

ESTABLISHMENT OF COOPERATION AND COLLABORATION PLATFORMS BETWEEN UNIVERSITIES AND INDUSTRY TO IMPROVE EDUCATION QUALITY

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Abstract: Although education is the primary mission of universities, research activities in support of businesses and industries are quite important as well. The education aims to provide qualified manpower for industry in addition to create scientists for the future of our civilization. Such an aim requires coordination, cooperation and collaboration with industry to fully understand and meet the requirements of the business. Today, techno-parks which provide opportunities for industry and university cooperation have many deficiencies in terms of efficiency and effectiveness. Additionally, many countries established vocational qualification systems to realize the qualification requirements and provided a full spectrum education system to meet industrial requirements. The study is to be conducted in three steps. In the first step, capabilities of possible platforms and eligibility of them to meet the coordination requirements of universities and industries will be investigated. The second step is dedicated to investigate effectiveness of the use of different platforms. Finally possible solutions will be summarized and associated to propose an effective and applicable solution for better coordination, cooperation and collaboration.

Key Words: Coordination, Cooperation and Collaboration between University and Industry, Vocational Qualification System, Education and Research, Techno-park.

1. INTRODUCTION

Due to the state's conservative bureaucratic structure, state universities in Turkey have long been reluctant to establish cooperation with industry and just a few state universities have had links with state-owned industrial corporations. After the foundation of a private university system in the Turkish academic world, the situation has changed.

Although the first private university was founded only couple of decades ago, in 1984, private universities have become effective on cooperation issues with industry by increasing their numbers in Turkish academic life in the 2000s. Since then, University-industry collaboration has been a foregoing issue in academic planning because most of the board of trustees' members of foundation universities were coming from the business world and they have already had links to start cooperation with the industry

As a result of the new opportunities provided by university-industry cooperation and encouragement by the state, the research function of universities in addition to the routine educational function has started to gain more value. Research is not only a scientific inquiry but also a business for private universities. Moving from this point of view, private universities have also assumed the research cooperation with industry as a significant tool to increase their incomes to secure flow of their revenues. Meanwhile, decreasing government support to state universities due to the increasing number of universities in the country made the universities search for new resources to support their research activities. Accordingly, they have also started to look for cooperation with industry as a new asset to expand their limited resources allocated for research.

Both Turkish industry and universities do not have an enhanced expertise on research projects and development of innovation, and, unfortunately, most of them are still reluctant on the matter. Despite the state's developing interest and encouragement, university-industry collaboration could not gain sufficient momentum. There is a threat to reduce getting benefit from the young and educated population in the country. This gap may slow down the improvement of research activities and lose innovation efforts which are vital for the development of the country. In order to fulfil this gap, the European Union funded research projects may be an opportunity as being a suitable tool. The cooperation and collaborations of Turkish universities with some EU universities on these kind of projects would facilitate improvement of practice and lead to start similar projects in home. Even though some universities have already been participated in EU funded projects, their numbers are still inadequate and project sharing level is low.

Nowadays industry and university cooperation moved another dimension from cooperation to collaboration. Collaboration means the action of working with someone to produce something and it differs from cooperation which means the association of person or business for common, usually economic benefit. The co-works in the university-industry activities mainly resemble the collaboration rather than cooperation as a nature of the work. An important part of information exchange process requires with a series of jobs which should be

done together as synchronized movements. So we should consider also collaboration beyond coordination and cooperation. This makes us consider collaboration when we study on the relations of university and industry.

This paper will introduce the current situation on university and industry collaboration in Turkey and look for new opportunities.

2. METHODOLOGY

The aim of this study is to determine current problem areas in the university and industry interactions in Turkey and to define probable solutions in establishing platforms for effective coordination, cooperation and coordination issues especially in improving education quality. The study is to be limited with university and industry relations to have an effective applications of collaboration activities for the benefit of not only the industry but also for benefit of universities.

The study has been conducted in three phases. In the first phase, intention was to gather detailed information and present a full view of current situation in Turkey on university and industry cooperation, collaboration and coordination issues. The second phase covers study of data related to the subject. In the third and final phase the findings are categorised, grouped and associated for a further deeper study that is necessary for formulating possible/probable model solutions which may overcome the possible problems directly affecting the success of a mutual collaboration. In this phase, proposals are also prepared and summarized to be discussed in related/respected forums.

This paper is designed to provide discussion items on possible solutions especially for cooperation, collaboration and coordination requirements to be taken into account in establishment of platforms/mechanisms aiming to improve university and industry relations. Accordingly, having introduced to the subject and determination of research methodology respectively in the first and second sections, then, issues related with education and research possibilities and cooperation and collaboration opportunities both for universities and industry are to be discussed in detail in the third section and results are to be presented in the last section.

The results of this study will provide possible solutions to establish effective platforms in providing reliable, acceptable and applicable coordination, cooperation and collaboration between universities and industries.

3. DISCUSSION

3.1. The University-Industry Collaboration:

The university–industry collaboration is one of the most important means of embedding accumulated knowledge into production. University-industry mutual collaboration is a special multidisciplinary process using basic and theoretical knowledge that are obtained from universities for the benefit of industry. It is not only a commercial factor, but also a routine practice necessary for innovation and economic development.

Etzkowitz (2002) adds government contributions into university-industry collaboration activities and defines three different types of university, industry and government collaboration in his study. Triple Helix is the most welcomed model stationed in the core of his theory. The concept of the Triple Helix of university-industry-government relationships initiated in the 1990s (Etzkowitz and Leydesdorff, 1997), interprets the shift from a dominating industry-government dyad in the Industrial Society to a growing triadic relationship between university-industry-government in the Knowledge Society. The Triple Helix thesis is that the potential for innovation and economic development in a knowledge society lies in a more prominent role for the university and in the hybridisation of elements from university, industry and government to generate new institutional and social formats for the production, transfer and application of knowledge. Triple Helix Thesis has evolved over time to its neo-institutional and neo-evolutionary perspectives.

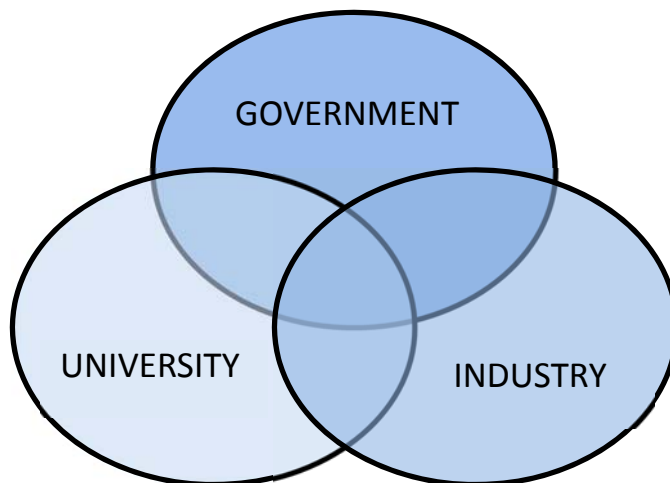


Figure 1: Triple Helix; Government, University, Industry Collaboration.

A (neo) institutional perspective examines the growing prominence of the university among innovation actors. University has gained a 'third mission' as commercialization of academic research and involvement in socio-economic development, such as forms, stakeholders, drivers, barriers, benefits and impact, university technology transfer and entrepreneurship, contribution to regional development. A (neo) evolutionary perspective sees the university, industry and government as co-evolving sub-sets of social systems that interact through an overlay of recursive networks and organizations. These interactions are part of two processes of communication and differentiation: a functional one, between science and markets, and an institutional one, between private and public control at the level of universities, industries and government (Etzkowitz and Leydesdorff, 2000).

The Entrepreneurial University is a central concept to the Triple Helix. It takes a pro-active stance in putting knowledge to use and in creating new knowledge. The academic 'third mission' - involvement in socio-economic development, next to the traditional missions of teaching and research, is most salient in the Entrepreneurial University. Collaborative links with the other innovation actors have enhanced the central presence of universities in the production of scientific research over time. The Entrepreneurial University also has an enhanced capacity to provide students with new ideas, skills and entrepreneurial talent. Students are not only the new generations of professionals in various scientific disciplines, business, culture etc., but they can also be trained and encouraged to become entrepreneurs and firm founders, contributing to economic growth and job creation in a society that needs such outcomes more than ever. Moreover, entrepreneurial universities are also extending their capabilities of educating individuals to educating organizations, through entrepreneurship and incubation programmes and new training modules at venues such as inter-disciplinary centres, science parks, academic spin-offs, incubators and venture capital firms. Entrepreneurial universities also have an enhanced capacity to generate technology that has changed their position, from a traditional source of human resources and knowledge to a new source of technology generation and transfer. Rather than only serving as a source of new ideas for existing firms, universities are combining their research and teaching capabilities in new formats to become a source of new firm formation, especially in advanced areas of science and technology. Universities increasingly become the source of regional economic development and academic institutions are re-oriented or founded for this purpose (The European Commission, 2012).

The Enterprise Concept focuses upon the development of the 'enterprising person and entrepreneurial mindset'. The former constitutes a set of personal skills, attributes, behavioural and motivational capacities (associated with those of the entrepreneur) but which can be used in any context (social, work, leisure etc). Prominent among these are; intuitive decision making, capacity to make things happen autonomously, networking, initiative taking, opportunity identification, creative problem solving, strategic thinking, and self efficacy. The 'Mindset' concept focuses not just upon the notion of 'being your own boss' in a business context but upon the ability of an individual to cope with an unpredictable external environment and the associated entrepreneurial ways of doing, thinking, feeling, communicating, organising and learning (Gibb, 2013).

The university has a place in the main core in collaboration. Science and innovation policy is directly linked with the university and industry. Universities have several functions related with industrial requirements such as to educate qualified staff of growing business, to increase their knowledge and to find solutions for the business world (Hughes, 2003).

University industry collaboration was having problems because of approaches sceptical of the industry and hesitant of academicians initially. Developments in science and also with the participation of state later achieved great progress and have established stronger links (Etzkowitz, 2010).

The basic motivation behind university–industry collaboration in research is to increase development capability and innovative potential of the companies (Geisler et al, 1990). This collaboration leads the way to an increase in country's competition power as well.

According to Carayannis (Carayannis et al, 2000), university–industry relations gained new perspectives especially in the field of research and development in industrialized countries. Today, many countries all over the world are getting benefits of social and technological knowledge and research capabilities of universities in developing their wealth and prosperity in collaboration with their industrial capacity.

3.2. Considerations for the Effective Collaborations:

The gradual, transparent and clear procedures and step by step relationship instead of intertwined relationships have gained importance due to the difficulty in cooperation issues in collaboration.

Each university has a reputation on one or two specific subjects. The industry searches integrated capabilities to support their enhanced and mostly complex research requirements. To meet industrial requirements, universities require to merge their abilities and to achieve that they should establish cooperation to enhance their capabilities for research. Such consolidated universities are more attractive for industry which looks for competent partners for their large scale comprehensive research projects. Therefore, the first step should focus on university-university collaborations. A university which forecasts the future cooperation field

(under a practice, policy and system environment) should estimate of the situation and should be in an effort to fill its gaps in capability by looking for collaboration with an available university.

The large scale projects also require cooperation with the government and society. That means achieving a comprehensive research study additionally needs cooperation with government and society. The best practice is to provide such cooperation in a single platform, if not additional platforms should be establish a strong cooperation with all three elements. Three main elements will also provide a link to understand “real life practice, policies, systems and environmental issues” which key elements directly affect research studies (See Figure 2).

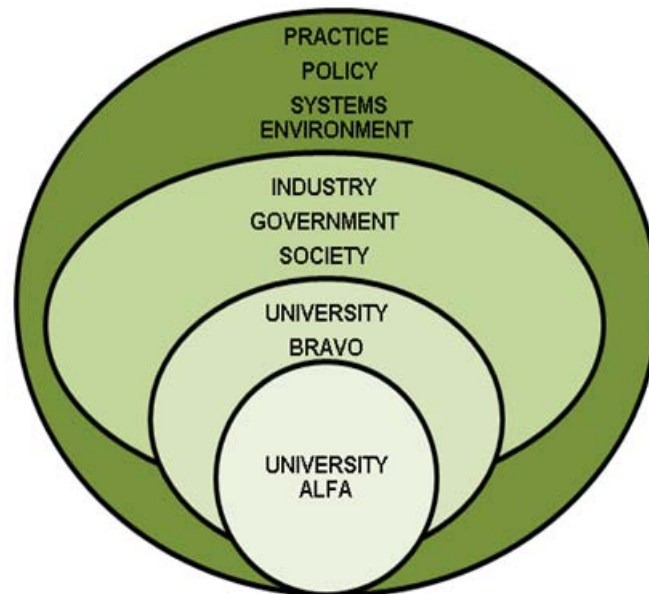


Figure 2: Interlinked Echelon for an effective cooperation

Environmental opportunities provides not only practice, policy and systems but also available and suitable platforms for collaboration issues such as techno parks, technology transfer offices and alike.

University-university collaboration requires coordination and sometime cooperation and collaboration of different units of each university as well. Collaboration efforts of vocational units should be focused on meeting of industrial requirement precisely and effectively.

The cooperation and collaboration is a complex activity and needs to be handled in a strategic perspective and should be led by upper management. David (2011) considers that “Strategic planning is an involved, intricate, and complex process that takes an organization into uncharted territory. It does not provide a ready-to-use prescription for success; instead, it takes the organization through a journey and offers a framework for addressing questions and solving problems”. To achieve such a complex mission strategic management concept should be taken into consideration. So the formation of the upper management (Board of the Trustees, Board of the Managers) should be redesigned under this concept which is based on stakeholders who are from the institutions which has close relations with university. Actually this is already being actualized by the private universities having many trustees form business and industry, but not for the state universities.

3.3. University-Industry Collaboration in Turkey:

The knowledge and technology transfer between universities and companies in Turkey, has recently gained impetus in recent years. Under the conditions of unwillingness of private companies for R&D (research and development) investments and their desire to exploit more intensively external knowledge sources whereas there is only a slight increase in public funds devoted to scientific research, there is an improvement in interaction between universities and industry in Turkey in 2000's due to the rise of knowledge economy which is mainly based on new developments in science-based technologies.

The investigations prove that cooperation between educational institutions and the business world is still insufficient and suggests that more comprehensive measures should be taken to improve existing situation. As an example, we can introduce a comprehensive survey conducted by the World Bank in 2007. The survey proved that of a large segment of the business sector (55%) were not satisfied with the education given in the universities and only half (48%) of the universities is reported to be willing to cooperate with the business sector. The cooperation between the business sector research and development organizations are recognized as less than 10% (World Bank, 2007).

Joint research and developments programs of university and industry have also been supported by

governments with legal regulations. In recent years, important regulations were introduced in this direction are as follows;

The Law numbered 4691 provided important incentives for technology development zones (Official Gazette, 2001).

The law numbered 5746 brought about the support procedures of R&D activities (Official Gazette, 2008).

The programme for the establishment of University-Industry joint Research Centres (USAM) by TUBITAK provided new opportunities. University-industry Joint Research Centre was closed in on the base of TUBITAK Science Board Decision. From that time, Centre for University-Industry Collaboration Platform (USIMP) as a non-governmental organization has taken the role of USAM and the responsibility on coordination of university-industry collaboration issues (USIMP, 2006).

In the recent Development Program of State Planning Organization (SPO-DPT) for the period of 2014-2018, it is emphasized that “structure and functioning of the technology development zones will be made more active and effective in order to maximize the level of innovative entrepreneurship, university-industry collaboration, inter-enterprise collaborative research and development and innovation activities (Para.632)” and “further facilitating and encouraging measures on the university and private sector cooperation will be brought into force. Additionally, R & D and entrepreneurship activities will be encouraged in restructuring of higher education (Para.634)” (Onuncu Kalkinma Planı, 2013).

Despite the incentives mentioned above to build up and improve connections between universities and firms, the interactions are still limited. The main reasons could be the lack of resources at universities as well as the lack of resources and skills on the firm side or insufficient mechanisms to facilitate knowledge and technology transfer between universities and firms. Even if the number of research centres, master and PhD programs, and researchers especially in emerging fields required by the industry’s media has significantly increased in the recent years; the rising awareness of universities, firms and government bodies; but how knowledge and technology transfer between academia and industry be increased still stands as an important issue (Beyhan and Findik, 2010).

3.3.1. Technology Development Zone Practises In Turkey:

The main purpose of “Technology Development Zones” is to contribute to the development of export oriented technology and worldwide competitiveness of the country's industry according to the law numbered 4691. Technology development zones have been given a legal structure in Turkey as in the first time in year 2001 with the Law Numbered 4691.

Government-University-Industry Collaboration Assessment Report, Strategy and Action Plan (2015-2019) (Draft) prepared under coordination of Science, Industry and Technology Ministry and promulgated to public in 2014. According to that document, as of April 2014, 55 technology development zones (TDZ’s) have been established in Turkey. Such technology development zones, as platforms to facilitate the process of public universities and industry collaboration, are among the leading institutions of technological development. Technology transfer offices (TTO’s) in those technological development zones are established to ensure the collaborations between academics and enterprises.

TTO’s carry out many tasks, such as the devise venture capital for the realization of joint projects between the business world and academia, the commercialization of research results to the business requirements and to provide counselling both for university and for industry.

A very wide incentive mechanism exists for the establishment of a public, university and industry cooperation schemes offered by public support. Those incentives are detailed in the Government-University-Industry Collaboration Assessment Report, Strategy and Action Plan (2015-2019).

Technology transfer offices, technological development zones and public, university and industry collaboration issues were analyzed in total and weakness items presented in the aforementioned report. Some of the deficiencies stated in the report are listed herewith.

The communication channels between the public, the university and the industry is not functional,

A common institutional framework and a sustainable dialogue systematic could not be established,

Firms do not know the procedure on how to contact the university will be,

Lack of full-time employment of qualified personnel in technology transfer offices,

Many machines and test equipment obtained by state support cannot be used because of lack of technical staff,

Despite the increase in quantity of universities in Turkey, namely the nature of the quality problem continues,

Local / regional problems and needs of the industry are not to be among priorities of the university's research,

Lack of industry-focused scientific research projects,

Inadequate number of teaching staff does not provide solutions to the problems of industry,

The teaching staff does not have the experience enough to respond to the problems of industry,
The registration number of domestic patent applications remains low,
Cooperation between academic researchers and firms in techno parks are extremely low.

As it is seen, although wide support is provided by many means, the system for public, university and industry collaboration which was created by the state does not work well. The report provides an action plan effective for the period of 2014-2019 to make the deficiencies in the current system corrected as well.

3.3.2. Vocational Education and Training System:

The main aim of the vocational education and training (VET) is to provide qualified people to support industry. In order to achieve this aim the provision of cooperation between business sector and vocational education and training institutions is strictly necessary.

The operating methods and requirements of industry and VET are generally different as a nature of their *modus operandi*. How those requirements are combined is the main question of business and academy collaboration efforts today.

It is clear that we cannot undermine the education philosophy and techniques as well as the requirements of the industry which is the reality of economic life. We may satisfy both sides if we can define over-sections of the requirements of two parties which depend on each other.

A significant evolution has happened in the vocational education system recently. Higher vocational schools / community colleges/polytechnic schools became a part of the universities and universities started an important player in the VET. This change has created a positive transformation in meeting the requirements of industry because university provided a suitable platform for collaboration. Not only the organizations but also programme structures has drastically changed with the inclusion of universities into the VET system.

Industry has started to demand more specific manpower with additional qualifications and many new job descriptions rose in 2000s. Unfortunately education institutions could not fully support these new manpower requirements. To meet these requirements, many new institutions have been established to provide special courses to support the industry. Some companies established their own schools and training departments to meet their specific manpower needs. The countries which realized this problem have formed special platforms consisting of the representatives of the education institutions and industry to improve a suitable system to meet mutual requirements. The role and the mission of such platforms became more significant after vocational qualification systems became an important area of concern in the Western World.

The European Union has established many qualification standards and institution for the VET. The European Quality Assurance Reference Framework (EQAVET) and work based learning are good examples of European Union's effort to make VET coordinated well. Those regulations are designed to meet the industrial requirements in the European Union Areas specifically based on defined lessons learned after the economic crisis of 2008.

The European Quality Assurance Reference Framework (EQAVET) is a reference instrument designed to help EU countries promote and monitor the continuous improvement of their vocational education and training systems on the basis of commonly agreed references. The framework should not only contribute to quality improvement in VET but also, by building mutual trust between the VET systems, make it easier for a country to accept and recognise the skills and competencies acquired by learners in different countries and learning environments.

Work-based learning (WBL) is another tool and a fundamental aspect of vocational training for the European Union. It is directly linked to the mission of VET to help learners acquire knowledge, skills and competences which are essential in working life.

In many countries bilateral links between industry and government have been established to improve the vocational education and training system, but it could not worked as expected because of missing elements for providing inputs for feeding the system better. The regulatory authority, the government is the key element of the system with its respective bodies such as Standardization, Vocational Qualification, Education, and different Industry Departments.

Vocational education in Turkey is carried out at many levels such as apprenticeship practices in industry, common education in society, formal education in schools of different levels and so on. Higher vocational education and training is coordinated and supervised by the Council of Higher Education (CoHE). Associate's programs are executed in post-secondary vocational schools which are institutions of higher education that is aimed at training human capacity in specific profession and provides instruction lasting four semesters. The associate degree programs may require a period of on-the-job training specifically aimed to meet the industry requirements. As of September 2014, there are 176 universities in Turkey. There are also eight independent post-secondary vocational schools not attached to any university. According to statistics of CoHE, total number of students in post secondary vocational schools is 1,750,133 in the education year of 2013-2014 (The Council of Higher Education, 2014).

The project under the name of "Development of Vocational and Technical Education Quality Project

(METEK)” has been underway since 2009. Within this project, vocational education needs are determined and executed under the coordination of a group composed of vocational schools faculty members, industry and civil society organizations.

4. CONCLUSION

Although many supportive and incentive means are provided by states, the current system for public, university and industry collaboration does not meet the today’s industrial requirements. There are a lot of deficiencies in collaboration in many areas from the communication channels to the inadequate cultural infrastructure both in academy and industrial community. Incapability and unavailability of universities on research issues has a special importance in shortages list of the current system.

Both universities and industry need to make coordination, cooperation and collaborations to enhance their scientific and commercial capabilities. Universities need to establish a special board to assess the research capabilities and possible cooperation opportunities taking into account existing and future requirements. Such association also requires establishment of permanent units to handle the planning, execution and controlling all respective activities. In addition to these permanent units, common platforms such as scheduled meetings, regular boards, and research conferences should be arranged. Therefore, a special unit which may be organized as a section or department to assume the responsibility of coordination, cooperation and collaboration activities needs to be established and manned by suitable academic and administrative personnel. Pending upon the size and content of the research project Ad Hoc committees may be activated.

University-university collaboration has also started playing an important role in the core of the university-industry collaboration efforts. The universities may enhance their research capabilities taking benefits from the experiment of each other. The above mentioned special unit should also handle the cooperation and collaboration activities among the universities in all state and private universities.

The cooperation between university and industry is also assist to improve the Vocational Education and Training System which is a vital element for economic development. The higher education institutions need to establish links with industry to improve their education quality in particular post-secondary vocational schools.

Innovation requirements created a “research projects market” which commands great amount of values. All projects need a detailed study on the cost evaluation, feasibility, manpower, budgeting, finance and planning to complete the work on a timely manner. Unfortunately the academicians are not expert on the pricing not being actors of the real economic life. To solve this problem most of the universities which continuously conduct cooperation with industry and business world, should also establish their own office for project evaluation and pricing manned with experts on the procurement, budgeting and finance.

The management boards of the state university generally consist of academicians. The new era enforces the universities for close cooperation with business and industry. To achieve this complex task the state universities should apply strategic management concept and configure their management boards under stakeholder approach which facilitates establishment of close links with business and industry.

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