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Harmonization and Simplification Roles of Technology Transfer Offices for Effective University – Industry Collaboration Models

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Abstract

There are different kinds of knowledge transfer methodologies that have been used between university and industry such as publications, training, contracted research, collaborative research, Intellectual Property (IP) licensing, academic spin-offs etc. Although academia and business world have different perspectives from training purposes and publicly available data sharing to commercial concerns such as trade secrets, profitability and competitiveness; there is indispensable cooperation environment between both sides. Policy instruments, on the other hand, are also have different perspectives for research, trade, profit or not-profit organization establishment and/or management, product approval by sector specific government bodies etc. University – Industry Collaboration contracts shall conform to these policy instruments in terms of technical requirements, financial requirements, roles and responsibility share between partners as well as liabilities. Common recognition for transferring best practices of university – industry collaboration models may be possible, but should have been re-structured so as to conform the regulatory tools and strategic roadmaps as wells as socio-economic concerns of both sides in different regions. Interface organizations such as Technology Transfer Offices' (TTO) have a key role to provide structural link between these parties and appropriate collaboration models for their specific needs as well as simplified tools for all possible collaboration models. In this paper we analyzed the components of university – industry collaboration models which can be simplified from the point of TTO roles and responsibilities. Harmonization and simplification possibilities for university-industry collaboration in terms knowledge transfer channels, strategic roadmaps, socio-economic impact factors and regulatory instruments will be analyzed from the point of Technology Transfer Office as the interface organization between both parties.

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1. Introduction

The University – Industry Collaboration towards a continuous improvement and innovation process is promoted following a bottom-up approach. The objective is to focus in localized and specific problematic areas in the industrial companies where the potential of improvement and innovation is large, to diagnose the situation and propose new and efficient solutions supported by technical/scientific methodologies. Collaborative and/or contracted projects allow both collaborators, academia and companies, to smoothly define their roles, achieve high levels of personal trust and design achievable expectations within their competencies, which are the basic foundations to successfully develop large and risky research projects.

The enterprises have specific needs, usually more technological and/or organizational based. So, they are mainly interested in using their relationships with university to address these specific needs, which are nuclear to their business performance. Such relationships are generally driven to support low risk applied research with results that can be exploited in the immediate future.

The university strategy fostering the involvement of enterprises with academia must have an interpersonal approach rather than formal. Also, company owners and managers must be aware that the relationship with the university community is an important skill that they need to possess to enhance the opportunities to initiate a collaborative research project.

The university and industry do not know each other well enough. The science produced at the university is not easily transformed into commercialized technology. A large part of the existing industrial sector doesn't know enough about which subjects and projects can be carried out at the university.

Therefore, the strategies used to establish strong and long-term relationships between the university and industry must be adapted to the intrinsic characteristics of the organizations involved in the process. The main question here should be “How can the university contribute to the company's performance as a result of this cooperation?”

Technology Transfer Offices' (TTO) have a key role to provide structural link between university and industry, appropriate collaboration models for their specific needs as well as simplified tools for all possible collaboration models.

OECD defines 2 groups of channels for knowledge transfer between university and industry. Formal channels such as Labour/Research Mobility, Academic Spin-off, Intellectual Property, Collaborative Research as well as informal channels such as Publications, Conferencing/Networking, Facility Sharing and Training [1].

2. University – Industry Collaboration Models

In the coming section, we introduce formal and informal knowledge transfer channels defined by OECD [1]. However, since TTO roles emphasize on formal channels, informal channels will only be summarized.

2.1. Formal Knowledge Transfer Channels

- Collaborative Research refers to joint projects managed by both parties, university and industry. In some cases, public bodies may involve in these projects. Collaborative research projects might have been funded by government and/or industry partly or full.
- Contracted Research refers to projects which are managed by universities as part of a development program initiated by industry. These projects generally financed by industry. In some cases, industry may sub-contract specific work packages of government funded projects.
- Academic Consultancy is the most common knowledge transfer channel used by enterprises.
- Intellectual Property (IP) Licencing is transferring knowledge generated by academicians to enterprises. In this type of contract enterprises pays licence fee or royalties to the university.
- Research Mobility is the temporary assignment of research staff between parties.
- Labour Mobility is the recruitment of graduates by enterprises.
- Academic Spin-offs are start-ups established by academicians so as to commercialise research outputs

2.2. Informal Knowledge Transfer Channels

- Publication of research outputs in conferences, journals etc.
- Conferencing and Networking via dissemination events that are organized.
- Networking Facilitated by Geographic Proximity is establishing science parks near to universities as well as industry funded laboratories established at the universities.
- Facility sharing by both parties.
- Training activities provided by both parties.

3. Best Practices

ASTP (Association of European Science and Technology Transfer Professionals) is a non-profit organisation committed to knowledge transfer among universities and industry and provides training materials and best practices for the use of Technology Transfer Professionals [2]. Technology Transfer Professionals are encouraged to check the availability of best practices for different knowledge transfer applications. One best practice example is listed in this paper which is essential to include young generations into R&D activities.

3.1. Technical University of Lisbon, Portugal

The experience carried on by a research university group in the promotion of the collaboration and teamwork attitude between the academia and SMEs, involving researchers, young engineering students and SME employees and top-management, was presented. As a result, universities could become increasingly important for the development of the local economies in smaller countries on the periphery of Europe [3].

The Industrial Management Group of the Mechanical Department of Instituto Superior Tecnico (Technical University of Lisbon, Portugal) has developed intense partnerships with Portuguese manufacturing companies. Beside other activities, since 1998 this group has carried out more than 20 short duration projects with Portuguese SMEs. These projects with duration between 6 and 12 months were run by students of the final year of the engineering courses. The basic aim of the projects was to increase the productivity and competitiveness of the manufacturing companies through the implementation of dedicated “simple” engineering-based solutions. Several approaches were used as regards to the projects management and to the methodologies for successful interaction between the companies and the university. Among the referred set of projects and mainly for the first ones some unsuccessful occurred in what concerns the fulfilment of the original objectives. The causes for these failures were identified, analysed and crosschecked with the successful projects. The approach has been optimized through an error-learning process, originating the increase of the success degree with the number of projects accomplished. The degree of success was measured qualitatively based mainly on the company involvement level, number of developed engineering-based solutions that achieved an implementation stage in the industrial environment and company requests for new project and collaboration.

The purposed model assures the response to the industry needs but also to the university researcher’s need of papers publishing. The use of a scientific methodology is a demand referred on the model. So, the university students and faculty benefit from the interaction as they learn about the necessities and the improvement potential of the industry and gain real-life exposure to practical problem-solving experiences that they do not encounter in the classroom or in the laboratory.

In these short-duration projects the students must focus on a company critical problem. The students perform the diagnosis, followed by the development of potential solutions and impact estimation. The company collaborators, including management team, must be involved on the process from the early beginning. This practice assures the knowledge/technology transfer, the solutions feasibility and the personnel good will on the implementation phase. Taken advantage of student’s irreverence, initiative, innovation spirit and work capacity, optimization methodologies and systematic studies can be developed. The technological and scientific strictness is assured by the professor’s coordination. The companies have the opportunity to see and discuss the diagnosis of their processes, to improve their process procedures, to have technological and economic feasibility studies, among others, at low cost, in a short term, and with results they can control. An additional benefit frequently observed is the contribution of this type of projects

to the initiation of a continuous improvement culture inside the company.

The results achieved so far demonstrated a set of benefits:

- It has been observed that by including young engineers in cooperation, they increase their practical experience and contribute to entrepreneurial development.
- Creative processes have been supported as a result of cooperation in SMEs.
- Collaborations should be continued as small projects.
- Focus on the local and private problems of companies in the industry.
- Help with problem solving with the help of new technologies and creative perspectives and be able to propose new methods to produce efficient solutions.

The goal of the cooperation is the improvement of the education quality according to the market demands and consequently there is a student in the middle of the triangle. He or she is also the main recipient of the benefits of such cooperation.

4. Proposing simplified knowledge transfer models

As mentioned in “Section 2” there are different ways of knowledge transfer between universities and industry. At the Ankara University TTO, we generally using 3 types of knowledge transfer model where informal channels are generally included in the contracts.

Table 1: Ankara University TTO Knowledge Transfer Models

	Collaborative Research / Contracted Research / Consulting	Academic Spin-off	IP Licencing
Tools / Models / Contracts	<ul style="list-style-type: none">• Non-Disclosure Agreement (NDA)• Protocol• Equipment Sharing Protocol• Research Staff / Labour Mobility• IP Agreement*	<ul style="list-style-type: none">• Non-Disclosure Agreement (NDA)• Company Establishment Procedures• Research Staff / Labour Mobility	<ul style="list-style-type: none">• Non-Disclosure Agreement (NDA)• Protocol• IP Agreement**
Informal Channels Included	<ul style="list-style-type: none">• Publications• Facility Sharing• Training• Conferencing / Networking		
<p>* IP agreement refers to contract which protects the ownership of current know-how (background information included in the scope of the contract) and sharing the ownership of the generated information (Foreground information generated through the scope of the contract)</p> <p>** IP agreement refers to contract which includes the IP transfer conditions</p>			

5. Results

As an interface organization between Ankara University and industry we have prepared the simplified tools and model contracts which can be used by academicians / students / entrepreneurs / companies. They are available at ankaratto.com website.

In terms of “Collaborative Research / Contracted Research / Consulting”; draft contracts made available to academicians. During the bilateral negotiations, TTO staff support academicians and industry so as to protect their rights.

In terms of “Academic-Spin-off” support mechanisms; technology management, company establishment procedures made available to academicians. TTO organizes trainings, pre-incubation, incubation and accelerator

programs so as to increase the effectiveness of Academic Spin-offs.

In terms of “IP Licencing”; patent attorneys working in the TTO, collect Invention Notification Forms (INF) from academicians and support their patent filing procedures. Ankara University patent portfolio made available in the website for private industry. During the negotiations, TTO staff support academicians and industry with model agreements prepared beforehand.

6. Conclusion

As result of simplified tools prepared by TTO, performance parameters are increased for those 3 knowledge transfer channels. University – Industry Collaboration projects increased from 57 in 2017 to 81 in 2018, established* Academic Spin-off increased from 7 in 2017 to 11 in 2018 and patent applications increased from 13 in 2017 to 21 in 2018.

As an important interface organization between university and industry, TTOs should prepare commonly used contracts, procedures and make them available for their use.

*The numbers presents the establishment of Academic Spin-offs in the concurrent year, not the total number.

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