THE WORLD BANK IFC International Finance Corporation World Bank Group

Technology Transfer Mechanisms

Policy and Design Challenges

JUSTIN HILL | 27 MAY 2014

Financial & Private Sector Development

WHAT IS TECHNOLOGY TRANSFER?

The formal and informal transfer of skills, technical knowledge, or technology from **public research organizations** to **industry**.

WHY IS IT IMPORTANT?

TECHNOLOGY TRANSFER promotes innovation that boosts productivity and economic development.

The challenge is to generate a systematic process of transferring skills and knowledge from research organizations to private industry, maximizing the contribution of public investments in research and innovation for economic growth.

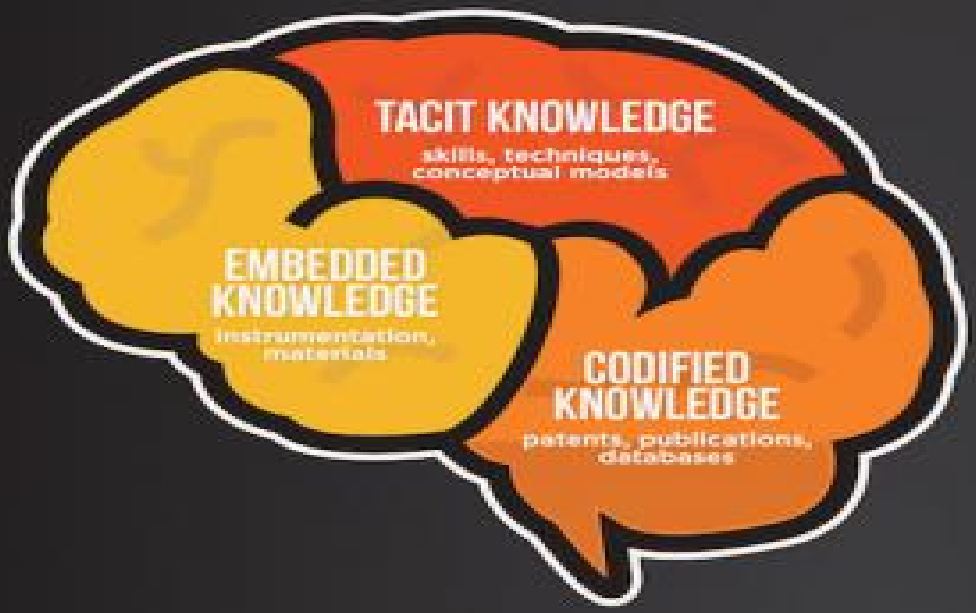
SYSTEMATIC PROCESS

INNOVATION

ECONOMIC DEVELOPEMENT

TECHNOLOGY TRANSFER MECHANISMS

TYPES OF KNOWLEDGE



TECHNOLOGY TRANSFER MECHANISMS

- SCIENTIFIC PUBLICATIONS
- UNIVERSITY-INDUSTRY JOINT RESEARCH PARTNERSHIPS
- SEMINARS, MEETINGS, AND CONFERENCES
- EDUCATION AND TRAINING
- PERSONAL CONTACTS
- TECHNOLOGY COMMERCIALIZATION
  - Contract R&D and Consultancies
  - Technology Licensing
  - Spin-offs
  - Selling Intellectual Property

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WHY IS TECHNOLOGY TRANSFER AND COMMERCIALIZATION RELEVANT TO DEVELOPING COUNTRIES?

It contributes to the widespread diffusion of knowledge, so that it is not concentrated in universities.

International technology transfer with foreign companies and universities can help firms catch up with international competitors and obtain global knowledge.

It helps adapt existing technology and ideas to meet local needs.

It contributes to addressing pressing social and environmental problems.

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WHAT ARE THE THREE CATEGORIES OF UNIVERSITY-INDUSTRY COLLABORATION?

Relationships

Research Partnerships
Arrangements for joint projects

Research Services
Research-related activities commissioned to universities by industrial clients

Shared Infrastructure
Shared use of university labs and equipment

Mobility

Academic Entrepreneurship
Start-up or spin-off companies created by academics

Human Resource Exchange
Cross-sector training, internships and hiring

Transfer

Commercialization of Intellectual Property
Licensing of university-generated intellectual property to firms

Scientific Publications
Use of codified scientific knowledge within industry

Informal Interaction
Formation of social relationships through conferences, meetings and social networks

WHAT ARE THE DRIVERS AND BARRIERS TO UNIVERSITY-INDUSTRY COLLABORATION?

Industry — Universities

Drivers

KNOWLEDGE

- Access to the skills and knowledge developed by universites
- Access to industry's empirical data and entrepreneurial expertise

EMPLOYMENT

- A more skilled applicant pool from which to hire
- New opportunities for student internships and employment

ECONOMICS

- New patents and more efficient processes
- Greater funding and recognition

Barriers

RESEARCH ORIENTATIONS

- Focus on obtaining fast, commercial results
- vs.
- Focus on basic research

OUTPUTS

- Goal of quickly obtaining patents for new products
- vs.
- Goal of publishing research results

INTELLECTUAL PROPERTY

- Concern about maintaining secrecy in order to control intellectual property rights and expectations about a new commercial product
- vs.
- No major concern about secrecy

CARROTS: INCENTIVES TO COLLABORATE

Policy Tools for Promoting Collaboration

CARROTS
Positive Incentives

COLLABORATION
Success

INCENTIVES TO COLLABORATE

POTENTIAL RISKS

RESEARCH & DEVELOPMENT

Governments offer companies grants, matching grants, and tax incentives to participate in collaborative research projects.

'Innovation Vouchers' offering small lines of credit to firms to purchase services from universities have been successful in Ireland, the Netherlands and the UK.

In developing countries, firms may show little interest in applying for grants because they don't have matching resources or find the process too complex.

Universities do not provide incentives for academics to align research agendas with market demands.

CONDITIONAL FUNDING FOR UNIVERSITIES

Governments can develop new criteria for funding public universities, such as the number of start-ups and industry contracts they generate.

Universities may offer faculty members funding for research and development, sabbaticals to launch research-based start-ups, and promotions and recognition for industry connections.

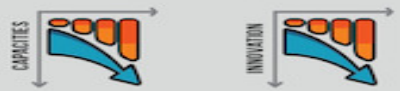
Funding for public universities is often based on traditional metrics like the number of students or publications.

Excessive bureaucracy and bans on creating private organizations at public universities can get in the way of industry participation.

INTELLECTUAL PROPERTY RIGHTS

Researchers in many OECD countries have blanket permission to file for patents for research products and give those patent licenses to private firms.

Technology Transfer Offices inside universities can assist researchers in patenting their findings and obtaining license fees and royalties.



The results of intellectual property reform in countries with low technological capacities and low levels of innovation can be disappointing.

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SCIENCE PARKS

Science parks are physical spaces created for high-tech, innovation-centered collaboration between universities and industry. They often include business incubators intended to support spin-off and start-up companies.

These ambitious endeavors can become little more than unsustainable real estate players. Many science parks in middle- and low- income countries have failed, including several in China.

EDUCATION & TRAINING

It can benefit both industry and universities to support internship programs and allow PhD students to conduct research in outside firms.

In Chile, many PhD students who were offered scholarships to conduct research in outside firms gained long-term employment.

Industry will not be able to recruit graduates with the skills they need unless they work with universities to create their curricula.

GLOBAL PARTNERSHIPS

Collaborations between local industry and foreign universities with greater research qualifications can help modernize local technology and processes.

Foreign universities sometimes take up government and foreign funding and crowd out local universities.

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