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Regional development dynamics: university-business cooperation strategies

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Abstract

In today's world, with the globalisation process, the functions of higher education institutions have changed within the framework of new strategies and cooperation models. In this process, the potential of higher education institutions to increase local, regional, national and international development and competitiveness, especially through their innovation development capabilities, becomes increasingly important. Universities, within the framework of their education, research and innovation missions, have defined their role in regional development by developing other cooperation models. The most effective way of transferring the knowledge produced in the academic field to the production process is to provide university-business cooperation. The cooperation in question both ensures the rational use of scarce resources and constitutes the driving force of national and regional development. Higher education institutions reflect political, socio-economic and cultural characteristics of the region. Universities have to respond to the opportunities presented in the regional context by developing research agendas that reflect these characteristics and to be the focal point of the regional innovation system and trigger the process. In this study, university business world cooperation models and the effects of these formations on the regional economy are examined.

Keywords: university-business cooperation, regional development, triple helix, higher education institution, innovations, research and development, socio-economic level, government, university, industry, economic development, invention

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Динамика регионального развития: стратегии сотрудничества университета и бизнеса

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Аннотация

В современном мире с процессом глобализации функции высших учебных заведений изменились в рамках новых стратегий и моделей сотрудничества. В этом процессе все более важным становится потенциал высших учебных заведений для повышения местного, регионального, национального и международного развития и конкурентоспособности, особенно благодаря их возможностям инновационного развития. Университеты в рамках своей образовательной, исследовательской и инновационной миссии определили свою роль в региональном развитии, разработав другие модели сотрудничества. Наиболее эффективным способом передачи знаний, произведенных в академической сфере, в производственный процесс является обеспечение сотрудничества между университетом и бизнесом. Такое сотрудничество не только обеспечивает рациональное использование ограниченных ресурсов, но и является движущей силой национального и регионального развития. Высшие учебные заведения отражают политические, социально-экономические и культурные особенности региона. Университеты должны реагировать на представленные в региональном контексте возможности, путем разработки программ исследований, отражающих эти характеристики, быть координационным центром региональной инновационной системы и запускать процесс. В данном исследовании рассматриваются модели сотрудничества университетов с деловым миром и влияние этих образований на региональную экономику.

Ключевые слова: университетско-деловое сотрудничество, региональное развитие, тройная спираль, высшее учебное заведение, инновации, исследования и разработки, социально-экономический уровень, государство, университет, промышленность, экономическое развитие, изобретение

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İntroduction

In the process of social development, universities served in different models within the framework of the mission assigned to them. In this context, universities, which basically assumed the function of education and training in the Middle Ages, focused on the research function in the axis of the modernisation project initiated with the change of the universal ideology from Christianity to modern experimental sciences and the development of the understanding of the nation state until the 17th century [Han, 2017]. Despite the differences in the mission of the university in the historical development process, it is generally accepted that university activities are shaped around three basic functions [Dulupcu, 2006]: (1) Education; (2) Scientific research; (3) Public goods and services (sustaining culture).

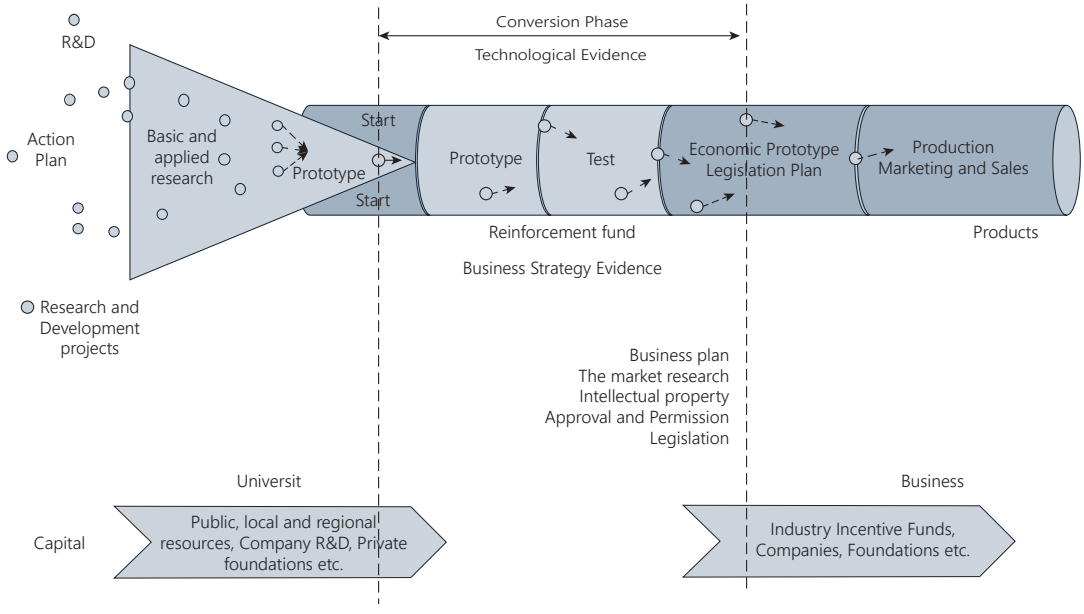
Public services offered to society by higher education institutions can be classified as follows.

1. Education service.
2. Health care provided by university hospitals.
3. Developing the innovations needed by the industrial sector (especially in the defense of the country where the defense industry serves).
4. Increasing regional development with an innovation-oriented and entrepreneurial university approach.
5. Assuming a defensive role such as improving the quality of life and standards, protecting the natural and cultural heritage, and being sensitive to social problems.

The phenomenon of innovation, which is the result of the information age, is becoming a competitive element in the global economy day by day. In this context, it is important to increase innovation performance in both national and regional development. Knowledge-oriented management and development is realized with the cooperation of university-business world developed within the framework of the region-specific interaction [Fixari et al, 2009]. At this point, it is important to develop not only the service quality of higher education institutions in education, but also their capacity to develop innovation, their R&D activity potential, their potential to create technology and qualified workforce in line with the needs of the industrial sector, and to develop their decisive role in regional development.

Global Expansion in the Information Age: University-Business Cooperation

Reflecting scientific and technological studies into the production process is on the basis of increasing international competitiveness by ensuring sustainable growth and development in the information age. A study that started on an intellectual basis within the university is reflected in the industrial sector as a product/service and technological development at the end of a certain research and development process [Bursalıoğlu, 2013]. At this point, the most effective way of transferring the knowledge produced in the academic field to the production process is to provide university-industry cooperation. While this cooperation ensures the rational use of scarce resources, it also provides universities with a field of application for existing research, on the other hand, it constitutes the driving force of national and regional development.



Source: [Kiper, 2010]

Figure 1. Information Value Chain from Intellectual Process to Market Process

In today's world, where knowledge-based international competition is accelerating, the development of university-business cooperation accelerates the commercialization of academic research and creates significant effects both for the region and for stakeholders (Table 1).

Since the early 1980s, cooperation programs covering universities, private sector organisations and the public sector have begun to be developed throughout the world, within the framework of research and development activities. While providing support within the framework of the "Targeted Socio-Economic Research Program (TSER)", which aims to expand joint research institutions and increase cooperation among European Union member countries; Research/technology exchange is strengthened through cooperation between universities, industry and national research institutes within the framework of Japan's Science and Technology Basic Plan; In the USA, collaborative and contractual partnerships to be established by university – industry research centers within the framework of a liberal and competitive approach are supported.

Table 1

The Impact of University-Business Cooperation on Stakeholders

Effects by Degree	Business (Industry)	University
Primary Effects		
Industrial value and know-how (prototype, knowhow, solutions)	√	√
Scientific discovery and increase in knowledge	-	√
Academic output (book, paper, title)	-	√
Access to scientific knowledge and expertise	√	-
Scientific problem solving and consulting	√	-
New or expanded collaborations	√	√
Access to research tools	√	√
Solving industry-oriented problems	-	√
Increasing demand for academic and industrial outputs	√	√
Revision in education programs	-	√
More funding for postgraduate research	-	√
Increase in joint research with industry	-	√
Secondary Effects		
Change in long-term R&D strategies	√	√
Change in the model of university industrial relations	√	√
Increase in research experience	√	√
University-industry personnel movement	√	√
Specialized centers	√	√
Increased investment in external information resources	-	√
New and more R&D ideas	√	√
Transition to the understanding of interdisciplinary work at the university	-	√
Employment increase at universities	-	√
Interdisciplinary work and capacity increase	√	√
Increase in university-industry R&D expenditures	√	√
Tertiary Effects		
Changes in the organisation and space of R&D	√	-
Differentiation in product market and competition	√	-
Cultural change	√	√
An increase in the background resource from third institutions	√	√
Changes in university organisation and strategies	-	√

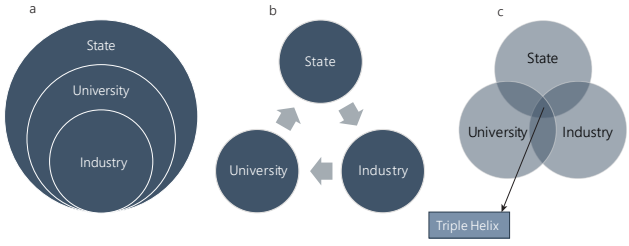
Source: [Kiper, 2010]

Triple Helix Model

Initially, most countries based their innovation systems on a triple helix model, in which the state greatly influences the relationship and performance between university and industry. As a matter of fact, innovation requires multi-faceted interaction and connection between various actors, especially business world, universities and government. The most important contribution to the literature on this interaction has been the notion of the "Triple Helix" [Sabour, 2005], which was revealed by and became prominent after the second half of the 1990s.

The Triple Spiral Model is intertwined with the aim of promoting academic research and sustainable development, and has been shaped on the axis of university, industry and state, which are represented as intersecting rings. The entrepreneurial university, a product of the said actors, transcends the boundaries of the education and research function with a basic academic mission; especially within the framework of the economic and regional development mission, it contributes significantly to the systematic production of scientific knowledge and the re-establishment of the knowledge base [Leydesdorff and Etzkowitz, 2001].

Etzkowitz and Leydesdorff [2001] dealt with the state-university-industry relations in three chronologically consecutive processes [Fixari et al, 2009]: (2a), the model in which the nation-state manages relations between sectors by including university and industry segments. (2b) refers to a model in which the state plays a less dominant role and each institution's relationship with other institutions is framed. (2c), the three constantly evolving domains are complex and flexibly interacting at different levels; It represents the development-oriented and innovative model, in which each actor operates to achieve their own institutional goals as well as the definitive goals of other institutions.



Source: [Fixari et al, 2009]

Figure 2. State-University-Industry Relations Network

In the axis of the Triple Spiral Model, the role of the "knowledge producer university" in terms of regional innovation system and therefore regional development can be summarised as follows [Durgut, 2007].

1. Regional Aggregation: The aforementioned element refers to the establishment of new companies, the settlement of new or existing companies in the university region, the capitalisation of knowledge (transformation into capital) as a result of physical proximity, and thus the formation of capital accumulation projects.
2. Human Capital Accumulation: The aforementioned element refers to the combination of knowledge capitalization activities, the establishment of new companies, the diversification of programs that support economic mobility, the development of training programs to meet regional needs, the employment of students/graduates who know the region, and the creation of region-based learning processes.
3. Governance: The aforementioned element means identifying the weak and strong aspects on an institutional basis, combining the industrial sector and the state on the innovation strategy platform, and thus motivating the regional innovation strategy on the basis of knowledge capitalisation. In this context, the effectiveness of governance is increased with the contribution to the socio-cultural texture of the region.
4. Cultural Norms: This element refers to the traditional knowledge-based university-industry-state interaction. At this point, another important benefit of the university, which is engaged in the region, on regional development is the concept of "learning economy/region", and economic success is associated with individual skills and knowledge transfer between groups.

University-Industry Cooperation and Regional Development Interaction

Universities contribute to the economic development of their region through education, research, invention, non-formal education and other activities they carry out in accordance with their mission. In the process of globalisation, countries and companies adapt to the changing environment and strengthen their creative and innovative attitudes [Dahlstrand and Jacobsson, 2003]. While these innovative and competitive institutional attitudes forced universities to integrate education, research and innovation triad on a micro basis, they led to a change in approaches to higher education on a macro basis (Table 2). In today's liberal economies, universities are partners of the state and private sector and are considered as the dynamo of regional development.

As seen in the historical and intellectual development process, higher education institutions reflect the physical, socio-economic and cultural characteristics of the region. Universities need to respond to the opportunities presented in the regional context by developing research agendas that reflect these characteristics. At this point, the region is perceived as a research laboratory that provides both national and international competitive advantage [Doutriaux, 2003].

Table 2

Analytical Approaches to Higher Education

	Traditional Approach	Regional Innovation System Approach
Basic Thought	R&D efforts lead to innovation and commercialisation; thus resulting in better economic performance	The interaction process between different networks, continuous learning processes and innovation-driven arrangements such as political incentives gives confidence to increase economic growth, technological dynamism and competitiveness
Innovation Overview	To make clear the division of labor between the stages in the production process. There is a linear flow of processes and there is no feedback loop in the innovation process	Innovation is an iterative process characterized by trial-and-error method and increasing cohesion at each stage. Users are actively involved in the innovation process. It operates in a continuous feedback loop from users to manufacturers
Overview of the Higher Education Role	A higher education institution is considered a source of academic information and a provider of education. It focuses on two performance indicators: research success (publication) and scientific application in production (patent)	Higher education institution is accepted as a regional system builder in direct interaction with social stakeholders. The focus is on system production and development. Innovation is perceived as learning/invention between stakeholders. They are seen as institutions that enable regional innovation

Source: [Caniëls ve Bosch, 2011]

The Effect of University-Industry Cooperation on Regional Development

In the global information society, economic development strategies focus on regions, metropolises and knowledge clusters. Leading higher education institutions in these regions are held responsible for the production and transfer of new knowledge as global actors. This rising hierarchy of universities supports the hierarchy of cities and regions. In these circumstances, the important construct is to establish the regional responsibilities of universities with a global position. Thus, the polarization in the knowledge economy can be reversed and the innovation process of universities can be associated with regional development [Looy et al, 2003]. In terms of supporting regional development, innovation systems require an interaction network that brings together the processes of producing and disseminating knowledge and activities that provide commercial value among various actors.

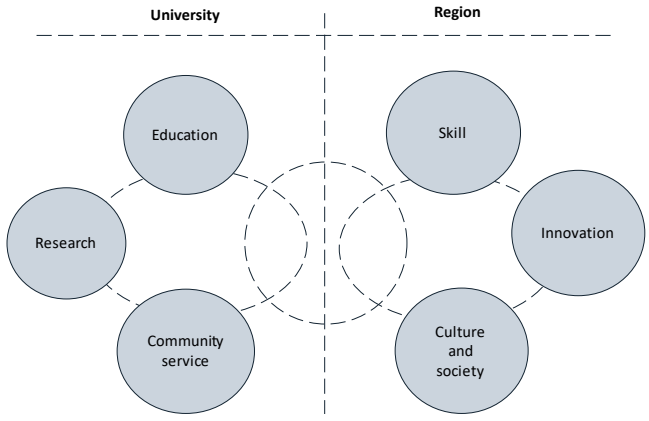
Universities play a unique role by bringing together different elements of national policy regarding culture and social inclusion, research and innovation, education and training for the region and civil society (Figure 3). The responsibility of universities in regional development emerges in different dimensions [Marmolejo and Puukka, 2009].

1. Generating knowledge by research and using it through technology transfer

2. Graduate employment in the region, localized learning process limited to work-related education, training, knowledge transfer and professional development with continuous education

3. Sustainable development based on cultural and social development and innovation, creating an environment of social integration.

Universities create indirect or induced effects in some places through public activities directed at research, education and society. Its subject can be classified according to regional effects, different regional subsystems: (a) political (participation of academics and students in domestic political life); (b) demographic (population size, establishment and mobility); (c) economic; (d) infrastructural (such as housing, traffic, library); (e) cultural (expanding market for cultural goods and services); (f) educational (education quality and education participation rate); (g) social (quality of life, the entertainment industry, the impact of students and academics on social life) [Tavoletti, 2007].



Source: [Marmolejo ve Puukka, 2009]

Figure 3. Multidimensional Regional Responsibility Network of Higher Education Institutions

Florax [1987], in his study in which he defined the university as a regional driving force, evaluated the possible effects of establishing a university in a region in eight different dimensions [Pellenbarg, 2005] (Table 3).

Regional development studies carried out within the scope of providing regional competitive advantage, institutional development, improving innovation capabilities, benefiting from technological change and increasing regional cooperation should be supported by the regional innovation system. Regional innovation system;

Table 3

Multidimensional Regional Impact Dimensions of Universities

Regional Impact of the University	Example
Political	Improvement of the political process, increased public participation in the political process, change in the political structure
Demographic	Change in birth and death rates, higher mobilisation, migration movement
Economy	Labor mobility, labor market, industrial structure, impact on regional income. Expenditures for the purchase of goods and services made by the University; knowledge marketing, companies established to commercialise the knowledge and skills of the university (secondary effect)
Infrastructure	Impact on housing, traffic, healthcare, retail
Culture	Higher supply of cultural goods and services, impact on the cultural environment
Attractiveness	Creating a regional identity, impact on the image of the region, providing prestige to the region
Education	Quality change with impact on participation
Social	Impact on quality of life, impact on students' socialization

Source: [Pellenbarg, 2005]

(a) supply (researchers, universities, science centres); It consists of three parties: (b) demand (firms, industry, innovation beneficiary markets) and (c) intermediary (innovation support institutions, regulatory agencies, financial institutions) [Telli Üçler and Karaçor, 2015]. In order to ensure sustainable economic development at the national level, the economic effects of the university-industry cooperation to be developed within the framework of the regional innovation system at the local / regional level are also important.

The most striking examples of local economic development stimulated by university research are the Stanford University-affiliated electronic cluster in Silicon Valley and Route 128 of the Massachusetts Institute of Technology near Boston. In this case, local university studies not only serve to widen the employment base, but also increase the average income levels significantly. These are successful examples. However, there are universities (such as Johns Hopkins University in Baltimore) that, despite having well-respected research programmes, have a relatively low impact on the high-tech industry for the local economy [Hill, 2006].

Conclusion

Higher education institutions, which are important actors of the information society, are important at local, regional, national and international levels, especially through the cooperation initiatives they provide within the framework of their changing mission. As a matter of fact, within the framework of the changing mission, not only the education and training service quality of higher education institutions, but also innovation development capacities, R&D activities, technology and qualified workforce creation capabilities that meet the needs of the industrial sector, establishment of the regional innovation system and the development of its decisive role in sustainable regional development are increasing day by day increases its importance.

Although different methods and strategies have been developed for university-industry cooperation, the triple spiral model (state-university-industry) is the most effective and widely applied in ensuring sustainable regional development. In the first stage of the model implementation process, the state should prepare a legal infrastructure. For example, a legal regulation prohibiting the use of lead for the promotion of the environmentally compatible electronics industry mobilises the private sector in this direction. The state can also strengthen its guiding function, which it bases on legal regulations, with incentive practices. The R&D demand of the private sector can be met by making joint research centers or research contracts with universities. Thus, universities, on the one hand, offer their research infrastructure and data information set to the service of the private sector, on the other hand, strengthen their R&D and innovation-based institutional cooperation. As a result, it is seen that the incentive and regulation mechanisms of the state encourage close and intense cooperation between companies and universities, thus serving regional development.

In addition, formations such as the development of the regional innovation system, innovative environment, industrial zone, cluster, technopolis-technopark also serve the purpose of sustainable regional development. In order to increase the effectiveness for the purpose of regional development, it is important to develop organisational structures and good governance strategies that will ensure the effective functioning of the model, as well as choosing the appropriate university-industry cooperation model.

условия для дальнейшего планомерного развития государства [Ажлуни, Борзова, 2019].

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