

University-Industry Cooperation in Turkey: The Case of OSTİM Technical University

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Abstract

Within the scope of this study, the scope of university-industry cooperation is discussed, and sectoral cooperation studies in Turkey have been evaluated. While the study examines the University - Industry Cooperation activities in Turkey through OSTİM Organized Industrial Zone and OSTİM Technical University, it also reflects a regional flow perspective. Turkey's view of these cooperation studies in terms of Development Plans, current situation and strategic targets have been analyzed. The role and effectiveness of Technology Transfer Offices, which is one of the most important interfaces for University-Industry Cooperation, has been evaluated. While interdisciplinary work and sectoral clusters are discussed in cooperation studies, the difficulties experienced in this process and examples of how to overcome them are given.

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1. University-Industry Cooperation in Turkey

In this study, there is information about the historical development, current situation and current conditions of university and industry cooperation in Turkey. When we look at it historically, it is possible to say that university-industry cooperation mechanisms are maintained with traditional methods in our country. Within the framework of development plans, university-industry cooperation processes, strategic goals and the role of technology transfer offices in these processes will be evaluated in the study. Universities, which have enabled the discussion of knowledge at an academic level in the history of the world, have played a very important role in the development of knowledge and its transfer from academic level to production. Universities, which work as the main source of knowledge, have undertaken important tasks in the dissemination of information throughout the society. From the middle age, when the first university emerged, until the 19th century, the focus of universities was education. In the 19th century, besides education, which is known as the first academic revolution, research and development studies were among the main activities of universities. (Arslan, 2017)

The most basic factors of industrialization can be defined as science, technology and economy. Today's growing technology needs scientific knowledge-based and constantly innovative approaches. While universities are producers of innovative science, industry has been the biggest factor in the growth of economy and technology. In this framework, the State has the duty to implement scientific studies by providing financial support to scientific studies. Although the university, industry and state trio have an important effect on economic growth, this cooperation may not always be fruitful. University, industry and government cooperation can be seen as an area in need of improvement at all levels, and even a mandatory field for the mutual benefit of the parties.

1.1 University-Industry Cooperation in the Historical Process of Turkey within the Framework of Development Plans

When we look at the details of University-Industry Cooperation, the Five-Year Development Plans have been an important source for this issue. In the 1st and 2nd Five-Year

Development Plans, the topics for the management of technology, the relationship between science and technology and R&D were determined (Kurt, Yavuz, 2014). The relationship between education policies and technology transfer processes has been tried to be explained. When we look at the 3rd Five-Year Development Plan, advanced technologies and R&D management issues have an important place. In this context, the lack of infrastructure and institutional structures of universities or other institutions in terms of production technologies were emphasized. In the 4th Five-Year Development Plan, the inadequacy of R&D resources, the lack of which institutions and sectors will be the interface for university and industry cooperation were determined. Accordingly, technological inadequacies and high costs were mentioned within the scope of the plan. In the 5th Five-Year Development Plan, it was stated that the inadequacy of industrial policies should be resolved within the framework of R&D activities. In the 6th and 7th Five-Year Development Plans, the necessity of starting Technology Development Zones (Technopark / Technokent) initiatives and allocating a budget for R&D activities came to the fore. On the other hand, in the 8th Five-Year Development Plan, the development of new technologies and the encouragement of the work of industry and technology centers within the framework of joint cooperation were discussed. In the 9th Five-Year Development Plan, it was emphasized that the necessity of contributing to the development of the industry with new technologies by revealing the competitive structure of the industry was emphasized, and at the same time, it was emphasized that it was to ensure the completion of the structural reforms by providing stability. In the 10th Development Plan, it was decided to increase R&D resources under the title of Technological Development and Innovation, to evaluate and encourage industrial policies in terms of university and industry cooperation, and to carry out studies for the development of these mechanisms. In the 11th Development Plan, incentive systems will be established for projects developed in industry and technology zones within the scope of university-industry cooperation. At the same time, there are issues that will be carried out to train qualified human resources for this field. (Kurt, Yavuz, 2014)

1.2. Strategic Targets in University-Industry Cooperation

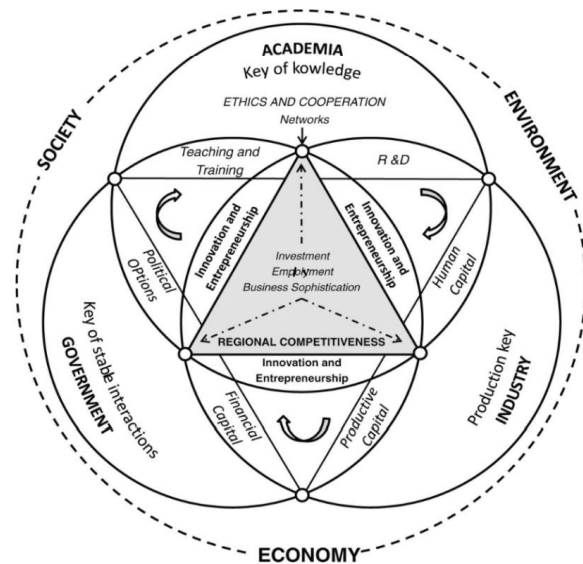
First of all, it is very important to achieve domestic production targets in the university industry ecosystem. Various resources will be developed and activated within the framework of R&D and innovative planning. Qualified knowledge production of universities and commercialization processes of technology transfer offices will be encouraged. Accordingly, technology-based entrepreneurship, 3rd generation university features will be handled with the industry and cooperation will be ensured.

Production frameworks with high added value will be determined for the formation of the market for the products that will be commercialized with R&D. Export studies should be carried out for the commercialization of high technologies and national added values that will arise in university-industry cooperation. In this way, the import dependency of the economy will be reduced in the medium and long term. In this respect, it will be important to reduce the foreign dependency of the country's industry and to increase the qualified human resource capacity of universities. From this point of view, the most important goal is to create an ecosystem that will bring universities and industry together in order to transfer the information that will emerge as a result of R&D studies of universities, technoparks and research and development centers to production.

1.3. Why University Industry Cooperation?

In University-Industry cooperation, only these two factors are not enough, and we should not forget the public part. Because legal regulations need to be prepared and implementation-oriented procedures should be carried out. The element that will ensure this is the public. For this reason, the element called University-Industry-Public and called the Triple Spiral is important. The triple helix model of innovation, as defined in concepts such as the knowledge economy and knowledge society, refers to a series of interactions between academia (university), industry and government to promote economic and social development (Compagnucci & Spigarelli, 2018).

Figure 1. Triple Helix Model for innovation.



Developing projects for solutions that will address the problems of universities, industry,

Carrying out studies for the funding of production research of universities,

Contributing to the development of high value-added products to be produced by the industry,

Revealing studies for the commercialization of both knowledge and products developed within the scope of university-industry cooperation,

Ensuring the employment of qualified human resources for the industry,

Developing the basic infrastructures (laboratories, research centers) of universities,

It is possible to count the transfer of products developed within the scope of cooperation among the main reasons.

Preparation of projects supporting the innovation capacities of universities and preparation of production-oriented studies for industry cooperation,

Increasing the technology competencies of universities accurately and effectively,

To define the roles of industry in the regional and then national R&D systems of universities and to increase their motivation in this regard,

Developing public-supported cooperation programs in project-oriented studies of universities,

It is important in terms of creating an export-oriented structure and producing information about technology so that our country can compete on an international scale within the scope of industrial policies.

1.4. The Current Situation

From past to present, many studies have been carried out within the scope of University-Industry Cooperation and various suggestions have been put forward. As a result of these studies, the practices put forward by both public institutions and the private sector, universities, research centers and industrial environment were highlighted. When we look at these studies, it has been seen that university-industry cooperation has not been established sufficiently in our country. The basis of this approach is the fact that the industry does not know universities well, approaches with prejudice, university curricula are not close to industry, and lack of legislation.

In Turkey, this situation clearly reveals that universities will take their work further, while the industry allocates financial resources to this phenomenon while trying to fulfill the human resource task that universities will train in the eyes of researchers. In the current situation, universities need to be financially autonomous in order to ensure university-industry cooperation and to ensure good progress. The main purpose is to contribute to the transformation of scientific developments in the university into both commercial and economic value by transferring them to the industry, and to encourage companies to direct them to R&D activities. Accordingly, it should be ensured that university academics establish a mutual relationship with industrialists. Undoubtedly, universities are the most important institutions that will realize the transfer of

knowledge and technology. Ensuring this cooperation has started to accelerate with the increase in the efficiency of technology transfer offices. When we look at the last 20 years, it is seen that with the increase in R&D studies, industrial cooperation has increased concretely with the existence of technology transfer offices.

In our country, it is seen that determining the current situation of the regions for university-industry cooperation, encouraging entrepreneurship and training industry-oriented personnel are insufficient. Accordingly, with the current situation, it is known that the entrepreneurial university structure in Turkey is not at a sufficient level and Technology Transfer Offices and Technopark structures are trying to do this with insufficient resources. In the current situation, it is seen that the companies do not have enough knowledge of the literature, it is seen that the disconnection between both the public sector and the private sector is an obstacle to the development of university-industry cooperation.

1.5. Technology Transfer Offices within the Scope of University-Industry Cooperation

Technology Transfer Offices are mechanisms that make great efforts for the commercialization of scientific and technological developments carried out by universities, the protection of intellectual property rights, the realization of needs-oriented activities and the delivery of technology to the industry. When we look at the purposes of the Technology Transfer Office, they focused on the main issues such as providing university-industry cooperation, acting as a bridge that will bring industry and academicians together, providing support in R&D issues, and supporting the patents of products that will emerge in University-Industry cooperation.

Today, the interaction of countries with each other has increased, economic rivalries between countries have grown and it has been accepted by everyone that productivity and innovation are the greatest power. Considering the regional economies, it is seen that the innovation-based economies are one step ahead of the economies of other countries. In many studies in the literature, the necessity of the national innovation system and the importance of university-industry cooperation have been emphasized. In addition, the necessity of having a special and expert team to manage university and industry collaborations, which is frequently mentioned in the literature, is also stated. In the light of these developments, TTOs have played an important role in transferring and using ideas or inventions that will benefit the industry in a beneficial way to society (Keleş, 2007).

Technology Transfer Offices have close relations with universities, industry and the public sector. It is important to transfer the technologies and knowledge that will emerge within the framework of university-industry cooperation. Accordingly, supporting the development of university-

industry cooperation and contributing to the development of products at an international level is one of the main roles.

Technology, knowledge, experience, know-how, design, production methods and systems; scientific and research institutions, industry, public, etc. Sharing the relations between the parties is one of the main goals of Technology Transfer Offices.

2. University-Industry Cooperation in Turkey: The OSTIM Model

OSTIM Organized Industrial Zone, which started its production and activities in 1967 with 1748 members, continues its activities as an important industrial zone of both Ankara and Turkey, with 6200 enterprises from 17 different sectors and nearly 70,000 employees. Thousands of products are also produced by small and medium-sized companies in the OSTIM Organized Industrial Zone, where production is carried out in the main headings of metalworking, construction equipment, automotive, manufacturing equipment, machinery manufacturing, electrical-electronics, plastic, rubber, medical equipment. For the success of the OSTIM Model, institutions and systems established in the fields of R&D, construction and investment, foreign trade, consultancy and promotion, in which industrialists, businessmen and non-governmental organizations are involved, provide solutions for SMEs both in an up-to-date and permanent way. While OSTIM Organized Industrial Zone is preferred as "pilot application" areas for supporting projects for SMEs in the industrial sector, it is also recommended as a regional development model for developing countries (OFIM, 2022). All companies in the OSTIM Ecosystem attach great importance to vocational training. Companies continue to work with both technology development and R&D activities. Accordingly, all institutions and organizations in this ecosystem not only support the work for the national industry, but also continue their activities in the pioneering position of our country. OSTIM Ecosystem, which is in close cooperation with OSTIM Technical University, carries out important studies in joint cooperation to strengthen the regional industry, increase R&D projects, and reach international competition. OSTIM has been in close cooperation with both regional and national universities in ensuring university-industry cooperation. At the same time, today, it has accelerated the activities of companies in a common competition at the international level and working in cooperation. It is obvious that the Organized Industrial Zone has made many plans in both micro and macro dimensions from the past to the present. Supporting regional companies with different sectors, increasing both the production and commercialization activities of the region, and accordingly, the OSTIM Ecosystem contributes to the formation of the infrastructure of many business lines.

Figure 2. OSTIM Model



Source: <https://www.ostimvakfi.com/bolgeselisbirdlikleri/detail/47>

2.1. OSTIM Clusters

In the OSTIM Organized Industrial Zone, which draws attention as the region with the highest number of initiatives in the field of clustering activities in Turkey; There are 7 different clusters in Business and Construction Machinery, Renewable Energy and Environmental Technologies, Defense and Aviation, Rubber Technologies, Anatolian Rail Transportation Systems, Medical Industry and Communication Technologies sectors.

The first clustering activities of our country have emerged within the scope of companies, institutions and organizations within the OSTIM Ecosystem. When we look at these clusters; Business and Construction Cluster, Renewable Energy and Environmental Technologies Cluster, Defense and Aviation Cluster, Rubber Technologies Cluster, Anatolian Rail Transportation Systems Cluster, Medical Industry Cluster and Communication Technologies Cluster, in addition to doing very successful works in their fields of activity, as well as to ensure university-industry cooperation. They put a lot of effort into it.

The close cooperation with OSTIM Technical University has been very important in terms of both increasing the field of study of academics and contributing to regional development. The role of clusters continues to increase day by day in terms of making Sectoral Competitiveness Analysis and contributing to international projects. In addition, they operate in the companies' concentration on their own business competencies, and their contribution in terms of technology transfer and knowledge production has also been an important factor.

2.2. *The Role of OSTIM Technical University Technology Transfer Office in the OSTIM Ecosystem*

The OSTIM region was established in 1967, and with its previously formed and developing structure, it took on an institutional structure in this date. A series of steps have been taken to produce solutions for industrial needs in its ecosystem that has developed over time. Established Technical High School, Vocational Education Center, TechnoPark and finally OSTIM Technical University have been complementary to this step. The Technology Transfer Office and Research Center established within the university undertakes the task of being an interface in university-industry cooperation (OSTIMTech, 2022).

OSTIMTech Technology Transfer Office, which aims to produce solutions for industry needs in the OSTIM Ecosystem, undertakes the task of being an interface in university-industry cooperation. For this purpose, it aims to ensure correct cooperation that enables to produce high value-added technologies. OSTIMTech TTO plays an active role in its activities aimed at the needs of the industry, in developing communication, promotion, business development and R&D activities with companies. It contributes to the OSTIM Ecosystem by activating both national and international projects with companies. Simultaneously, it provides cooperation by acting as a bridge between academics and industry.

The main university-industry cooperation models carried out by OSTIMTech TTO;

- Project-based, need-oriented university-industry collaborations,

- To produce projects between public-university, industry and university,

- To manage the patent, utility model and design registration processes that will emerge within the scope of University-Industry Cooperation,

- To provide university-industry cooperation within the scope of training programs,

- Making Business Development and Academic-Industry matching accurately and effectively,

- Managing medium and long term commercialization activities,

- Creating company profiles regionally,

- To organize joint research and training programs that will develop cooperation between our university and companies, NGOs and public institutions, which may be within the scope of intellectual property rights, and to ensure the creation of products and services at a level that will fall within the scope of intellectual property rights,

- To enable industry and universities to meet on a common platform,

- By organizing BN (Business Network) programs on a sector-based and continuous basis, to constantly bring together academics and the business world, to ensure the

formation of possible pairings on academic-business, business-business, business-academic-business axis,

- Producing solutions to the problems revealed within the scope of company visits,

- To develop the project production capabilities of both sector and corporate representatives,

- To ensure the coordination of projects supported by both national and international funds,

- To carry out studies for the benefit of OSTIMTech laboratories and industrial organizations.

Within the scope of University-Industry Cooperation, OSTIMTech TTO is in the position of interface in terms of reaching the technologies obtained as a result of technology transfer to the industry, one of the most important details here is the licensing and commercialization of inventions (OSTIMTech TTO, 2022). The gains created by OSTIMTech TTO in Market Research, patent and contract portfolios contribute to the development of the industry at national and international level.

Since OSTIMTech TTO started its activities, it has made 14 patent applications, 3 design applications and 12 trademark registration applications in a short time. R&D consultancy services were carried out under the sub-titles of TÜBİTAK, KOSGEB and European Union programs with the R&D enterprises operating in the region. OSTİM Technical University has started to be an interface between academic staff, TechnoParks in the region, sectoral clusters and academic staff. It contributes to the OSTİM ecosystem with the activities it has carried out in the last 1.5 years.

2.3. *Difficulties Before University-Industry Cooperation*

The role of technology transfer offices and technoparks is extremely critical for the development of university-industry collaborations. It is important to transfer information and technologies as a result of R&D studies carried out in universities, to encourage economic growth and to improve innovative activities. However, establishing collaborations between universities and industrial companies is a difficult and sensitive issue. There are usually differences between institutions in terms of expectations, requirements, evaluation of the results of R&D and cooperation objectives between the parties. The two most important issues are the sharing of intellectual property rights and the determination of the sharing model of the parties in the commercialization phase. One barrier to innovation is lack of access to finance. The fact that businesses that carry out innovative studies with academic staff at universities cannot find finance to implement is an obstacle to this cooperation (D'Este, Rentocchini, & Vega-Jurado, 2014).

The fact that the mission of universities is prepared for education and training and acting within a student and research-oriented definition can make industry cooperation difficult. The fact that OSTİM Technical University defines

itself as a Third Generation University, expresses itself as the "University of Industry" as a mission and is established within the borders of the Organized Industrial Zone are the factors that make it stand out in this regard (Toprak, Bayraktar, Erdoğan, Kolat, & Şengül, 2019).

Another problem that prevents the development of cooperation is the personnel turnover rate in the enterprises. The fact that the change processes of the qualified human resources working in the enterprise are high, hinders the R&D-oriented cooperation studies. The fact that the sharing model related to the product with commercialization potential was not determined at the first stage after the R&D study is among the problems (Bruneel, D'Este, & Saltera, 2021). While the company that makes the R&D expenditures expects to own more of the income rights of the product, the university that gives an academic direction to this study can make a similar request. This is seen as an important problem in cases where working conditions and income sharing are not predetermined.

R&D activity is considered as a work that takes a certain time in terms of quality. While companies want research to be done in the short term so that problems can be solved as quickly as possible with R&D, research projects for universities are considered as a job that needs to be carried out in the long term (D'Este & Patel, 2007).

3. Conclusion and Evaluation

In order to ensure university-industry cooperation, the relationship between the parties must be correctly established and the factors must be planned. To increase interaction;

- Physical facilities with new common use opportunities should be established and machinery and equipment infrastructure should be designed accordingly.
- Appropriate legal preparations should be made in order to ensure that cooperation studies where information sharing will complement each other theoretically and practically.
- The processes between Intellectual Property Rights and the parties should be planned as prescribed by law, researchers and parties who will commercialize them should be involved in the work knowing their rights.
- Cooperation between disciplines should be ensured in R&D activities, and commercialization processes should be carried out in parallel while conducting R&D work on a technical equipment.
- The support mechanisms provided by the public for R&D activities should be more effective and the budget level should be higher.
- Expanding the tax exemption processes for expenditures on R&D activities will enable greater University-Industry cooperation.

Since there are technoparks, vocational schools and training centers of different universities in the OSTIM region, it is in a structure suitable for this cooperation model. With the establishment of OSTIM Technical University, it has been directly involved in the OSTIM ecosystem and has developed cooperation with sectoral clusters and companies that are affiliates of the region. As a result of this, an increase has been observed in the number of patent, utility model, design registration applications in the region and the applications made to TÜBİTAK, KOSGEB, Development Agency, European Union and similar institutions providing R&D funds. With the evaluation of the above listed items as applicable, cooperation activities can be carried out more effectively. In particular, more effective use of public funds for R&D and the revision of legal regulations in this direction are of critical importance.

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