedback loops are present throughout the entire progress of ideas-to-markets. Technical and market feasibility and commercial potential must be demonstrated through proofs of concepts and proof of market feasibility and prototype development stages – each of which has feedback from market intelligence and potential customers.

References

- World Bank 2008, Global Economic Prospects 2008, http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,,cont... [1]
- Zuniga, P. and Correa, P., Technology Transfer from Public Research Organizations

Related Link: International Linkages
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Processes and contributions of universities and PRIs

Links
[1] http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,,contentMDK:23098486~pagePK:64165401~piPK:64165026~theSitePK:476883,00.html