

Challenges and Obstacles of Improving Technology Transfer in Indonesia in Example of the Idea to Establish a Technology and Innovation Center in Yogyakarta

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In decentralizing social and economical development of Indonesia improving the interactions among actors of local innovation system is becoming more important. This paper discusses ideas in improving technological capability and describes a field study of Technology and Innovation Center in Yogyakarta. Obstacles on technology transfer will be described based on perceptions of local actors. Suggestions in example of promoting jamu (herbal medicine) industry will be presented to lead into general recommendation.

Background / Context

In a narrow sense technology is the know-how required to develop and apply technical methods. It appears in a bound form in machines and plants, in an unbound form in blueprints, and manuals. Technology transfer is the transmission of this know-how. In a broad definition, technology consists of technical hardware, know-how, and organization. These factors are relevant with respect to both processes and products.

Technological capability is the ability to scrutinize and grasp what technology components are available, to assess and select a technology, to utilize it, to adapt and improve it, and, finally, to develop technologies independently. Technological capability exists in individuals and organizations, but the usual pattern is the creation and improvement of technological capability in innovation systems. The four pillar model of innovation (Figure 1) is an attempt to outline the key elements of an innovation system:

- The first pillar is the firm. This is where a large part of innovation takes place, and firms are the target of efforts to stimulate innovation.
- The second pillar is established through the macroeconomic, regulatory, political and other framework conditions.
- The third pillar are technology institutions. In a developed economy, there is usually an enormously diversified set of such institutions. Some of them do basic research, applied research and development, transferring know-how to firms (transfer agencies), or focus on waking-up firms which are unaware of innovations they will need to survive (extension agencies), technology incubators, technology assessment and forecasting, or social science research on technology. There are institutions in measurement, standards, testing, and quality assurance (MSTQ). Institutions like business associations can play an important role here in terms of stimulating interaction.

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- The fourth pillar consists of education and training institutions. There is certainly some overlap with the third pillar, as some research institutions will do some training, and some training institutions (especially universities) may be involved in research and development.

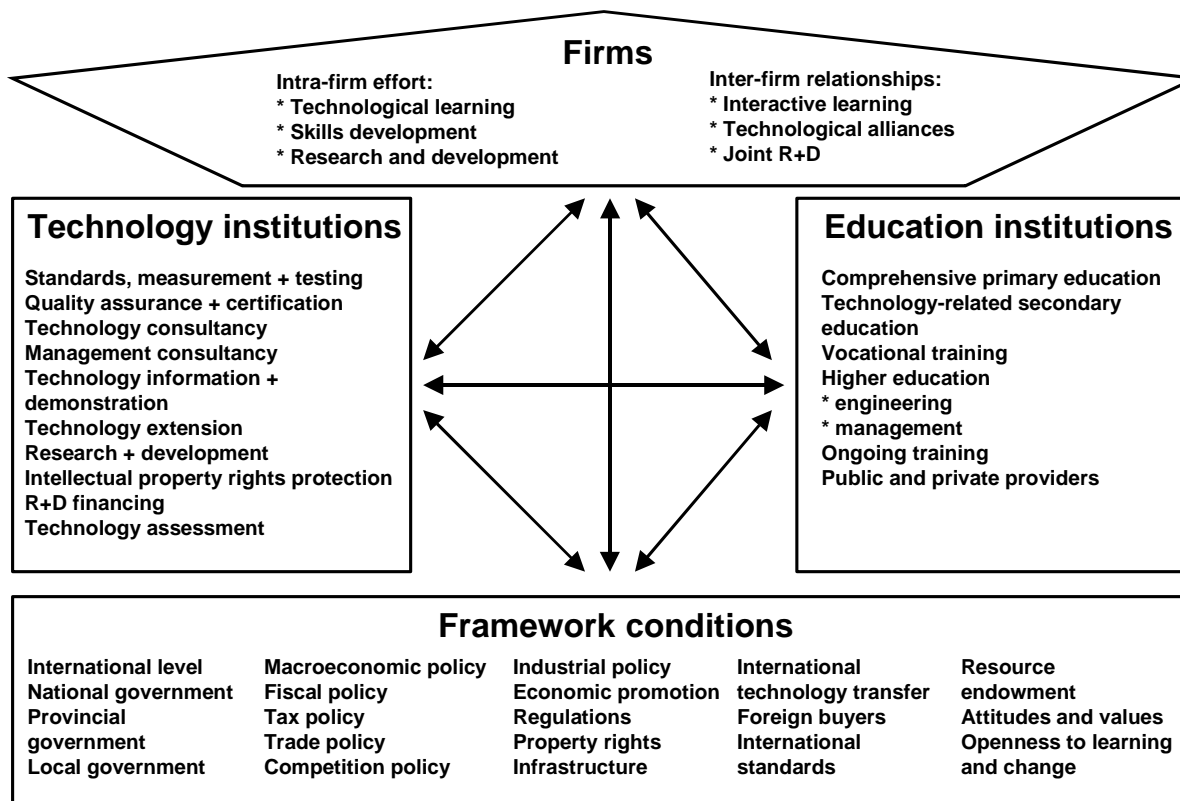


Figure 1:

The Innovation System: Four Pillars of Technological Capability [Meyer-Stamer 2001]

The four-pillar-model helps to avoid too narrow a perspective. For instance, it is common to find innovation deficits at the firm-level, particularly in developing countries. Typical causes are deficient management know-how and technical education. A typical development cooperation response is then to create certain mesolevel activities, like technology extension, management training, and technical training. More often than not, the analysis of macrolevel factors is at best superficial. Yet macrolevel factors are often the main causes for firms' behavior; what may appear dysfunctional to the external observer may be highly rational in the perspective of the firm owner. Therefore, it is crucial to develop a systemic view, including macrolevel factors, to understand the incentives and restrictions which shape the behavior of businesspeople, and to understand whether the conditions for interaction between firms and mesoinstitutions are in any way favorable. [Meyer-Stamer, 2001]

Since 2001 Indonesia has been implementing new paradigm of national development which is based on regional autonomy. Decentralization is believed to become an effective way in creating a better future in which local needs and local environment will be more considered in

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the social and economical activities than before. The shift from centralized authorities and mindsets into more decentralized ones is a process which needs much time. The transformation process will become more effective if formal and informal interaction mechanisms can be found and established which can accommodate individual and collective initiatives and efforts and connecting them to build meaningful changes toward sustainable development in the local and regional setting. This process needs the awareness of local actors for the importance of cooperation and tolerance. Interactions between local actors become very important in optimizing the efforts and its synergy. Many actors are aware of the importance of innovation system, however many obstacles might be faced for the emergence or creation of local and regional innovation system in Indonesia. Some examples are:

- Funding problems, especially in low income regions
- Communication and cooperation barrier, i.e. every group of people mostly don't trust other groups, bad image of local government in some districts in which they take over of former behaviour / authority of central government.
- People's believe in old paradigm is not changed very much because for long time people depended on the policy of central government and the application of decentralization is not yet clear.
- Lack of driving forces, i.e. local actors feel that strengthening the local innovation system is not their main task, for some districts qualified human resources needed are difficult to find, one or more pillars are not well prepared, low awareness of firms to supportive institutions.
- Many reluctance to transform the local technology institutions from supply to demand orientation
- People are in general not ready to learn, change and innovate

Idea of Technology and Innovation Center Yogyakarta

Yogyakarta is well known as center of Javanese culture which is rich on traditions and arts. Besides as a center of tourism Yogyakarta is also a student city. It has around 200.000 students who came from many regions Indonesia. Most industries in Yogyakarta are small and medium enterprises. Important industrial sectors are garment, textile, leather, furniture, and food industry. Technology is very important especially to improve the quality of products to meet international standard. Yogyakarta is located in the region of Central Java. Therefore industries in Central Java should be considered in developing the concept of technology and innovation center in Yogyakarta. The Chamber of Commerce and Industry of Yogyakarta decided to launch a study on the potential of a Life Science Center (LSC) in Yogyakarta with the following five core technologies: biotechnology, pharmacy, medical equipment, food and agrotechnology, and life science related software-development. The study has been conducted in the year 1999/2000.

According to the regional industry structure, out of the 34 interviewed enterprises the vast majority came from the food and agro-based industry, 3 from pharmacy, 1 from medical equipment and 2 from the market of biotechnology. Approximately 50% of all located Life Science related companies in Yogyakarta and their surroundings were personally interviewed.

- More than 85% of the companies prefer Yogyakarta as the location of the LSC.

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- All but one of the companies responded that the establishment of the LSC is something either very useful or quite useful. The main reason the companies support the concept of the LSC was that the center will aid in solving their problems through bridging them to research institutions and providing them with technology and innovation.
- According to the companies the center should mainly act as a service center (37% of all respondents), applied research center (31%), center for qualification and training (25%), production center (6%)
- The interviewed companies were also asked which services they would use from the center and the top 5 of answer are: product development (74% of all respondents), training and qualification of staff (71%), applied research (71%), design (66%), quality management (62%). All companies responded that they would use services offered by the LSC. This means that they obviously intend to do business with companies located in the center.
- The companies were also asked whether they could think in general of participating as a tenant in the center. There was a significantly positive response to this question: 15 companies could in general think of participating as tenants in the LSC either through spin-offs, founding companies or by just moving in, and out of these 15 companies, five companies are ready to get involved in the center.

In the following breakdown the results of the interviewed science community will be outlined. Interviews were conducted with representatives from the research fields of food technology, agrotechnology, pharmacy, biotechnology, medical technology and software development. All respondents work for either applied research (20%) or both basic and applied research (80%).

- All respondents prefer Yogyakarta as the location of LSC.
- Nineteen out of 20 respondents responded that a LSC in Yogyakarta is something very useful.
- According to the interviewed institutions the LSC should mainly act as a service center (85% of all respondents), center for qualification and training (75%), demonstration center (65%), production center (55%).
- Expected services to be offered (top five listing): patent consultation (80%), marketing and PR (75%), measurement devices to use (60%), applied research (55%), product development (40%)
- All respondents reported they would think of offering services as well as using services from the LSC. A hundred percent (100 %) could think about offering applied research, 90% providing qualification and training and 85% offering product development.

It should be noted that the readiness to offer services may not mean that all science institutions will have the (financial) potential to become tenants of the center.

Based on the interviews it can be concluded that the amount of cooperations is still below its potential capacity. This might have been caused by the following factors:

- Lack of information about who needs which services
- Unavailability of an effective mediator between scientific institutions and industries
- Not enough resource allocation for marketing potential and technology services
- Technology services for the existing regional industry are not of the main interest of scientific institutions.

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In general the obstacles of the founding of the Life Science Center in Yogyakarta can be rooted to the short term mindsets of the most local actors, changes of persons involved from the local government and chamber of commerce and industry, and low commitment of local institutions to allocate budget needed for set-up and start-up the center.

Role of Universities in Technology Transfer

A field study of technology transfer has been conducted in which the author is involved for 5 districts: Samarinda, Surabaya, Mataram, Semarang and Yogyakarta. The team of the study come to the following general findings:

- University research does not match industrial needs / SME needs.
- Innovation / technology upgrading is influenced by buyers.
- The importance of NGO links and networks in the technological upgrading.
- Co-operations / interactions with foreign institutions can significantly increase the motivation and innovation.
- Low role of government in inter-linkages and innovation processes.
- Low coordination between local institutions. Personal contact is most useful.
- There is no perfect link among 4 pillars of the technological capability in the districts.

The field study concludes that the most important technology sources in the technology transfer in many districts are in-house training, customers/buyers, suppliers, and it is followed by technical assistance, consultants, universities, research institutes, and NGOs. The following general perceptions might show that universities in many districts are less connected to companies:

- University research projects take long time and it is expensive, but the results are not always applicable. Research is not based on companies' demands, no surveys on industrial needs by universities, and research results are too theoretical (scientific, conceptual), not practical.
- Little interaction inside universities (inter-faculty, inter-department), low networking with companies, and technology offered by universities is not relevant for companies. Research extension is oriented to community, not to companies. Orientation of researchers from universities is not to serve industrial needs. University research mostly serves science. Most researchers don't have industrial experiences. University researchers do not specialize in fields demanded by industry.
- University people have a narrow understanding of technology - not related to key issues in value chains

Technology Demands of Jamu Industry

Jamu is herbal medicine which has been consumed since centuries. There are many jamu industry in Indonesia, however jamu is not permitted to be recommended in an official medical treatment by medical doctor. Certification of clinical tests is required and quality assurance system should be developed. Related to this issue some technology demands of jamu industry are standardization of jamu products and its testing, minimization of the time needed in clinical tests of jamu product, quality assurance system of input material for jamu. Some suggestions to promote jamu industry are the following:

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- Supporting MSTQ for jamu product and jamu industry
- Improving the cost efficiency of clinical tests for jamu products
- Disseminating research results of jamu
- Creating technology cooperation with foreign institutions to improve the image of jamu product international
- Assistance in the marketing and promotion
- Supporting the founding of technology and innovation center for jamu.

General Recommendation

Founding technology and innovation center might be an effective way in improving the interactions between actors of four pillars of technological capability. It is very important in order to intensify the learning processes in the local innovation system which may lead to a higher systemic competitiveness of the region. However it needs a long term investment which might be not very interesting for many actors in the current social and political situation of Indonesia. To intensify the technology transfer and innovation the following recommendation might be the most practical ones:

- To disseminate information about potential, demand and contact person of firms in value chains and institutions related to the four pillars of technological capability.
- To establish link of information about technology demand and capability among districts.
- To empower associations and chambers of commerce and industry to manage its organization effectively.

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