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THE ROLE OF THE HIGHER EDUCATION MANAGEMENTS ON LEADING THE UNIVERSITY AND INDUSTRY PARTNERSHIP THROUGH CLUSTERING: CASE IN HEALTH

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Abstract

Restructuring of higher education and its management is one of the liveliest debated topics in Turkey. In this paper, this issue is approached by focusing on university-industry relations. Technological advancement and globalization have substantial effects on the structure of the university and the industry. This paper not only aims to make suggestions that could be useful in the on-going debate about restructuring of higher education management in Turkey, but also to analyse critically and deeply what the roles of the higher education managements have on clustering, how they affect the success of the clustering, particularly what kinds of roles they have that they can affect significantly their stakeholders, universities in the region, international and national companies, small medium enterprises (SMEs), researchers, academics, start-ups, spinoffs, suppliers, and non governmental institutions, particularly in the field of health in which the translational research is the main area of activities. The author concludes that the mentality and the strategic approach of the higher education managements play an important and crucial role in developing sustainable partnerships like clustering, which requires long-term, intensive collaboration.

Keywords: University, industry, alliances, collaboration, higher education management, stakeholders; clustering

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1. Introduction

It is highly valuable to state that the ultimate aim of biomedical research is to answer medical questions leading to the discovery of treatment, prevention and diagnosis of diseases that cause illness and death. According to European Medical Research Councils (EMRC) White Paper II "A Stronger Biomedical Research for a Better European Future", it is a vast field of science that includes parts of life, physical and social sciences. It is commonly divided into basic research, which broadly investigates the underlying processes of living organisms to help understand how they function; and clinical research, which applies basic research discoveries to human subjects to determine the effectiveness and safety of drugs, methods and devices used to diagnose, support and maintain individuals during and after treatment for diseases. Translational research has recently emerged as a new discipline that emphasizes the importance of translating basic research 'from the laboratory bench to the bedside'.

Biomedical research has had a major impact on people all around the globe. For instance, over the past 40 years, infant mortality in Europe has dramatically dropped through the implementation of social and public health advances such as childhood immunization for diseases like polio and diphtheria. In addition, efficient drugs for adults have revolutionized the treatment of heart attacks and high blood pressure and enabled many people with schizophrenia to emerge from mental hospitals to live at home. While cancer is still a major cause of death, it should not be forgotten that leukaemia for example was once a fatal disease and many now live with a variety of cancers. Technical advancements have also brought significant benefits. It can be said that biomedical research holds more promises for the future. As proven by past breakthroughs, it can lead to better health, welfare and economic prosperity for Turkey and all of Europe if the right political and strategic choices are made. Because of its impact on society, it can be said that biomedical research in particular is poised to become the predominant science of the 21st century.

According to European Medical Research Councils (EMRC), the health industry faces a number of challenges:

The evolution of biomedical research is producing a massive increase in the complexity and quantity of data, there is a move towards so-called 4P medicine (personalized, predictive, preventative and participatory) with the need for global health solutions, the number of market approvals is decreasing while R&D costs continue to increase, together with the emergence of generic medicines, and there are moves towards enhanced anticipation and minimization of risk within the industry .This new landscape has resulted in new relationships between academics, biotech's, Small and Medium Enterprises

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(SMEs) and multinational companies. Clearly, industry can no longer rely on in-house research alone.

According to the Convention on Biological Diversity (CBD), biotechnology is any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products for specific use. (Secretariat of the Convention on Biological Diversity, 1992). This definition includes medical and industrial applications as well as many of the tools and techniques that are commonplace in agriculture and food production.

According to BioPolis National Report of Turkey (2007, March), while the government's efforts to strengthen biotech research capacity in higher education institutions seems to satisfy academia, the university–industry link seems to be missing. The low number of national patent applications indicates that in this area, innovation and thereby applied research is relatively poor. In the present scenario, the applied research projects in agricultural biotechnology (field trials with GMOs) are mostly being conducted by international companies. Public knowledge and public awareness of possible risks in agricultural biotechnology is low. There is almost a complete lack of consumer awareness in this field. Apparent causes for this lack of interest include few financial resources to create awareness, the lack of interest due to other seemingly more important socioeconomic issues, and the lack of public trust in civil service organizations. As a result, many Turkish consumer organizations, to their own detriment, do not contribute to the on-going dialogue.

Most of the leading universities have been strategically and systematically collaborating with different sectors of industry, particularly since the rise of a global knowledge economy. Therefore, the strategic partnership and collaboration have deeply intensified and transformed in order to increase highly technological and innovative products and services by participating in different proactive, interrelated, and integrated projects.

Most of the time the management styles and decisions have markedly affected the success of the strategic partnerships. In other words, the role of higher education management has increased the complex structure and organization of the strategic partnership, in which the industries prefer to pay more for the activities at the universities, outsource their Research & Development to universities laboratories, technology parks, and invest by going beyond the traditional funding at the universities where they open their offices, laboratories, and even buildings. More importantly, some of the world-class research universities managements, particularly in the US, play important roles in pioneering such partnerships by clustering one sector, such as clustering in health, biotech, and high-tech industries as in Silicon Valley. These clusters are specifically designed by the university and

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industry partnership to increase the longevity of the partnership, to invest strategically, and to collaborate effectively and efficiently in the competitiveness of companies, universities and regions.

The role of the research universities in the competitive, 21st century global economy has significantly transformed since they became vital centres of attraction and excellence. Their higher education managements with the partnership of industry help improve sustainable economic growth while decreasing social challenges. According to the Literature review carried out by Evila Piva and Cristina Rossi-Lamastra (2013) it can be seen that firms more and more frequently establish collaborative relationships with universities as a consequence of the on-going changes in the role of universities. Indeed, universities are increasingly active in technology transfer activities, including the creation and incubation of technology-based ventures, patenting, licensing, collaborative research, contract research and consulting (Wright et al., 2008). However, a firm that has profit as its ultimate goal has objectives, knowledge bases, incentives and governance structures that are very different from those of a university, for which technology transfer is still a ‘‘third’’ mission (Etzkowitz, 2003) and which historically has followed the key missions of teaching and scientific research. This diversity poses managerial challenges to firms that establish collaborations with universities.

In order to make university-industry alliances long-lasting, it should be taken into consideration that there are several dilemmas making university-industry collaborations difficult to create and maintain in a manner that benefits both sides. According to Cyert and Goodman (1997), the following dilemmas can be seen:

1.University and Company Partners Have Fundamentally Different Cultures:

The differences manifest themselves in divergent goals, time orientations, languages, and assumptions. Universities create knowledge, while companies produce products and services in a highly competitive environment. Most companies think about time in terms of meeting quarterly goals and other short-term constraints. For the university, time frames are much longer and less well defined. These differences work against effective UI relationships. In addition, the languages are different. “Hypotheses,” “models,” and “variables”, claim a lesser role in the vocabulary of most industry representatives participating in research centres. Moreover, many of the basic assumptions about work are different. For example, the central constituency for most university researchers lies outside the organization, in their professional reference group. While the university gives these researchers salary and tenure, their reputations in the field are a driving force. In contrast, for most managers involved in university centres, their boss or hierarchical superior is the critical constituent. Performance

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evaluations come from this source and take into account specific results from the university-industry collaboration. If participants from the university were to be subject to this type of evaluation, it would be difficult to motivate them to join a UI research collaboration. Also, faculty interests may change, and the university environment leaves them relatively free to exit UI relationships.

These motivational differences between the university and the firm are fundamental and can work against the relationships. All these cultural differences can lead to misunderstandings. Firms typically do not understand how work gets assigned in universities or how university budgets are created, nor are they familiar with the investments in human and physical capital that preceded their relationship with the university. University partners typically do not understand market forces, time demands, and the incentive structure of the firm.

1.1. The Nature of the Work and Products of UI Relationships differ

Firms enter into UI relationships because they want access to new scientific knowledge, new tools, new methodologies, new products, and the like. The nature of the work, however, is likely to be complex, ambiguous, and abstract. Much of the knowledge generated may be tacit. Moreover, there will likely be long time spans between project initiation and product creation. All these features are likely to create crises, misunderstandings, and difficulties in transferring knowledge. In addition, the "products" of these two institutions are quite different. Most companies desire concrete applications: typically, products or services, but also innovative procedures or approaches to problem solving. The university faculty members work for a much different product: contributions to knowledge in the form of new concepts, models, empirical findings, measurement techniques, and so on. Even when the university-industry research centres create interim products in the form of "proof of concepts," or prototypes, these fail to satisfy.

On one hand, these prototypes capture new ideas and concepts. On the other hand, they are far removed from a final commercial product. The road to commercialization is made more difficult in UI alliances because (1) university researchers typically lack the motivation and skills to move beyond the prototype, and (2) company representatives will have difficulty understanding the explicit and tacit knowledge inherent in the prototype. Issues concerning the ownership of the intellectual property rights also create tensions. The inherent nature of applied research - its complexity, ambiguity, long time span, and tacit qualities - can create a series of crises that may work against a viable UI relationship.

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1.2. Exogenous Shocks

The corporate world is subject to unexpected shocks-mergers, acquisitions, reorganizations, fluctuation in the economy, and downsizing, to name a few. While the world of the university has typically been more stable, it is not immune from equally disruptive events. The bidding away of key faculty members, administration turnover, and related events can change the direction and support of UI centres. Since many university-industry centres are engaged in researching fundamental problems that are not quickly resolved, projects are based on the assumption of long- term relationships. Regardless of from which side the exogenous shock hits, it will threaten the established relationship.

According to Cyert and Goodman, an effective UI Relationships can be based on the following steps:

1) Select problems that are intrinsically motivating for both parties. Spend time up front ensuring that the right problem is selected.
2) Create team-based organizations to conduct UI activities. One key issue is designing the team so that each party builds on its relative strengths. Another design issue is to integrate team activities so that both the university and industry members are knowledgeable about the total process, from problem formulation to the dissemination of results.
3) Create a process that permits a re-evaluation and possible redesign of the relationship over time.
4) Build multiple tasks (applied research, executive education, selection and recruitment) between the university and industry. Multiple activities such as these will create a community of interests between the company and university.
5) Create personnel linkages at different levels and areas of the company and university. This creates a community of interests that offsets the dilemmas and supports learning.
6) Create new formats to disseminate results of UI relationships to both company and university personnel. Seminars, executive training, briefings, and electronic bulletin boards represent some first steps.
7) Create new organizational arrangements to share results and their implications. For example, most universities have multiple centres, which tend to focus on specific content areas. However, in these diverse centres there may be some general properties, such as new methodologies or instrumentation that may be shared. Linking centres may be a new organizational arrangement that facilitates learning.

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8) Use existing developments in information technology to disseminate results and to store findings that may be useful to university or company.

2. Problem Statement

For the last two decades a massive shift from old-fashioned universities to entrepreneurial universities has been witnessed. In other words, the role of higher education management has been undergoing a constructional change, which leads to a university-industry collaboration. One of the most significant changes can be seen in the growth of clustering. This improves sustainable economic growth while decreasing social challenges. Universities are increasingly active in technology transfer activities, including the creation and incubation of technology-based ventures, patenting, licensing, collaborative research, contract research and consulting (Wright et al., 2008). However, a firm that has profit as its ultimate goal has objectives, knowledge bases, incentives and governance structures that are very different from those of a university, for which technology transfer is still a ‘‘third’’ mission (Etzkowitz, 2003), which historically follows the key missions of teaching and scientific research.

In this study, the main purpose is to analyse critically and deeply what the roles of the higher education managements have on clustering, how they affect the success of the clustering, particularly what kinds of roles they have that they can affect significantly their stakeholders, universities in the region, international and national companies, small medium enterprises (SMEs), researchers, academics, start-ups, spinoffs, suppliers, and non governmental institutions, particularly in the field of health in which the translational research is the main area of activities.

3. Research Questions

There are two research questions in this study;

(a) What is the Role of the higher education managements on leading the university and industry partnership through clustering?

(b) How can these management styles and decisions affect the success of the strategic partnerships between university and industry and lead to an increase in high-tech, innovative products and services?

These questions are crucial to understand all stakeholders’ perceptions about the role of the higher education managements. According to the article (Erdil et all, 2013) technological advancement and globalization have substantial effects on the structure of the

university and the industry. The authors offer several useful suggestions about how the university system should be organized in such an environment.

4. Purpose of the Study

The purpose of this study is to show that university and industry alliances are crucial to sustainable economic growth. In order to achieve this goal, it is important to understand the nature of higher education managements: in other words, how they differ from their industrial partners. According to Cyert and Goodman (1997), alliances between universities and industries are proliferating. At one level, these partnerships provide universities with funding sources as government support for research declines. Companies, in turn, are able to tap into knowledge at the frontier of science and achieve flexibility in funding their own research and development efforts. At another level, many of these collaboration attempts simply do not work. For the universities, proprietary issues may block the hoped-for dissemination of ideas. For companies, the promised technology transfer may not materialize. Many partnerships are terminated with no benefits to either side. This paper explores university- industry relationships and mainly focuses on the role higher education managements have on this collaboration.

5. Research Methods

The role of the higher education managements on leading university and industry partnership through clustering, particularly in health was observed and studied for ten months in Turkey by using phenomenological analysis as a research method. In this study, 72 different institutions were involved, and 17 different research questions were answered by 125 different participants from different institutions in semi- structured interviews. The institutions are the following ones:

- 3 of them are universities at the rector's levels,
-11 of them are faculties,
-11 of them are research centres from 5 universities,
-1 regional chamber of commerce,
-24 international companies,
-12 national companies,
-2 attorneys,
-3 consultancies,
-4 non-governmental organizations (NGOs).

The data analysis is conducted after making data mining for deductive reasoning.

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6. Findings

Most of the participants (91%) of this study agree that the mentality and the strategic approach of higher education managements play important and crucial role in developing sustainable partnership, like clustering in which long-term intensive collaboration is needed. Additionally, the participants from all the stakeholders strongly point out that the higher education managements and leaders are the ones who mediate the policies, the strategies, and long term and short business plans. The large number of the participants (79%) mentions that the success of the clustering depends on the policies of the higher education management, like it is seen in Silicon Valley region in which Stanford and UC Berkeley University have done comparing to MIT and Harvard University. According to most of the participants (87%), in Turkey, the system is very slow, and the bureaucracy is decreasing the effective and sustainable partnership for clustering. All the participants point out strongly that the government should support clustering at the universities depending on the competencies. Hence, the higher education managers should develop the system under the support of the government.

Additionally, most of the participants (87%) from the international and national companies do not really believe that the universities can really manage the clustering, like in the US and EU. Even though Turkey has great potential in some fields, like in translational research, the universities do not have such a global competitive vision; hence, the university managements in the rector, university academic senates, the deans, and the trusties' levels should support and canalize strategically their efforts to make clustering possible and successful. According to the findings above the following results might be expected.

7. Conclusions

Firstly, higher educational managements should be restructured in such a way that they are able to respond to the new demands that require new kinds of resources and new forms of management. Especially new forms of management enable higher education institutions to make a dynamic contribution to the development process. The challenge is to link within the institution the teaching, research and community service roles by internal mechanisms (e.g. funding, staff development, incentives and rewards, communications) and to engage the institution with all facets of the regional development process (e.g. skills enhancement, technological development and innovation, cultural awareness) in a higher education institution. In other words, the `value-added management' process in the learning region can be brought about through enhanced cooperation between firms.

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The first step, which has to be taken by an effective higher education management, is to activate the University research centres. According to Erdir et al. (2013) and Boardman and Bozeman (2007), these activated research centres will be able to adjust to a new organization of higher education where clearly defined divisions between different disciplines will no longer exist. This step will also lead to the rise of so called "Hybrid Researchers". In the United States, for example, 40% of the academic staff works part time in one of these research centres.

Another contribution of activating these research centres is that the knowledge produced here is easier to commercialize by the researchers due to the foundation of the spin-off firms. In addition, these spin-off firms also contribute to the development of the region.

An effective and influential higher education management should take the following steps:

1) These research centres should be incorporated bodies and their role in the higher education system should be redefined.
2) In order to foster interdisciplinary research projects and collaboration Higher Educational Institutions should be reconstructed immediately.
3) Some of the laws regulating the Higher Education System should be changed in order to redefine research centres and make these centres more functional. In addition, these changes also enable higher educational institutions to employ multi-skilled researchers. Like any other department, faculty, institute or technology parks, research centres should be seen as an integral part of the university.
4) The laws regarding Higher Education and Technology should complement each other.
5) Affiliation problem should be solved. In order to solve this, institutions should make use of any mechanisms outside or inside the institution.
6) Recruitment of foreign researchers can be increased through collaboration with the Ministry of Finance, Ministry of Internal Affairs and Ministry of Foreign Affairs.
7) To prepare or conduct a project based research is not one of the essential components of the research activities of the universities in Turkey. Conducting projects should be one of the indispensable duties of academicians. Most of the developed countries finance researchers by means of projects. This project-based mechanism leads to an increase in the variety of financial sources and to greater partnerships.
8) Higher education Managements play a crucial role in encouraging and supporting project based research. That is why research management should be dealt with professionally by the university. The importance of projects should be stated

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precisely so that structural changes can be carried out immediately. Furthermore, the application of projects should be encouraged and the output of the Project should be taken into consideration as one of the promotion criterion. The university should support the researcher in managerial and legal issues.

9) Science for Humans should be the priority. In order to gain awareness, society must be educated about the importance and benefits that universities provide. Also, the access to some of the sources of the university should be simplified for people. Whereas people in Europe have more access to these sources, it is much more difficult in Turkey. That causes some misunderstandings and prejudices. In order to set aside these misunderstandings and prejudices we should enable people with easy access to universities.

All of these suggestions made above will work as ultimately beneficial contributions to university – industry partnerships, particularly clustering. Since all of them highly recommend a transformation of managerial attitude, it will be the rector, the board of trustees or the university senate who is going to transform the system. In other words, developing an affirmative attitude towards collaborating with industry will help to design the innovative universities of the future. This transformation will reveal itself in:

- behaviour
- language and
- how both sides of the partnership perceive each other.

Obviously, the biomedical and pharmaceutical industries in particular have a strong connection with universities. Especially universities with a proactive and enterprising management in Turkey are able to establish long lasting alliances such as clustering. Clustering in health industry is one good example for partnership between university and industry. Although clustering in biopharmaceutical is extremely low (%1.6), research illustrates that especially due to translational research this type of clustering has an enormous potential in Turkey. Translational research is the key element, which will lead to the growth of this partnership. For example, the National Institutes of Health (NIH) has made translational research a priority, forming centres of translational research at its institutes and launching the Clinical and Translational Science Award (CTSA) program in 2006. With 24 CTSA-funded academic centres already established, other universities are transforming themselves to compete for upcoming CTSA grants.

By some accounts, translational research has become a centrepiece of the European Commission’s

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€6 billion budget for health related research, and the United Kingdom has invested £450 million over 5 years to establish translational research centres. Moreover, clusters are considered to increase the productivity with which companies can compete, nationally and globally. In order to set up a successful clustering, especially clustering in health industry in Turkey the following recommendations should be taken into account:

- complementation of regional and national cluster policies, namely removing barriers to trade, investment in Turkey

- motivation and strengthening of regional and national cluster policies, by developing and promoting a strategic approach to cluster policy in Turkey.

- supporting the creation of regional and national clusters by strengthening the knowledge base in Turkey and enabling better exploitation of research for innovation.

All these can be achieved with the help of the high education managements. However, the only possible way for this to take place is to make the transformation in universities happen.

Furthermore, higher education managements must display a strategically innovative plan that leads to a shift from agricultural biotechnology to human therapeutic discovery. Health biotechnology is only just emerging as a priority for the Turkish government. Due to this reason, there is not an overwhelming amount of support for companies. R&D research is seen as commercially expensive and few companies are in the position to make the long-term investments required. The majority of the R&D funding available comes from government institutes such as TÜBITAK that distribute EU funds to applicants. Approximately 3% of TÜBITAK-supported projects are biotechnology related, but they do not necessarily focus on the health science sector. As interest in these funds was historically low and some funds remained unused, the EU chose to reduce their funding contribution. Currently, there is over €200 million available for general biotechnology funding in Turkey from various governmental and EU sources. The government provides approximately 50% of R&D funding in Turkey with just over 40% coming from industry. Venture Capital investment is very limited and is only present from large holdings and for very limited projects. There are no investors that specialize in biotechnology and private funding is still rare. Investors are not experienced in biotechnology and the level of awareness about possible potential returns from the industry is low.

Being aware of all these political and environmental factors, the managements of future higher educational institutions should act as a mediator between the government and the related industries. As mediators, high education managements should be in hold of convincing and sustainable projects. The role of the government is to take these projects into

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consideration and support the companies, which want to invest in various aspects. In addition, the companies should focus on long-term outcomes.

Another important point is that the pharmaceutical industry in Turkey is clustered around Istanbul with no particular focal point existing for biotechnology. For example, the R&D that takes place is largely conducted at universities with the individual conducting the research often being the one best placed to benefit from its success. There are some very early stage technology transfer offices emerging, but their network is limited. There are few links between academia and industry, and even researchers rarely collaborate amongst themselves. Science and technology parks in Turkey are mostly IT-focused, with almost no premises easily available for biotechnology companies. Approximately 7% of the firms located in technology parks are active in biotechnology but not necessarily in health. In 2004, the Ege University Faculty of Engineering, Department of Bioengineering received FP6 funding for the BIOACE project to establish a centre of excellence for bioengineering and biotechnology. Currently the centre focuses on improving networks between stakeholders and supporting human resources through programs and training. Most emerging business advice available to Turkish companies is built around risk and IP management development. The various support structures remain under developed and uncoordinated.

According to the Survey from Turkish Association of Biotechnology (2008), another important issue is that the research culture is not particularly strong in Turkey. As a result, there is a shortage of experts and qualified professionals. The availability of experience management is also low. Moreover, many who do complete a scientific education leave Turkey for more favourable employment opportunities abroad.

In addition, Turkey adopted patent laws similar to those of the EU in 1995 and subsequently large companies opened local subsidiaries to distribute their products. The patent office is as yet not very sophisticated with most patent applications requiring support from abroad to process. Currently patent disputes are decided in a non-specialized court with inconsistent outcomes due to the lack of expertise of legal professionals in the sector. In the near future, however, patent disputes will be held in a specific court with a specialized judge more suited to this particular type of legal action.

Turkey has very few patent applications per capita with less than 10 patents related to biotechnology issued between 2002 and 2005. The publication and citation rates are also low compared to the EU average, but are rising, particularly in the area of agricultural biotechnology. Technological innovation in Turkey is underdeveloped with universities largely following developments in other parts of the world instead of conducting original research and very few small labs making value added products. The little research that does

develop is rarely taken to further stages due to lack of funding and resources for activities such as clinical trials. The government has begun to initiate some programs aimed at increasing the overall level of innovation in the country. In conclusion, cooperation and networking between biotechnology stakeholders is limited. There is limited use of available funding and limited commercialization of innovation (in other words, companies are focusing on cheaper production rather than innovation). Turkey has a good base for biotechnology to grow on, but specific programs for healthcare biotechnology are needed. The re- configuration of higher education managements will yield a supportive environment for further research and prospect for growth in the health industry.

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