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Comparison of Universities in Turkey in Terms of Entrepreneurship and Innovation ***Türkiye'deki Üniversitelerin Girişimcilik ve Yenilikçilik Bakımından Kıyaslanması***

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Abstract: This study aims to analyze the entrepreneurship and innovation effectiveness of universities in Turkey, determine the universities (reference set) that inefficient universities can refer to, and rank the universities according to their relative efficiency. In the study, firstly, the criteria to be considered in the ranking / used in the analysis were determined by reviewing the literature. Data Envelopment Analysis (DEA) method was used in this study to evaluate the entrepreneurship and innovation effectiveness of universities. According to the findings; Abdullah Gül University, Ankara University, Bezm-İ Âlem Vakıf University, Çankaya University, Hasan Kalyoncu University, Sabancı University, and TOBB Economy and Technology University, among the 49 universities evaluated in terms of entrepreneurship and innovation, are efficient; others are inefficient. Istanbul Okan University, Özyeğin University, and Yaşar University with efficiency scores between 0.9-1 are the closest universities to being efficient. The 10 universities with the lowest efficiency scores in terms of Entrepreneurship and Innovation are Çukurova University, Süleyman Demirel University, Gazi University, Ege University, Akdeniz University, Dokuz Eylül University, Istanbul University, Atatürk University, Marmara University and Hacettepe University. In addition, at the end of the study, universities that inactive universities can take as an example were also determined.

Keywords: Entrepreneurship, Innovation, Efficiency, Data Envelopment Analysis (DEA)

Öz: Bu çalışmada, Türkiye'deki üniversitelerin girişimcilik ve yenilikçilik etkinliklerinin analiz edilmesi, etkin olmayan üniversitelerin referans alabilecekleri üniversitelerin (referans kümesinin) tespit edilmesi ve üniversitelerin göreceli etkinliklerine göre sıralanması amaçlanmıştır. Çalışmada öncelikle literatür taraması yapılarak sıralamada dikkate alınacak/analizlerde kullanılacak kriterler belirlenmiştir. Üniversitelerin girişimcilik ve yenilikçilik etkinliklerinin değerlendirilmesinde Veri Zarflama Analizi (VZA) yöntemi kullanılmıştır. Elde edilen bulgulara göre; girişimcilik ve yenilikçilik bakımından değerlendirilen üniversitelerden Abdullah Gül Üniversitesi, Ankara Üniversitesi, Bezm-İ Âlem Vakıf Üniversitesi, Çankaya Üniversitesi, Hasan Kalyoncu Üniversitesi, Sabancı Üniversitesi ve TOBB Ekonomi ve Teknoloji Üniversitesi etkin; diğerleri etkin değildir. Etkinlik puanları 0,9-1 arasında olan İstanbul Okan Üniversitesi, Özyeğin Üniversitesi ve Yaşar Üniversitesi etkili olmaya en yakın üniversitelerdir. Girişimcilik ve Yenilikçilik açısından en düşük etkinlik puanına sahip 10 üniversite ise Çukurova Üniversitesi, Süleyman Demirel Üniversitesi, Gazi Üniversitesi, Ege Üniversitesi, Akdeniz Üniversitesi, Dokuz Eylül Üniversitesi, İstanbul Üniversitesi, Atatürk Üniversitesi, Marmara Üniversitesi

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ve Hacettepe Üniversitesi'dir. Ayrıca çalışma sonunda etkin olmayan üniversitelerin kendilerine örnek alabilecekleri üniversiteler de belirlenmiştir.

Anahtar Kelimeler: Girişimcilik, Yenilikçilik, Etkinlik Veri Zarflama Analizi (VZA)

1. Introduction

In today's world, where competition is at the forefront of globalization, innovation and entrepreneurship deeply affect all organizations regardless of their sector. Organizations that adopt an innovative culture and succeed in establishing this structure, which is accepted as the driving force and prerequisite of entrepreneurship (Karadal, 2016: 121), can adapt more easily to the environment and developments they are in and can perform successful venture activities (Çağlar, 2013: 356). It is accepted by the authorities that there is a relation between innovation and entrepreneurship (Capello and Lenzi 2016; Galindo and Méndez-Picazo 2013; Pradhan et al. 2020) and It is stated that innovation capacity consists of the variables of the nature of research institutions, R&D expenditures of the business world, university-industry cooperation for R&D (Looy, Debackere, and Andries 2003; Maietta 2015), public procurement policies for advanced technologies, the presence of scientists, patents, and protection of intellectual property rights (Barrichello, Santos, and Morano 2020). In this case, countries must have a good education system (Yavuz Konokman, Yelken, Yokuş, 2016: 858) to raise innovative individuals (Gündüz, 2017: 56-58). They need to work on innovation to restructure their programs and create an innovative society (Yavuz Konokman, Yelken, Yokuş, 2016: 858).

It is a known fact that education accelerates economic growth by increasing labor productivity, and economic growth raises human development to high levels by increasing health, education, and social expenditures through income increases (Altinişik and Peker, 2012; Bozkurt, 2010; Çakmak, 2008; Taş and Yenilmez, 2008). Today, education is a source of strength and value for development by forming the basis of the information society. In the age of information and technology we live in, the quality of education of the people of a society is a criterion that determines the development level of that country (Buyruk, 2016; Günkör, 2017). Well-educated, well-trained entrepreneurial, and innovative human resources, who can read the changes and developments that occur, are considered the driving force in increasing the welfare level and development. Universities, which have universal importance as the place where scientific thought flourishes, blends, and spreads for the welfare of the large mass of people, have great duties in raising this entrepreneurial, innovative, and quality driving force, ensuring the development of the country and the region (Gündüz, 2017: 56-58; Balyer and Hesapçioğlu 2013: 53; Zengin and Yüksel 2021; Gündüz, 2017: 56-58; Durak, 2020, 218-219). Because producing, teaching, and disseminating knowledge are the universities' primary (essential) functions (Torun 2013).

In addition to being an indispensable element that enables individuals to become more qualified by increasing the knowledge level of individuals in the society, universities are institutions that increase the living standards of individuals by meeting the demand for the increased production of goods and services as a result of economic development (Gündüz, 2017: 56-58). The globalization process imposes new tasks on higher education besides its classical duties, such as teaching and research (Yıldız and Talih 2011). Universities that train qualified personnel who can produce and use high knowledge and technology; also make significant contributions to regional development by creating income streams (Yıldız and Talih 2011). The changing global economy and increasing financial pressures (Etzkowitz et al., 2000; Huang-Saad, Fay, and Sheridan 2017: 1467) have forced universities traditionally responsible for student character development and the advancement of knowledge (Brubacher and Rudy, 1997) to reconsider their goals and stakeholders, and to take a more active role in economic development (Etzkowitz et al., 2000; Huang-Saad, Fay, and Sheridan 2017: 1467).

The socio-economic, socio-political, and socio-cultural changes created by globalization have also caused radical changes in the functions, areas of responsibility, structure, and processes of universities, their ability to create funds, and the level of perception of their environment, and it has forced them to take on a new mission to develop their entrepreneurship-related sensibilities and to place the entrepreneurial ecosystem in the university at the institutional level. (Tekin, Geçkil, Koyuncuoğlu,

Tekin, 2018: 139). In this context, since the 1990s, higher education has been given more importance to higher education in Turkey and direct investments by the public; foundations have also been supported to make investments by providing significant support. As a result of these efforts, 203 universities, 74 of which are the foundation and 129 state universities, have been reached in Turkey by 2020. With the considerable increase in the number of universities, many studies have been made and are being carried out in the academy to evaluate the universities' performance, efficiency, and productivity. In this context, with the data obtained from the Scientific Technological Research Council of Turkey (TÜBİTAK), the Turkish Academy of Sciences (TÜBA), the Higher Education Council (YÖK), and some units affiliated with the Ministry of Science-Industry and Technology since 2012 (Tosun 2020: 196) an "Entrepreneurial and Innovative University Index (GYÜE)" is created by taking 22 indicators in 4 factors into account. Universities are evaluated in the context of Entrepreneurship and Innovation. GYÜE index consists 4 dimensions as "Scientific and Technological Research Competency Dimension (15%)", "Intellectual Property Pool Size (20%)", "Cooperation and Interaction Dimension (25%)" and "Economic Contribution and Commercialization Dimension (40%)", evaluates universities in terms of Entrepreneurship and Innovation (TUBİTAK, 2020). The dimension of "Entrepreneurship and Innovation Culture", which was taken into account in the evaluation between 2012 and 2017, was excluded in 2018 and the weights were redefined as above (TUBİTAK, 2020).

2. Literature Review

Efficiency for businesses; It is one of the important criteria is showing how adequately or effectively the inputs (materials, raw materials, workmanship, etc.) are used in line with the purpose (s) determined within the enterprise (Yükçü and Atağan 2010: 3). In the globalized business world where competition is intense, efficiency and performance evaluation are among the priority concepts that businesses should consider to survive and achieve their goals (Orhan, Karakaya and Uçar, 2020: 333; Yükçü and Atağan, 2010: 3).

When studies on efficiency comparisons in the literature are examined, it is seen that DEA is used in many efficiency studies (Orhan, 2019). Studies conducted with DEA in the literature are presented in Table 1.

Tablo 1. Studies Conducted with DEA in the Literature

Writer(s)	Method (s) used	Term / institutions	Input (s)	Output (s)
Kutlar and Kartal (2004)	Dea	2000-2004 8 faculties of Cumhuriyet University	Personnel expenses, travel allowances, consumables, service procurement, surface measurement, number of academic and administrative staff	Student fees, projects, undergraduate and graduate student numbers.
Özden (2008)	CCR models	2006 24 foundation universities in Turkey	Number of other academic staff, number of faculty members and total expenses,	Number of associate and undergraduate students, number of graduate students, the number of publications, education, and other income
Dikmen (2008)	Dea	2000-2001 51 state universities in Turkey	Number of faculty members, number of administrative staff, and budget allocations;	The number of undergraduate students, the number of graduate students and the number of domestic/international publications.
Yeşilyurt (2009)	Dea	2006 Teaching performances of economics departments of 48 foundation	Education time	Raw score averages were obtained from general skills and general culture tests and raw score averages in 10 different branches, including labor economics and industrial relations, econometrics, law,

		and state universities operating in Turkey		economics, statistics, business administration, public administration, finance, accounting, and international relations.
Gündüz vd., (2013)	Dea	2010-2011 Vocational schools in İnönü, Ondokuz Mayıs and Karamanoğlu Mehmet Bey universities	Number of academic staff, number of administrative staff, number of programs, number of students enrolled in the academic year, number of classrooms, the educational area (m2), the budget (TL), number of computers belonging to the instructors and number of computers belonging to the students	Number of scientific articles, number of graduates of 2010-2011, and the GPA of graduate students
Özel (2014)	BCC model for DEA output super efficiency model	2009-2010 52 Public universities in Turkey	While the number of research assistants, assistant professors, associate professors and professors, and the total budget expenses;	The number of associates, undergraduate and graduate students, and number of international publications and projects
Türkan and Özel (2017)	DEA and super efficiency model	2014-2015 43 state universities in Turkey	Total expenses, the number of faculty members and the number of lecturers.	Number of citations, the total number of the associate degree, undergraduate and graduate students, number of supporting infrastructure and public projects, and number of publications indexed in SCI, SSCI, AHCI.
Günay, Dulupçu and Oruç (2017)	Total factor productivity	2004-2013 23 state universities established in 1992 in Turkey	Inputs related to human resources (number of academic and administrative staff), amount of closed space and financial inputs (personnel expenses, purchase of goods and services expenses, capital expenses related to construction and maintenance, and capital expenses related to purchasing goods)	Number of students, number of publications and number of projects
Orhan et al., (2020)	BCC model for output	2018-2019 31 foundation universities in Istanbul	Number of faculty members (total of professors, associate professors, and doctor faculty members) and number of teaching staff (research assistants and lecturers total)	Total number of associate degree graduates, number of undergraduate graduates, number of graduate students and academic evaluation score of the university (URAP)

3. Material and Method

This study aims to analyze the entrepreneurship and innovation activities of universities located in Turkey, determine the universities (reference set) that inefficient universities can take reference, and rank the universities according to their relative efficiency. For this purpose, the DEA method was used to evaluate the entrepreneurship and innovation activities of universities.

3.1. Data Envelopment Analysis

Data Envelopment Analysis (DEA) has been one of the important techniques that contribute to the production and efficiency evaluations, which are frequently used in health, technology, education, transportation, accommodation, economy and finance. DEA is an application type of linear programming that can produce similar products such as schools, hospitals, universities, airports, and banks and measure their businesses' efficiency and effectiveness (Selamzade and Özdemir, 2020: 981). DEA emerged with Farrell's proposal for Border Production Function in 1957 and turned into its current form with the works of Charnes, Cooper, Banker and Rhodes (Charnes et al., 1994:3-4; Yeşilyurt and Alan, 2003: 95; Yıldırım, Yıldız ve Durak, 2020). DEA can be resolved as input or output-oriented (Öncü, Çömlekçi and Coşkun, 2013). Input orientation is defined as keeping the output quantity constant and evaluating the changes that may occur in the input quantity, output orientation is defined as the evaluation of the changes that will occur in the output amounts by keeping the input amounts constant (Akyüz, Çamur and Yıldırım, 2015; Çakmak and Örcü, 2016; Pala ve Aksaraylı, 2017).

Analysis with the DEA method can be done in two ways: input or output (Akbulut and Rençber, 2016). Two methods are widely used in the literature, namely the "BCC (Banker-Chaenes-Cooper) Method" and the "CCR (Charnes-Cooper-Rhodes) Method" (Okursoy and Tezsürücü, 2015; Özel, Şahin ve Göröl, 2017; Özen ve Öztornacı, 2015).

3.1.1. Selection of Decision Units

Selection of Decision Units is the first stage of DEA application and constitutes one of the most important stages (Boussofiane, Dyson and Thanassoulis, 1991: 8; Orhan, 2019: 1463). In this study, universities were chosen as decision units. When choosing decision units, if the number of input (s) to be selected is "m" and the number of output (s) is "p", determining at least "p + m + 1" decision unit is an important criterion for the reliability of DEA application. Another important criterion is that the number of decision units determined in DEA application is at least twice the total number of variables (Orhan, 2019: 1463; Boussofiane et al., 1991: 15). These two criteria are also provided in this study.

In this study, it is aimed to compare the top 50 universities in the Entrepreneurial and Innovative University Index. Some of the Istanbul Şişli Vocational School data, one of these institutions, could not be reached, so it was not included in the analysis.

3.1.2. Determination of the Output and Input Variables

The output and input variables used in the analysis in the application phase of the study were formed based on the output and input variables that are frequently used in the literature. As Input Variables in the analysis made by DEA method: number of graduate students, number of doctorate students, number of faculty members, the number of teaching staff, Amount Transferred to Ongoing Projects (Amount of Fund Transferred to Ongoing Projects); As output variable: Entrepreneurial and Innovative University Index Total score, Scientific and Technological Research Competency score, Intellectual Property Pool score, Cooperation and Interaction score, Economic Contribution and Commercialization score are used. While analyzing the efficiency, an efficiency analysis was made according to 5 models. The input and output variables used in these models and the explanations about these variables are shown in Table 2.

Table 2. Input and Output Variables Used in All Research Models

Input Variables		Descriptions
All Models	Number of faculty members	Total number of Professors, Associate Professors and Doctor Faculty Members
	Number of teaching staff	The total number of Research Assistants and Instructors
	Number of graduate students	The total number of graduate students enrolled
	Number of Ph.D. students	Total number of registered Ph.D. students
	Funds Transferred to Ongoing Projects	Amount of Fund Transferred to Current Projects by TÜBİTAK (Million TL)
Output Variables		Descriptions
Model 1	Scientific and Technological Research Competence	Scientific and Technological Research Competence is calculated based on the following variables.
		Number of scientific publications
		Number of citations
		Number of projects received from R&D and innovation support programs
		Amount of funds received from R&D and innovation support programs
Model 2	Intellectual Property Pool	Number of national and international science awards
		The number of Ph.D. graduates
		The Intellectual Property Pool is calculated based on the following variables.
		1. Number of patent applications
		2. Number of patent documents
Model 3	Cooperation and Interaction	3. Number of utility models/design documents
		4. Number of international patent applications
		Cooperation and Interaction are calculated based on the following variables.
		1. Number of R&D and innovation projects conducted in university-industry cooperation
		2. Amount of funds received from R&D and innovation projects in university-industry cooperation
Model 4	Economic Contribution and Commercialization	3. Number of R&D and innovation projects carried out with international cooperation
		4. Amount of funds obtained from international R&D and innovation collaborations
		5. Number of teaching staff/students in circulation
		Economic Contribution and Commercialization is calculated based on the following variables.
		1. Number of active companies that academicians have partners or owned in technoparks, incubation centers, TEKMERs
Model 5	Entrepreneurship and Innovation total score	2. The number of active companies that university students or those who have graduated in the last five years, in technoparks, incubation centers, TEKMER's partners, or owned.
		3. Number of people employed by academics in technoparks, incubation centers, TEKMER's partners, or companies owned by them
		4. Number of patents/utility models/designs licensed
		Entrepreneurial and Innovativeness total score is calculated based on the following variables.
		1. Scientific and Technological Research Competence (Weight Ratio: 23.75%)
2. Intellectual Property Pool (Weight Ratio: 18.75%):		
3. Cooperation and Interaction (Weight Ratio: 28.75%)		
4. Economic Contribution and Commercialization (Weight Ratio: 28.75%)		

Source: TUBITAK, (2020). Girişimci ve Yenilikçi Üniversite Endeksi <https://tubitak.gov.tr/tr/girisimci-ve-yenilikci-universite-endeksi> (Accessed on 12.03.2021)

The data of the variables are compiled from the Entrepreneurial and Innovative University Index (tubitak.gov.tr/tr/girisimci-ve-yenilikci-universite-index) developed by TUBITAK, and the web page of the Higher Education Information Management System (www.statistic.yok.gov.tr), which includes statistical information about higher education institutions. Universities' data of input variables and output variables are shown in Table 3.

Table 3. Universities' Data of Input Variables and Output Variables

Universities	Input Variables					Output Variables				
	I1	I2	I3	I4	I5	O1	O2	O3	O4	O5
Abdullah Gül U.	85	160	104	102	14,56	39,7	6,6	9,2	14,6	9,3
Akdeniz U.	1347	1509	3768	1342	64,03	47,2	7	7,1	14,3	18,8
Anadolu U.	769	771	3825	1761	13,16	46	6,9	7,2	13,2	18,6
Ankara U.	1762	1946	7884	6170	0,49	57,9	9,8	6,1	15,8	26,2
Ataturk U.	1550	1212	4675	2376	35,85	40,3	7,1	4,4	11,3	17,6
Atılım U.	251	262	952	183	15,56	43,4	5,8	4,4	14,8	18,4
Bahçeşehir U.	507	294	4887	469	12,8	40,4	4,2	4,3	12,8	19,2
Bezm-İ Âlem Vakıf U.	234	439	93	74	8,42	37	5	7,7	8,1	16,3
Boğaziçi U.	480	537	1866	1027	84,34	70,2	9,7	10,1	19,3	31
Bursa Uludağ U.	1153	1385	4422	2110	32,57	49,1	6,3	6,8	15,7	20,2
Çankaya U.	177	149	515	67	3,05	40,3	6	5,4	12,1	16,7
Çukurova U.	1046	1206	4709	1821	26,19	43,9	6,1	6,3	13,3	18,2
Dokuz Eylül U.	1610	1693	4262	2222	80,83	53,2	8,3	7,3	15,6	22
Düzce U.	570	659	1602	370	4,03	36	3,8	3,7	11,8	16,6
Ege U.	1651	1564	4324	2852	128,01	60,7	9,2	8,9	18,7	23,8
Erciyes U.	1114	1169	5360	1949	45,04	56,8	7,6	5,8	13,9	29,5
Eskişehir Osmangazi U.	827	891	2541	920	19,17	42	5,8	3,1	12,4	20,7
Eskişehir Teknik U.	401	254	1639	592	9,26	49,1	5,1	9,8	12,7	21,7
Fırat U.	970	992	2722	991	18,13	40,1	6,3	3,1	10,6	20,1
Gazi U.	1485	1736	5409	3400	46,46	52,7	8,8	6	14,1	23,9
Gaziantep U.	722	1059	3624	700	10,33	39,4	5,3	7,4	10,2	16,4
Gebze Teknik U.	291	378	2174	747	65,08	64,4	8,4	7,9	17,8	30,2
Hacettepe U.	1849	2162	5223	4140	128,26	60,6	11,5	7,8	17,5	23,8
Hasan Kalyoncu U.	172	125	1111	250	1,76	42,2	3,3	7,7	1,4	29,8
İhsan Doğramacı Bilkent U.	362	389	789	429	122,8	74,9	11,7	13,3	20,9	29
İstanbul Bilgi U.	315	355	2507	161	4,75	43,7	4,1	2,5	12,8	24,4
İstanbul Kültür U.	224	241	1062	166	4,03	33,4	3	3,6	9,8	17
İstanbul Medipol U.	694	512	1072	579	47,53	41,1	5,3	11,7	14,1	10
İstanbul Okan U.	450	209	2469	422	1,41	34,8	2,9	4,2	11,5	16,2
İstanbul Şişli MYO	15	72	0	0	-	74,9	11,5	12,5	21,8	29,2
İstanbul U.	1927	1641	8151	5738	58,58	57,6	10,1	10,7	15,5	21,4
İstanbul U.-Cerrahpaşa	1162	956	2488	2219	8,82	46,3	7	9,1	13	17,3
İzmir Yüksek Teknoloji Ens.	208	388	820	412	81,83	63,2	9,4	9,9	19,9	24
Karadeniz Teknik U.	969	1223	2060	1240	44,61	41,8	7,1	6,2	14,3	14,2
Kocaeli U.	992	1183	5045	1156	27,1	47,7	5,2	5,2	14,1	23,2
Koç U.	415	211	758	676	122,02	65,4	11,4	10,1	18,6	25,3
Konya Teknik U.	233	179	1277	412	5,73	33,5	4,3	3,4	15,2	10,5
Marmara U.	1679	1396	8479	4322	36,36	45,5	7	5	15,2	18,2
Orta Doğu Teknik U.	829	1379	4499	3293	210,37	81,9	12,6	11,4	22,7	35,2
Özyeğin U.	213	183	476	192	30,59	63,7	5,9	14,4	18,5	25
Pamukkale U.	1009	1180	2033	716	15,26	38,6	4,6	3,9	10,9	19,1
Sabancı U.	212	141	676	336	100,76	73,6	9,8	14,5	22,7	26,7
Sakarya U.	892	706	4664	1559	19,64	44,6	6,3	5,4	13,7	19,1
Selçuk U.	1171	1474	4007	1698	23,98	47,5	6,8	7,9	12,3	20,5
SUleyman Demirel U.	912	925	2880	1309	27,01	35,8	5,6	1,2	10,1	19
Tekirdağ Namık Kemal U.	559	659	1401	244	8,78	34,7	3,8	2	11,3	17,7

TOBB Ekonomi ve Teknoloji U.	219	96	556	165	32,39	55,5	5,4	9,5	16,7	23,8
Yaşar U.	196	255	502	196	3,61	37,9	4,4	3,9	13,9	15,8
Yeditepe U.	561	396	2650	1167	24,81	38	5,4	11,5	14,5	6,6
Yıldız Teknik U.	893	787	4649	2260	55,94	67,9	9,4	12,2	18,3	28,1

3.1.3. Calculation of efficiency values of the universities

At this stage, using the Data Envelopment Analysis (DEA) method, the entrepreneurship and innovation efficiency values of the universities calculated, and the university/universities that inefficient universities can take reference were determined. MaxDEA 8 Basic (maxdea.com/Download.htm) program was used in calculations performed in the DEA method. The output-oriented efficiency values of universities in terms of entrepreneurship and innovation and the universities that ineffective universities can take reference are given in the findings section

4. Findings

In this section, the findings obtained result from the analysis made by the DEA method regarding entrepreneurship and innovation efficiency of universities, and determination of universities (reference set) that ineffective universities can take reference, and ranking of universities in their relative efficiency are presented.

4.1. DEA Method Findings

As a result of the analyzes made with the output-oriented total efficiency (CCR) model of DEA method, the efficiency scores of universities according to entrepreneurship and innovativeness and the universities (reference set) to which inefficient universities can be taken as reference were determined. Information on efficiency scores reference clusters was presented. According to the efficiency scores, the university/universities with 1 efficiency score is/are considered as effective university/universities and the university (s) with a score below 1 are considered as ineffective university/universities (Orhan et al., 2020b).

Output-oriented efficiency analysis values of universities made according to Model 1, Model 2, Model 3, Model 4, and Model 5, universities that ineffective universities can take reference (reference set) and the number of reference universities for ineffective universities presented in tables (Table 4, Table 5, Table 6, Table 7, and Table 8) in the appendix section.

In Model 1, an efficiency analysis was made according to the universities' scientific and technological research competence. The efficiency analysis findings are given in Table 4. When Table 4 is examined, 6 out of 49 universities are efficient; others are not efficient. Abdullah Gül University, Ankara University, Bezm-İ Âlem Vakıf University, Çankaya University, Sabancı University, and Tobb University of Economics and Technology are efficient universities with an efficiency score of "1". Since these universities are active, their names are written in the references column.

According to Scientific and Technological Research Competence, 10 universities with the lowest efficiency score: Gazi University (0.156), Istanbul University (0.151), Bursa Uludağ University (0.148), Atatürk University (0.144), Koç University (0.143), Ege University (0.139), Hacettepe University (0,130), Marmara University (0,124), Akdeniz University (0,122) and Dokuz Eylul University (0,120).

In Model 2, efficiency analysis has been made in terms of the Intellectual Property Pool of Universities. The efficiency analysis findings are given in Table 5. When Table 5 is examined, 8 out of 49 universities are efficient; others are not efficient. Abdullah Gül University, Ankara University, Bezm-İ Âlem Vakıf University, Çankaya University, Hasan Kalyoncu University, Özyeğin University, Sabancı University, and Tobb University of Economics and Technology are effective universities with an efficiency score of "1".

The 10 universities with the lowest efficiency score in terms of Intellectual Property Pool: Eskişehir Osmangazi University (0.105), Fırat University (0.101), Erciyes University (0.097), Dokuz

Eylül University (0.095), Ege University (0.094), Gazi University (0.093). Atatürk University (0.084), Hacettepe University (0.071), Marmara University (0.068) and Süleyman Demirel University (0.034).

In Model 3, an effectiveness analysis was made according to the Cooperation and Interaction of Universities. The efficiency analysis findings are given in Table 6. When Table 6 is examined, 8 out of 49 universities are efficient; others are not efficient. Abdullah Gül University, Ankara University, Çankaya University, İstanbul Okan University, Konya Technical University, Sabancı University, TOBB University of Economics and Technology, and Yaşar University are effective universities with an efficiency score of “1”.

The 10 universities with the lowest efficiency score according to the Cooperation and Interaction of their universities: Selçuk University (0.146), Süleyman Demirel University (0.144), Marmara University (0.132), Ege University (0.126), Gazi University (0.121), Akdeniz University (0.119), İstanbul University (0.111), Atatürk University (0.111), Dokuz Eylül University (0.108) and Hacettepe University (0.093).

In Model 4, efficiency analysis has been made according to the Economic Contribution and Commercialization of Universities. The efficiency analysis findings are given in Table 7. When Table 7 is examined, 8 out of 49 universities are efficient; others are not efficient. Abdullah Gül University, Ankara University, Bezm-İ Âlem Vakıf University, Çankaya University, Hasan Kalyoncu University, Özyeğin University, Sabancı University, and TOBB University of Economics and Technology are effective universities with an efficiency score of “1”.

The 10 universities with the lowest efficiency score according to Economic Contribution and Commercialization of their universities: Ege University (0,132), Dokuz Eylül University (0,131), Gazi University (0,128), Akdeniz University (0,128), Çukurova University (0,123), Atatürk University (0,116).), Hacettepe University (0.110), İstanbul University (0.085), Yeditepe University (0.083) and Marmara University (0.074).

In Model 5, the efficiency analysis of universities in terms of Entrepreneurship and Innovation has been made. The efficiency analysis findings are given in Table 8. When Table 8 is examined, 7 out of 49 universities are efficient; others are not efficient. Abdullah Gül University, Ankara University, Bezm-İ Âlem Vakıf University, Çankaya University, Hasan Kalyoncu University, Sabancı University, and TOBB University of Economics and Technology are effective universities with an efficiency score of “1”. İstanbul Okan University (0.981), Özyeğin University (0.968), and Yaşar University (0.909) with efficiency scores between 0.9-1 are the closest universities to be effective.

The 10 universities with the lowest efficiency score in terms of Entrepreneurship and Innovation: Çukurova University (0.165), Süleyman Demirel University (0.157), Gazi University (0.138), Ege University (0.131), Akdeniz University (0.127), Dokuz Eylül University (0.119). İstanbul University (0.118), Atatürk University (0.117), Marmara University (0.107) and Hacettepe University (0.106).

5. Conclusion and Suggestions

This study aims to calculate the effectiveness of the universities in Turkey in terms of entrepreneurship and innovation by using the data of 2019 with the Data Envelopment Analysis (DEA) method and to determine the university/universities that inefficient universities can take reference. In this study; The number of faculty members (the sum of the number of Professors, Associate Professors, and Doctor Instructors) and the number of teaching staff (the sum of the number of Research Assistants and Lecturers) were used as input variables; and as output variable: Entrepreneurial and Innovative University Index scores (Entrepreneurial and Innovative University Index Total value, Scientific and Technological Research Competence, Intellectual Property Pool, Cooperation and Interaction, Economic Contribution and Commercialization) were used. The study aimed to compare the top 50 universities according to the Entrepreneurial and Innovative University Index. However, İstanbul Şişli Vocational School, whose data could not be accessed, was excluded from the evaluation, and the efficiency analyses of the remaining 49 universities were made. 5 models have been developed for

efficiency analysis. According to the Scientific and Technological Research Competence with Model 1, according to the Intellectual Property Pool with model 2, According to the Cooperation and Interaction with model 3 and according to the Economic Contribution and Commercialization with model 4; Efficiency evaluations were made according to Entrepreneurship and Innovativeness with Model 5

According to the efficiency analysis conducted according to the Scientific and Technological Research Competence of the universities using Model 1, 6 out of 49 universities (Abdullah Gül University, Ankara University, Bezm-İ Âlem Vakıf University, Çankaya University, Sabancı University, and TOBB University of Economics, and Technology) are effective; other universities are not effective.

According to the efficiency analysis conducted according to the Intellectual Property Pool of their Universities using Model 2, 8 out of 49 universities (Abdullah Gül University, Ankara University, Bezm-İ Âlem Vakıf University, Çankaya University, Hasan Kalyoncu University, Özyeğin University, Sabancı University, and TOBB University of Economics and Technology) effective; other universities are not effective.

According to the efficiency analysis conducted according to Cooperation and Interaction using Model 3, 8 out of 49 universities (Abdullah Gül University, Ankara University, Çankaya University, İstanbul Okan University, Konya Technical University, Sabancı University, TOBB University of Economics and Technology, and Yaşar University) are effective; other universities are not effective.

According to the efficiency analysis conducted according to Economic Contribution and Commercialization using Model 4, 8 out of 49 universities (Abdullah Gül University, Ankara University, Bezm-İ Âlem Vakıf University, Çankaya University, Hasan Kalyoncu University, Özyeğin University, Sabancı University, and TOBB University of Economics and Technology) are effective; other universities are not effective.

According to the efficiency analysis of universities in terms of Entrepreneurship and Innovation using Model 5, 6 of 49 universities (Abdullah Gül University, Ankara University, Bezm-İ Âlem Vakıf University, Çankaya University, Hasan Kalyoncu University, Sabancı University, and TOBB University of Economics and Technology) are effective; other universities are not effective.

As a result, when the findings were examined, it was seen that the 10 universities with the lowest score in terms of efficiency score were generally large universities. Although this study is one of the first studies in which entrepreneurship, innovativeness, and its sub-components are used in efficiency analysis; entrepreneurship and innovation activities of higher education institutions according to the size of the universities; according to whether it is a public or foundation university; according to the years of foundation. According to countries, different studies can be done according to inputs, outputs, and the weights of the elements in the processes, which can contribute to the literature.

The major limitation of this study is the small sample of universities studied (only 49 universities). Small sample size may result in some universities becoming efficient by default (as a result of not having a comparator from within the small sample).

Disclosure Statements

1. Contribution rate statement of researchers: First author % 50, Second author % 50.
2. No potential conflict of interest was reported by the authors

References

- Akbulut, R, & Ömer, R. (2016). Veri Zarflama ve Lojistik Regresyon Analizi ile çimento işletmelerinde finansal performansa dayalı etkinliklerin değerlendirilmesi. *Uluslararası Alanya İşletme Fakültesi Dergisi*, 7(3), 91-103.

- Akyüz, K. C., Çamur, G. & Yıldırım, İ. (2015). Mobilya ve levha sektöründe veri zarflama analizi yardımıyla etkinlik ölçümü. *Turkish Journal of Forestry*, 16(1), 50-59. doi:10.18182/tjf.91910
- Altınışik, İ. & Peker, H. S. (2012). Eğitimin ekonomik kalkınmaya etkisi. *Selçuk Üniversitesi Sosyal ve Teknik Araştırmalar Dergisi*, 1(4), 1-13.
- Balyer, A., & Hesapçıoğlu, M. (2013). University establishment policies in Turkey comparing to some industrialized countries: theory and practice. *Marmara Üniversitesi Atatürk Eğitim Fakültesi Eğitim Bilimleri Dergisi*, 27(27), 53-78.
- Barrichello, A., Santos, E. G. dos & Morano, R. S. (2020). Determinant and priority factors of innovation for the development of nations. *Innovation & Management Review*, 17(3), 307-320. doi:10.1108/INMR-04-2019-0040
- Boussofiâne, A., Dyson, R. G. & Thanassoulis, E. (1991). Applied data envelopment analysis. *European Journal of Operational Research*, 52(1), 1-15. doi:10.1016/0377-2217(91)90331-O
- Bozkurt, Y. (2010). Eğitim, sağlık ve iktisadi büyüme arasındaki ilişkiler: Türkiye için bir analiz. *Bilgi Ekonomisi ve Yönetimi Dergisi*, 5(1), 7-27.
- Brubacher, J. S., & Rudy, W. (1997). *Higher education in transition: a history of American colleges and universities* (4th ed.). BOOK TP - Book, New Brunswick, NJ: Transaction Publishers. http://mirlyn.lib.umich.edu/Record/003961781 CN - LA 226.B89 1997.
- Buyruk, H. (2016). Ekonomik kalkınma hedefinden bin yıl kalkınma hedeflerine: eğitim-kalkınma ilişkisine dair bir çözümleme. *Mülkiye Dergisi*, 40(1), 11-142.
- Capello, R. & Lenzi, C. (2016). Relevance and utility of European Union research, technological development and innovation policies for a smart growth. *Environment and Planning C: Government and Policy*, 34(1), 52-72. doi:10.1177/0263774X15614655
- Charnes, Abraham, W.W. Cooper, A.Y. Lewin and L. M. Seiford, (1994). *Data Envelopment Analysis: Theory, methodology and application*, Kluwer Academic Publishers.
- Çağlar, İ. (2013). *Küresel Normlu Çağdaş Değişim yönetimi Aracı Olarak Örgüt Geliştirme*, Nobel Yayın No: 654, Ankara
- Çakmak, E. & Örcü, H. H. (2016). Türkiye'deki illerin etkinliklerinin sosyo-ekonomik temel göstergelerle Veri Zarflama Analizi kullanarak incelenmesi. *Karabük Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 6(1), 30-48.
- Çakmak, Ö. (2008). Eğitim ve kalkınma ilişkisinin incelenmesi. *Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi*, (11), 33-41.
- Dikmen, F. C. (2008). Veri zarflama analizi ile üniversitelerin etkinliğinin ölçülmesi. *Kocaeli Üniversitesi, İktisadi ve İdari Bilimler Fakültesi Dergisi*, 3-4(3-6.), 1-22.
- Durak, İ. (2020). Girişimcilik eğilimi, eğitimi ve niyeti arasındaki ilişkinin parametrik tekniklerle analizi: Düzce Üniversitesi örneği. *Düzce Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 10(2), 217-232.
- Etzkowitz, H., Webster, A., Gebhardt, C., & Terra, B. R. C. (2000). The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. *Research Policy*, 29(2), 313-330. doi:10.1016/S0048-7333(99)00069-4.
- European Statistical Office (Eurostat, <https://ec.europa.eu/eurostat>) database. (Accessed on 12.01.2021)
- Galindo, M. & Méndez-Picazo, M. (2013). Innovation, entrepreneurship and economic growth. *Management Decision*, 51(3), 501-514. doi:10.1108/00251741311309625

- Günay, A., Dulupçu, M. A., & Oruç, K. O. (2017). Türkiye’de devlet üniversitelerinin etkinlik ve verimlilik analizi: veri zarflama analizi ve malmquist toplam faktör verimlilik endeksi uygulamaları. *Bolu Abant İzzet Baysal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 17(3), 85-113.
- Gündüz, A. Y. (2017). Ülke kalkınmasında üniversitelerin rolü: Doğu ve Güneydoğu Anadolu Üniversiteleri örneği. *Sakarya İktisat Dergisi*, 6(1), 56-69.
- Günkör, C. (2017). Eğitim ve Kalkınma İlişkisinin İncelenmesi. *Uluslararası Sosyal Bilimler Eğitimi Dergisi*, 3(1), 14-32.
- <https://istatistik.yok.gov.tr> (Accessed on: 17.05.2021)
- https://tubitak.gov.tr/sites/default/files/18842/9_universiteler_bazinda_ardeb_destek_istatistikleri_2016-2020.pdf (Accessed on: 15.05.2021)
- <https://tubitak.gov.tr/tr/girisimci-ve-yenilikci-universite-endeksi> (Accessed on: 12.05.2021)
- Huang-Saad, A., Fay, J., & Sheridan, L. (2017). Closing the divide: Accelerating technology commercialization by catalyzing the university entrepreneurial ecosystem with I-Corps™. *The Journal of Technology Transfer*, 42(6), 1466-1486. <https://doi.org/10.1007/s10961-016-9531-2>
- Karadal H. (2016). *Girişimcilik bilgisi ve stratejik girişimcilik*. H., Karadal (Ed.), Girişimcilik içinde, 4.Baskı, İstanbul, Beta.
- Looy, B. V., Debackere, K. & Andries, P. (2003). Policies to stimulate regional innovation capabilities via university–industry collaboration: An analysis and an assessment. *R&D Management*, 33(2), 209-229. doi:10.1111/1467-9310.00293
- Maietta, O. W. (2015). Determinants of university–firm R&D collaboration and its impact on innovation: A perspective from a low-tech industry. *Research Policy*, 44(7), 1341-1359. doi:10.1016/j.respol.2015.03.006
- Okursoy, D. & Tezsürücü, A. (2015). Veri Zarflama Analizi ile görelî etkinliklerin karşılaştırılması: Türkiye’deki illerin kültürel göstergelerine ilişkin bir uygulama. *Yönetim ve Ekonomi Dergisi*, 21(2), 1-18. doi:10.18657/yecbu.92031
- Orhan, M. (2019). Türkiye’deki havalimanlarının etkinliklerinin Veri Zarflama Analizi ile değerlendirilmesi. *Turkish Studies-Economics, Finance, Politics*, 14(4), 1455-1472. <https://doi.org/10.29228/TurkishStudies.39243>
- Orhan, M., Karakaya, A., & Uçar, M. B. (2020). İstanbul’daki vakıf üniversitelerinin kuruluş dönemlerine göre etkinlik analizi. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi*, 9(1), 326-352. <https://doi.org/10.15869/itobiad.655525>
- Öncü, M. A., Çömlekçi, İ. & Coşkun, E. (2013). Havayolu yolcu taşıma işletmelerinin finansal etkinliklerinin ölçümüne ilişkin bir araştırma. *Uluslararası Alanya İşletme Fakültesi Dergisi*, 5(2), 77-86.
- Özel, N. G., Şahin, İ. E. & Göral, R. (2017). Türk bankacılık sektöründe etkinlik ve verimlilik analizinin Veri Zarflama Yöntemi ile incelenmesi: 2013- 2015 dönemi uygulaması. *Sosyal Ekonomik Araştırmalar Dergisi*, 17(30. Yıl Özel Sayısı), 85-100. doi:10.30976/susead.348135
- Özel, G. (2014). Devlet üniversitelerinin etkinlik analizi: Türkiye örneği. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*. 29(3). 124-136.
- Özen, A. & Öztornaci, E. (2015). Çeşitli ülkelerde iç denetim-performans denetimi ilişkisi ve Türkiye uygulamasının değerlendirilmesi. *Yönetim ve Ekonomi Dergisi*, 22(1), 1-18.
- Pala, O. & Aksaraylı, M. (2017). Veri Zarflama Analizi ve Kümeleme Analizi kullanılarak OECD’ye üye ülkelerin ekonomik performansları, Yaşam Memnuniyeti ve İnovasyon Düzeyleri Açısından İncelenmesi. *Aydın İktisat Fakültesi Dergisi*, 2(2), 67-80.

- Pradhan, R. P., Arvin, M. B., Nair, M. & Bennett, S. E. (2020). The dynamics among entrepreneurship, innovation, and economic growth in the Eurozone countries. *Journal of Policy Modeling*, 42(5), 1106-1122. doi:10.1016/j.jpolmod.2020.01.004
- Selamzade, F., & Özdemir, Y. (2020). COVID-19'a karşı OECD ülkelerinin etkinliğinin VZA ile değerlendirilmesi. *Journal of Turkish Studies*, 15(4), 977-991. <https://doi.org/10.7827/TurkishStudies.43718>
- Taş, U. & Yenilmez, F. (2008). Türkiye'de eğitimin kalkınma üzerindeki rolü ve eğitim yatırımlarının geri dönüş oranı. *Eskişehir Osmangazi Üniversitesi Sosyal Bilimler Dergisi*, 9(1), 155-186.
- Tekin, M., Geçkil, T., Koyuncuoğlu, Ö. ve Tekin, E. (2018). Girişimci dostu üniversiteler indeksi ve bir model geliştirilmesi. *Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 0(39), 138-150.
- Torun, İ. (2013). Yüksököğrenimin etkinleştirilmesi ve taşra üniversitelerinin önemi. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 27(1), 197-208.
- Tosun, H. (2020). Girişimci ve Yenilikçi Üniversite Endeksi Bağlamında Vakıf Üniversiteleri, *TURAN-SAM*, 12(47), 195-203.
- TUBITAK, (2020). Girişimci ve Yenilikçi Üniversite Endeksi <https://tubitak.gov.tr/tr/girisimci-ve-yenilikci-universite-endeksi>; (Accessed on 12.03.2021)
- Yavuz Konokman, G., Yokuş, G. & Yanpar Yelken, T. (2016). Yenilikçi materyal tasarlamanın sınıf öğretmeni adaylarının yenilikçilik düzeylerine etkisi. *Bartın Üniversitesi Eğitim Fakültesi Dergisi*, 5(3), 857-878. doi:10.14686/buefad.v5i3.5000203433
- Yeşilyurt, C. & Alan, M. A. (2003). Fen Liselerinin 2002 Yılı Göreceli Etkinliğinin Veri Zarflama Analizi (VZA) Yöntemi ile Ölçülmesi. *C.Ü. İktisadi ve İdari Bilimler Dergisi*, 4(2), 91-104.
- Yıldırım, M., Yıldız, M. S. & Durak, İ. (2020). Industry 4.0 performances of OECD Countries: A Data Envelope Analysis. *İşletme Araştırmaları Dergisi*, 12(3), 2788-2798.
- Yıldız, E., & Talih, D. (2011). Üniversitelerin kalkınmadaki rolü: Babaeski Meslek Yüksekokulu örneği. *Trakya Üniversitesi Sosyal Bilimler Dergisi*, 6(2), 269-287.
- Yükçü, S., & Atağan, G. (2010). Etkinlik, etkililik ve verimlilik kavramlarının yarattığı karışıklık. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 23(4), 1-13.
- Zengin, A. Y., & Yüksel, A. (2021). Yükselen pazar Türkiye'de proaktif kişilik özellikleri ile girişimcilik eğilimi arasındaki ilişki: Sağlık Bilimleri Fakültesi Öğrencileri Üzerinde Bir Uygulama. 3. *Sektör Sosyal Ekonomi Dergisi*, 56(1), 72-92. <https://doi.org/10.15659/3.sektor-sosyal-ekonomi.21.02.1443>

Appendix

Tablo 4. Efficiency Analysis Results According to Scientific and Technological Research Competence

University	Score	Universities that can be referenced
Abdullah Gül U.	1	Abdullah Gül U.(1,000000)
Akdeniz U.	0,122	Abdullah Gül U.(3,117069); Çankaya U.(6,113272)
Anadolu U.	0,266	Ankara U.(0,003051); Çankaya U.(4,314264)
Ankara U.	1	Ankara U.(1,000000)
Atatürk U.	0,144	Çankaya U.(7,900426); TOBB Ekonomi ve Teknoloji U.(0,362881)
Atılım U.	0,537	Abdullah Gül U.(0,588679); Çankaya U.(1,091891); Sabancı U.(0,036310)
Bahçeşehir U.	0,345	Çankaya U.(1,829537); TOBB Ekonomi ve Teknoloji U.(0,222906)
Bezm-İ Âlem Vakıf U.	1	Bezm-İ Âlem Vakıf U.(1,000000)
Boğaziçi U.	0,401	Abdullah Gül U.(1,735635); Çankaya U.(1,220457); Sabancı U.(0,549293)
Bursa Uludağ U.	0,148	Abdullah Gül U.(0,969959); Çankaya U.(6,048325)
Çankaya U.	1	Çankaya U.(1,000000)
Çukurova U.	0,161	Abdullah Gül U.(0,623560); Çankaya U.(5,610155)
Dokuz Eylül U.	0,120	Abdullah Gül U.(3,830759); Çankaya U.(7,220373); Sabancı U.(0,030091)
Düzce U.	0,456	Ankara U.(0,045699); Çankaya U.(1,313970)
Ege U.	0,139	Abdullah Gül U.(2,999603); Çankaya U.(6,367368); Sabancı U.(0,362060); TOBB Ekonomi ve Teknoloji U.(0,877867)
Erciyes U.	0,169	Abdullah Gül U.(1,973527); Çankaya U.(5,346046)
Eskişehir Osmangazi U.	0,197	Abdullah Gül U.(0,375664); Çankaya U.(4,491913)
Eskişehir Teknik U.	0,489	Çankaya U.(1,618707); TOBB Ekonomi ve Teknoloji U.(0,133465)
Fırat U.	0,193	Abdullah Gül U.(0,055426); Bezm-İ Âlem Vakıf U.(0,157138); Çankaya U.(5,245868)
Gazi U.	0,156	Abdullah Gül U.(1,593778); Çankaya U.(7,624457)
Gaziantep U.	0,253	Ankara U.(0,070676); Çankaya U.(3,375531)
Gebze Teknik U.	0,491	Abdullah Gül U.(1,670690); Çankaya U.(0,370747); Sabancı U.(0,393251)
Hacettepe U.	0,130	Abdullah Gül U.(6,873776); Çankaya U.(7,066614); Sabancı U.(0,065747)
Hasan Kalyoncu U.	0,906	Ankara U.(0,020301); Çankaya U.(0,573788)
İhsan Doğramacı Bilkent U.	0,614	Abdullah Gül U.(1,556699); Çankaya U.(0,219496); Sabancı U.(0,760448)
İstanbul Bilgi U.	0,435	Ankara U.(0,009199); Çankaya U.(1,555899)
İstanbul Kültür U.	0,393	Abdullah Gül U.(0,012990); Çankaya U.(1,259298)
İstanbul Medipol U.	0,244	Abdullah Gül U.(1,823966); Çankaya U.(1,128920); TOBB Ekonomi ve Teknoloji U.(0,541212)
İstanbul Okan U.	0,870	Ankara U.(0,063486); Çankaya U.(0,452096)
İstanbul U.	0,151	Abdullah Gül U.(0,306161); Çankaya U.(10,476454); Sabancı U.(0,220019)
İstanbul U.-Cerrahpaşa	0,379	Ankara U.(0,128020); Çankaya U.(2,871236)
İzmir Yüksek Teknoloji Ens.	0,585	Abdullah Gül U.(2,412947); Sabancı U.(0,013677)
Karadeniz Teknik U.	0,191	Abdullah Gül U.(1,849741); Bezm-İ Âlem Vakıf U.(0,840879); Çankaya U.(3,474612)
Koç U.	0,143	Abdullah Gül U.(0,382455); Sabancı U.(1,062463)
Kocaeli U.	0,881	Abdullah Gül U.(0,764107); Çankaya U.(5,237576)
Konya Teknik U.	0,588	Çankaya U.(1,157593); TOBB Ekonomi ve Teknoloji U.(0,067902)
Marmara U.	0,124	Çankaya U.(9,228067); Sabancı U.(0,021114); TOBB Ekonomi ve Teknoloji U.(0,187927)
Orta Doğu Teknik U.	0,211	Abdullah Gül U.(7,999043); Sabancı U.(0,703214)
Özyeğin U.	0,699	Abdullah Gül U.(0,658258); Çankaya U.(0,118660); Sabancı U.(0,007533); TOBB Ekonomi ve Teknoloji U.(0,613919)
Pamukkale U.	0,182	Bezm-İ Âlem Vakıf U.(0,409177); Çankaya U.(3,873683)
Sabancı U.	1	Sabancı U.(1,000000)
Sakarya U.	0,220	Çankaya U.(4,628384); TOBB Ekonomi ve Teknoloji U.(0,170529)
Selçuk U.	0,167	Abdullah Gül U.(0,290314); Çankaya U.(6,476403)
Süleyman Demirel U.	0,164	Abdullah Gül U.(0,862503); Çankaya U.(4,738346)

Tekirdağ Namık Kemal U.	0,229	Bezm-İ Âlem Vakıf U.(0,061355); Çankaya U.(2,709309)
TOBB Ekonomi ve Teknoloji U.	1	TOBB Ekonomi ve Teknoloji U.(1,000000)
Yaşar U.	0,714	Bezm-İ Âlem Vakıf U.(0,080947); Çankaya U.(0,960140)
Yeditepe U.	0,322	Çankaya U.(2,303985); TOBB Ekonomi ve Teknoloji U.(0,549023)
Yıldız Teknik U.	0,283	Abdullah Gül U.(0,544505); Çankaya U.(4,371481); Sabancı U.(0,344174)

Tablo 5. Intellectual Property Pool Efficiency Analysis Results

University	Score	Universities that can be referenced
Abdullah Gül U.	1	Abdullah Gül U.(1,000000)
Akdeniz U.	0,111	Abdullah Gül U.(3,031256); Bezm-İ Âlem Vakıf U.(0,520990); Çankaya U.(4,527536); Hasan Kalyoncu U.(0,965451)
Anadolu U.	0,222	Abdullah Gül U.(0,043389); Bezm-İ Âlem Vakıf U.(0,769069); Çankaya U.(0,050910); Hasan Kalyoncu U.(3,350806)
Ankara U.	1	Ankara U.(1,000000)
Atatürk U.	0,084	Abdullah Gül U.(1,079541); Çankaya U.(5,775690); Hasan Kalyoncu U.(1,429566)
Atılım U.	0,333	Abdullah Gül U.(0,917334); Çankaya U.(0,610481); Hasan Kalyoncu U.(0,194119)
Bahçeşehir U.	0,237	Abdullah Gül U.(0,460644); Hasan Kalyoncu U.(1,606051); Özyeğin U.(0,106779)
Bezm-İ Âlem Vakıf U.	1	Bezm-İ Âlem Vakıf U.(1,000000)
Boğaziçi U.	0,268	Abdullah Gül U.(1,512410); Özyeğin U.(1,482287); Sabancı U.(0,168481)
Bursa Uludağ U.	0,137	Abdullah Gül U.(0,715944); Bezm-İ Âlem Vakıf U.(1,744662); Çankaya U.(0,369553); Hasan Kalyoncu U.(3,595831)
Çankaya U.	1	Çankaya U.(1,000000)
Çukurova U.	0,136	Abdullah Gül U.(0,575387); Bezm-İ Âlem Vakıf U.(1,262875); Hasan Kalyoncu U.(4,078949)
Dokuz Eylül U.	0,095	Abdullah Gül U.(4,118825); Çankaya U.(6,618514); Hasan Kalyoncu U.(0,382635)
Düzce U.	0,299	Bezm-İ Âlem Vakıf U.(0,180122); Çankaya U.(0,000934); Hasan Kalyoncu U.(1,426434)
Ege U.	0,094	Abdullah Gül U.(6,428407); Hasan Kalyoncu U.(2,879225); Özyeğin U.(0,959299)
Erciyes U.	0,097	Abdullah Gül U.(2,213821); Bezm-İ Âlem Vakıf U.(0,513021); Çankaya U.(0,195313); Hasan Kalyoncu U.(4,483767)
Eskişehir Osmangazi U.	0,105	Abdullah Gül U.(0,198343); Bezm-İ Âlem Vakıf U.(0,818847); Çankaya U.(2,468669); Hasan Kalyoncu U.(1,055675)
Eskişehir Teknik U.	0,641	Abdullah Gül U.(0,460741); Çankaya U.(0,013911); Hasan Kalyoncu U.(1,425670)
Fırat U.	0,101	Bezm-İ Âlem Vakıf U.(1,341494); Çankaya U.(1,217540); Hasan Kalyoncu U.(1,773365)
Gazi U.	0,093	Abdullah Gül U.(1,333657); Bezm-İ Âlem Vakıf U.(1,836319); Çankaya U.(1,567343); Hasan Kalyoncu U.(3,863493)
Gaziantep U.	0,265	Abdullah Gül U.(0,049227); Çankaya U.(1,830886); Hasan Kalyoncu U.(2,289238)
Gebze Teknik U.	0,313	Abdullah Gül U.(1,602879); Özyeğin U.(0,450284); Sabancı U.(0,277569)
Hacettepe U.	0,071	Abdullah Gül U.(7,563518); Çankaya U.(4,971549); Hasan Kalyoncu U.(1,688611)
Hasan Kalyoncu U.	1	Hasan Kalyoncu U.(1,000000)
İhsan Doğramacı Bilkent U.	0,471	Abdullah Gül U.(1,261340); Özyeğin U.(0,596989); Sabancı U.(0,552743)
İstanbul Bilgi U.	0,259	Çankaya U.(1,402681); Hasan Kalyoncu U.(0,268082)
İstanbul Kültür U.	0,439	Abdullah Gül U.(0,051577); Çankaya U.(0,832881); Hasan Kalyoncu U.(0,419744)

İstanbul Medipol U.	0,372	Abdullah Gül U.(2,242950); Hasan Kalyoncu U.(0,560445); Özyeğin U.(0,453948)
İstanbul Okan U.	0,665	Ankara U.(0,036345); Hasan Kalyoncu U.(0,791018)
İstanbul U.	0,125	Abdullah Gül U.(2,594265); Çankaya U.(3,725089); Hasan Kalyoncu U.(5,367035)
İstanbul U.-Cerrahpaşa	0,425	Bezm-İ Âlem Vakıf U.(0,589726); Hasan Kalyoncu U.(2,190059)
İzmir Yüksek Teknoloji Ens.	0,442	Abdullah Gül U.(2,412947); Sabancı U.(0,013677)
Karadeniz Teknik U.	0,146	Abdullah Gül U.(1,799581); Bezm-İ Âlem Vakıf U.(1,039935); Çankaya U.(3,060743); Hasan Kalyoncu U.(0,179880)
Koç U.	0,534	Abdullah Gül U.(0,382455); Sabancı U.(1,062463)
Kocaeli U.	0,111	Abdullah Gül U.(1,111759); Bezm-İ Âlem Vakıf U.(0,005541); Çankaya U.(1,368765); Hasan Kalyoncu U.(3,801933)
Konya Teknik U.	0,311	Abdullah Gül U.(0,224127); Hasan Kalyoncu U.(1,121532); Özyeğin U.(0,016110)
Marmara U.	0,068	Abdullah Gül U.(1,127580); Bezm-İ Âlem Vakıf U.(0,020653); Çankaya U.(2,920680); Hasan Kalyoncu U.(6,170712)
Orta Doğu Teknik U.	0,136	Abdullah Gül U.(7,999043); Sabancı U.(0,703214)
Özyeğin U.	1	Özyeğin U.(1,000000)
Pamukkale U.	0,160	Bezm-İ Âlem Vakıf U.(1,455322); Hasan Kalyoncu U.(1,708060)
Sabancı U.	1	Sabancı U.(1,000000)
Sakarya U.	0,135	Abdullah Gül U.(0,725546); Çankaya U.(0,808835); Hasan Kalyoncu U.(3,755169)
Selçuk U.	0,185	Bezm-İ Âlem Vakıf U.(2,131388); Hasan Kalyoncu U.(3,428246)
Süleyman Demirel U.	0,034	Abdullah Gül U.(0,806735); Bezm-İ Âlem Vakıf U.(0,435080); Çankaya U.(3,238443); Hasan Kalyoncu U.(0,979153)
Tekirdağ Namık Kemal U.	0,132	Bezm-İ Âlem Vakıf U.(0,308849); Çankaya U.(1,792885); Hasan Kalyoncu U.(0,404088)
TOBB Ekonomi ve Teknoloji	1	TOBB Ekonomi ve Teknoloji U.(1,000000)
Yaşar U.	0,663	Bezm-İ Âlem Vakıf U.(0,340247); Hasan Kalyoncu U.(0,423364)
Yeditepe U.	0,437	Abdullah Gül U.(0,098074); Hasan Kalyoncu U.(2,100344); Özyeğin U.(0,643525)
Yıldız Teknik U.	0,238	Abdullah Gül U.(1,081760); Hasan Kalyoncu U.(3,262750); Özyeğin U.(1,126092)

Tablo 6. Cooperation and Interaction Efficiency Analysis Results

University	Score	Universities that can be referenced
Abdullah Gül U.	1	Abdullah Gül U.(1,000000)
Akdeniz U.	0,119	Abdullah Gül U.(3,097106); Çankaya U.(4,878317); Yaşar U.(1,123897)
Anadolu U.	0,252	Çankaya U.(4,308114); İstanbul Okan U.(0,014364)
Ankara U.	1	Ankara U.(1,000000)
Atatürk U.	0,111	Çankaya U.(7,172267); Konya Teknik U.(0,629028); TOBB Ekonomi ve Teknoloji U.(0,320168)
Atılım U.	0,640	Abdullah Gül U.(0,662596); Çankaya U.(0,989284); TOBB Ekonomi ve Teknoloji U.(0,089388)
Bahçeşehir U.	0,494	Çankaya U.(0,720634); Konya Teknik U.(0,957938); TOBB Ekonomi ve Teknoloji U.(0,157860)
Bezm-İ Âlem Vakıf U.	0,885	Abdullah Gül U.(0,561190); Yaşar U.(0,068997)
Boğaziçi U.	0,329	Abdullah Gül U.(2,614847); Sabancı U.(0,117405); TOBB Ekonomi ve Teknoloji U.(1,063234)
Bursa Uludağ U.	0,177	Abdullah Gül U.(0,903959); Çankaya U.(1,965341); Yaşar U.(3,715807)
Çankaya U.	1	Çankaya U.(1,000000)
Çukurova U.	0,170	Abdullah Gül U.(0,569267); Çankaya U.(2,251418); Yaşar U.(3,056690)
Dokuz Eylül U.	0,108	Abdullah Gül U.(3,892017); Çankaya U.(7,135339); TOBB Ekonomi ve Teknoloji U.(0,074080)

Düzce U.	0,640	Çankaya U.(1,130351); İstanbul Okan U.(0,413070)
Ege U.	0,126	Abdullah Gül U.(3,736663); Çankaya U.(5,344235); TOBB Ekonomi ve Teknoloji U.(1,769196)
Erciyes U.	0,148	Abdullah Gül U.(1,962144); Çankaya U.(4,641854); Yaşar U.(0,640866)
Eskişehir Osmangazi U.	0,205	Abdullah Gül U.(0,343207); Çankaya U.(2,484022); Yaşar U.(1,827324)
Eskişehir Teknik U.	0,580	Çankaya U.(0,302576); Konya Teknik U.(1,136954); TOBB Ekonomi ve Teknoloji U.(0,056264)
Fırat U.	0,156	Abdullah Gül U.(0,074759); Çankaya U.(3,367149); Yaşar U.(1,875817)
Gazi U.	0,121	Abdullah Gül U.(1,524495); Çankaya U.(3,338380); Yaşar U.(3,900636)
Gaziantep U.	0,238	Çankaya U.(3,233042); İstanbul Okan U.(0,332781)
Gebze Teknik U.	0,449	Abdullah Gül U.(1,937774); Sabancı U.(0,262053); TOBB Ekonomi ve Teknoloji U.(0,322986)
Hacettepe U.	0,093	Abdullah Gül U.(7,007619); Çankaya U.(6,880823); TOBB Ekonomi ve Teknoloji U.(0,161857)
Hasan Kalyoncu U.	0,173	Çankaya U.(0,489327); İstanbul Okan U.(0,189754)
İhsan Doğramacı Bilkent U.	0,471	Abdullah Gül U.(1,6); Sabancı U.(0,55); TOBB Ekonomi ve Teknoloji U.(0,430387)
İstanbul Bilgi U.	0,657	Çankaya U.(1,507975); İstanbul Okan U.(0,106863)
İstanbul Kültür U.	0,627	Abdullah Gül U.(0,002690); Çankaya U.(0,622061); Yaşar U.(0,579932)
İstanbul Medipol U.	0,286	Abdullah Gül U.(1,823966); Çankaya U.(1,128920); TOBB Ekonomi ve Teknoloji U.(0,541212)
İstanbul Okan U.	1	İstanbul Okan U.(1,000000)
İstanbul U.	0,111	Abdullah Gül U.(0,754062); Çankaya U.(9,854710); TOBB Ekonomi ve Teknoloji U.(0,541648)
İstanbul U.-Cerrahpaşa	0,345	Çankaya U.(2,684846); İstanbul Okan U.(0,447673)
İzmir Yüksek Teknoloji Ens.	0,560	Abdullah Gül U.(2,412947); Sabancı U.(0,013677)
Karadeniz Teknik U.	0,175	Abdullah Gül U.(2,181268); Çankaya U.(0,507832); Yaşar U.(3,130706)
Koç U.	0,626	Abdullah Gül U.(0,382455); Sabancı U.(1,062463)
Kocaeli U.	0,186	Abdullah Gül U.(0,707800); Çankaya U.(1,754255); Yaşar U.(3,170070)
Konya Teknik U.	1	Konya Teknik U.(1,000000)
Marmara U.	0,132	Abdullah Gül U.(0,042982); Çankaya U.(9,168402); TOBB Ekonomi ve Teknoloji U.(0,239906)
Orta Doğu Teknik U.	0,171	Abdullah Gül U.(7,999043); Sabancı U.(0,703214)
Özyeğin U.	0,857	Abdullah Gül U.(0,673593); Çankaya U.(0,097373); TOBB Ekonomi ve Teknoloji U.(0,632464)
Pamukkale U.	0,195	Abdullah Gül U.(0,075426); Çankaya U.(0,614516); Yaşar U.(3,403744)
Sabancı U.	1	Sabancı U.(1,000000)
Sakarya U.	0,232	Çankaya U.(1,721201); Konya Teknik U.(2,511403)
Selçuk U.	0,146	Abdullah Gül U.(0,197408); Çankaya U.(0,728950); Yaşar U.(5,230593)
Süleyman Demirel U.	0,144	Abdullah Gül U.(0,846237); Çankaya U.(3,732083); Yaşar U.(0,915772)
Tekirdağ Namık Kemal U.	0,332	Abdullah Gül U.(0,013463); Çankaya U.(2,266112); Yaşar U.(0,463251)
TOBB Ekonomi ve Teknoloji U.	1	TOBB Ekonomi ve Teknoloji U.(1,000000)
Yaşar U.	1	Yaşar U.(1,000000)
Yeditepe U.	0,390	Çankaya U.(0,219172); Konya Teknik U.(1,800989); TOBB Ekonomi ve Teknoloji U.(0,426732)
Yıldız Teknik U.	0,249	Abdullah Gül U.(1,245153); Çankaya U.(3,398892); TOBB Ekonomi ve Teknoloji U.(0,847297)

Tablo 7. Economic Contribution and Commercialization Efficiency Analysis Results

University	Score	Universities that can be referenced
Abdullah Gül U.	1	Abdullah Gül U.(1,000000)

Akdeniz U.	0,128	Bezm-İ Âlem Vakıf U.(2,121910); Hasan Kalyoncu U.(2,632238); Özyeğin U.(1,357659)
Anadolu U.	0,164	Bezm-İ Âlem Vakıf U.(0,789105); Hasan Kalyoncu U.(3,368567); Özyeğin U.(0,019191)
Ankara U.	1	Ankara U.(1,000000)
Atatürk U.	0,116	Bezm-İ Âlem Vakıf U.(1,432856); Hasan Kalyoncu U.(3,849740); Özyeğin U.(0,556058)
Atılım U.	0,620	Çankaya U.(0,872426); Hasan Kalyoncu U.(0,394795); Özyeğin U.(0,134628)
Bahçeşehir U.	0,314	Çankaya U.(0,484274); Hasan Kalyoncu U.(1,571862); TOBB Ekonomi ve Teknoloji U.(0,264171)
Bezm-İ Âlem Vakıf U.	1	Bezm-İ Âlem Vakıf U.(1,000000)
Boğaziçi U.	0,458	Abdullah Gül U.(1,773550); Hasan Kalyoncu U.(1,301588); Özyeğin U.(0,494719)
Bursa Uludağ U.	0,135	Abdullah Gül U.(0,234634); Bezm-İ Âlem Vakıf U.(1,926470); Hasan Kalyoncu U.(3,707220); Özyeğin U.(0,209485)
Çankaya U.	1	Çankaya U.(1,000000)
Çukurova U.	0,123	Abdullah Gül U.(0,575387); Bezm-İ Âlem Vakıf U.(1,262875); Hasan Kalyoncu U.(4,078949)
Dokuz Eylül U.	0,131	Bezm-İ Âlem Vakıf U.(2,271988); Hasan Kalyoncu U.(2,852139); Özyeğin U.(1,852896)
Düzce U.	0,365	Bezm-İ Âlem Vakıf U.(0,180122); Çankaya U.(0,000934); Hasan Kalyoncu U.(1,426434)
Ege U.	0,132	Bezm-İ Âlem Vakıf U.(1,405449); Hasan Kalyoncu U.(2,201448); Özyeğin U.(3,671186)
Erciyes U.	0,177	Abdullah Gül U.(1,959443); Bezm-İ Âlem Vakıf U.(0,609108); Hasan Kalyoncu U.(4,542638); Özyeğin U.(0,110715)
Eskişehir Osmangazi U.	0,233	Bezm-İ Âlem Vakıf U.(1,373768); Hasan Kalyoncu U.(2,117853); Özyeğin U.(0,126690)
Eskişehir Teknik U.	0,454	Bezm-İ Âlem Vakıf U.(0,103615); Hasan Kalyoncu U.(1,383195); Özyeğin U.(0,194611)
Fırat U.	0,211	Bezm-İ Âlem Vakıf U.(1,593792); Hasan Kalyoncu U.(2,307541); Özyeğin U.(0,021216)
Gazi U.	0,128	Bezm-İ Âlem Vakıf U.(2,452682); Hasan Kalyoncu U.(4,410527); Özyeğin U.(0,589928)
Gaziantep U.	0,165	Çankaya U.(1,836460); Hasan Kalyoncu U.(2,307829)
Gebze Teknik U.	0,599	Hasan Kalyoncu U.(1,691860)
Hacettepe U.	0,110	Abdullah Gül U.(0,146198); Bezm-İ Âlem Vakıf U.(2,651857); Hasan Kalyoncu U.(3,087758); Özyeğin U.(3,215700)
Hasan Kalyoncu U.	1	Hasan Kalyoncu U.(1,000000)
İhsan Doğramacı Bilkent U.	0,680	Abdullah Gül U.(0,917914); Hasan Kalyoncu U.(0,081089); Özyeğin U.(1,267747)
İstanbul Bilgi U.	0,777	Çankaya U.(1,402681); Hasan Kalyoncu U.(0,268082)
İstanbul Kültür U.	0,627	Çankaya U.(0,838722); Hasan Kalyoncu U.(0,439223)
İstanbul Medipol U.	0,190	Bezm-İ Âlem Vakıf U.(0,490378); Hasan Kalyoncu U.(0,323960); Özyeğin U.(1,400158)
İstanbul Okan U.	0,661	Ankara U.(0,036345); Hasan Kalyoncu U.(0,791018)
İstanbul U.	0,085	Bezm-İ Âlem Vakıf U.(1,339098); Hasan Kalyoncu U.(6,727835); Özyeğin U.(1,159327)
İstanbul U.-Cerrahpaşa	0,231	Bezm-İ Âlem Vakıf U.(0,589726); Hasan Kalyoncu U.(2,190059)
İzmir Yüksek Teknoloji Ens.	0,809	Abdullah Gül U.(1,176375); Hasan Kalyoncu U.(0,627954)
Karadeniz Teknik U.	0,151	Bezm-İ Âlem Vakıf U.(2,067624); Hasan Kalyoncu U.(1,332996); Özyeğin U.(0,812505)
Koç U.	0,700	Özyeğin U.(0,794762); TOBB Ekonomi ve Teknoloji U.(0,682902)
Kocaeli U.	0,157	Bezm-İ Âlem Vakıf U.(0,303050); Çankaya U.(0,770324); Hasan Kalyoncu U.(3,944831); Özyeğin U.(0,498723)

Konya Teknik U.	0,289	Bezm-İ Âlem Vakıf U.(0,049001); Hasan Kalyoncu U.(1,097901); Özyeğin U.(0,110661)
Marmara U.	0,074	Bezm-İ Âlem Vakıf U.(0,872399); Hasan Kalyoncu U.(7,333229); Özyeğin U.(0,526575)
Orta Doğu Teknik U.	0,264	Abdullah Gül U.(1,922884); Hasan Kalyoncu U.(3,869505)
Özyeğin U.	1	Özyeğin U.(1,000000)
Pamukkale U.	0,256	Bezm-İ Âlem Vakıf U.(1,455322); Hasan Kalyoncu U.(1,708060)
Sabancı U.	1	Sabancı U.(1,000000)
Sakarya U.	0,143	Bezm-İ Âlem Vakıf U.(0,326233); Hasan Kalyoncu U.(4,033535); Özyeğin U.(0,320173)
Selçuk U.	0,150	Bezm-İ Âlem Vakıf U.(2,131388); Hasan Kalyoncu U.(3,428246)
Süleyman Demirel U.	0,190	Bezm-İ Âlem Vakıf U.(1,282526); Hasan Kalyoncu U.(2,314912); Özyeğin U.(0,396760)
Tekirdağ Namık Kemal U.	0,376	Bezm-İ Âlem Vakıf U.(0,308849); Çankaya U.(1,792885); Hasan Kalyoncu U.(0,404088)
TOBB Ekonomi ve Teknoloji U.	1	TOBB Ekonomi ve Teknoloji U.(1,000000)
Yaşar U.	0,870	Bezm-İ Âlem Vakıf U.(0,340247); Hasan Kalyoncu U.(0,423364)
Yeditepe U.	0,083	Bezm-İ Âlem Vakıf U.(0,021442); Hasan Kalyoncu U.(2,090004); Özyeğin U.(0,684899)
Yıldız Teknik U.	0,200	Abdullah Gül U.(1,221432); Hasan Kalyoncu U.(3,796131); Özyeğin U.(0,639642)

Tablo 8. Entrepreneurship and Innovation Efficiency Analysis Results

University	Score	Universities that can be referenced
Abdullah Gül U.	1	Abdullah Gül U.(1,000000)
Akdeniz U.	0,127	Abdullah Gül U.(3,162541); Çankaya U.(5,610760); Hasan Kalyoncu U.(0,494649)
Anadolu U.	0,245	Abdullah Gül U.(0,237189); Çankaya U.(1,649929); Hasan Kalyoncu U.(2,655822)
Ankara U.	1	Ankara U.(1,000000)
Atatürk U.	0,117	Çankaya U.(7,394900); Hasan Kalyoncu U.(0,590678); TOBB Ekonomi ve Teknoloji U.(0,378387)
Atılım U.	0,600	Abdullah Gül U.(0,694886); Çankaya U.(0,810819); Hasan Kalyoncu U.(0,177028); TOBB Ekonomi ve Teknoloji U.(0,082059)
Bahçeşehir U.	0,402	Çankaya U.(0,484274); Hasan Kalyoncu U.(1,571862); TOBB Ekonomi ve Teknoloji U.(0,264171)
Bezm-İ Âlem Vakıf U.	1	Bezm-İ Âlem Vakıf U.(1,000000)
Boğaziçi U.	0,409	Abdullah Gül U.(2,614847); Sabancı U.(0,117405); TOBB Ekonomi ve Teknoloji U.(1,063234)
Bursa Uludağ U.	0,168	Abdullah Gül U.(1,155586); Çankaya U.(3,996986); Hasan Kalyoncu U.(2,019236)
Çankaya U.	1	Çankaya U.(1,000000)
Çukurova U.	0,165	Abdullah Gül U.(0,893623); Çankaya U.(2,625722); Hasan Kalyoncu U.(2,937729)
Dokuz Eylül U.	0,119	Abdullah Gül U.(3,935880); Çankaya U.(6,892915); Hasan Kalyoncu U.(0,240472); TOBB Ekonomi ve Teknoloji U.(0,064124)
Düzce U.	0,482	Çankaya U.(0,667893); Hasan Kalyoncu U.(1,132345)
Ege U.	0,131	Abdullah Gül U.(3,798553); Çankaya U.(5,002176); Hasan Kalyoncu U.(0,339305); TOBB Ekonomi ve Teknoloji U.(1,755148)
Erciyes U.	0,181	Abdullah Gül U.(2,343098); Çankaya U.(1,261966); Hasan Kalyoncu U.(4,020167)
Eskişehir Osmangazi U.	0,213	Abdullah Gül U.(0,404687); Çankaya U.(4,171185); Hasan Kalyoncu U.(0,315709)

Eskişehir Teknik U.	0,596	Çankaya U.(0,704); Hasan Kalyoncu U.(1,067); TOBB Ekonomi ve Teknoloji U.(0,161493)
Fırat U.	0,183	Abdullah Gül U.(0,055426); Bezm-İ Âlem Vakıf U.(0,157138); Çankaya U.(5,245868)
Gazi U.	0,138	Abdullah Gül U.(1,796396); Çankaya U.(5,385347); Hasan Kalyoncu U.(2,204070)
Gaziantep U.	0,229	Abdullah Gül U.(0,049227); Çankaya U.(1,830886); Hasan Kalyoncu U.(2,289238)
Gebze Teknik U.	0,564	Abdullah Gül U.(1,937774); Sabancı U.(0,262053); TOBB Ekonomi ve Teknoloji U.(0,322986)
Hacettepe U.	0,106	Abdullah Gül U.(7,274687); Çankaya U.(5,404768); Hasan Kalyoncu U.(1,464166); TOBB Ekonomi ve Teknoloji U.(0,101237)
Hasan Kalyoncu U.	1	Hasan Kalyoncu U.(1,000000)
İhsan Doğramacı Bilkent U.	0,569	Abdullah Gül U.(1,684834); Sabancı U.(0,553967); TOBB Ekonomi ve Teknoloji U.(0,430387)
İstanbul Bilgi U.	0,644	Çankaya U.(1,402681); Hasan Kalyoncu U.(0,268082)
İstanbul Kültür U.	0,626	Abdullah Gül U.(0,051577); Çankaya U.(0,832881); Hasan Kalyoncu U.(0,419744)
İstanbul Medipol U.	0,278	Abdullah Gül U.(1,823966); Çankaya U.(1,128920); TOBB Ekonomi ve Teknoloji U.(0,541212)
İstanbul Okan U.	0,981	Ankara U.(0,036345); Hasan Kalyoncu U.(0,791018)
İstanbul U.	0,118	Abdullah Gül U.(1,590); Çankaya U.(5,230); Hasan Kalyoncu U.(4,587); TOBB Ekonomi ve Teknoloji U.(0,351)
İstanbul U.-Cerrahpaşa	0,331	Çankaya U.(2,183647); Hasan Kalyoncu U.(1,227202)
İzmir Yüksek Teknoloji Ens.	0,653	Abdullah Gül U.(2,412947); Sabancı U.(0,013677)
Karadeniz Teknik U.	0,171	Abdullah Gül U.(1,849741); Bezm-İ Âlem Vakıf U.(0,840879); Çankaya U.(3,474612)
Koç U.	0,700	Abdullah Gül U.(0,382455); Sabancı U.(1,062463)
Kocaeli U.	0,183	Abdullah Gül U.(1,113155); Çankaya U.(1,380285); Hasan Kalyoncu U.(3,796926)
Konya Teknik U.	0,574	Abdullah Gül U.(0,092475); Çankaya U.(0,215227); Hasan Kalyoncu U.(1,010893); TOBB Ekonomi ve Teknoloji U.(0,060140)
Marmara U.	0,107	Abdullah Gül U.(1,132785); Çankaya U.(2,963622); Hasan Kalyoncu U.(6,152048)
Orta Doğu Teknik U.	0,222	Abdullah Gül U.(7,999043); Sabancı U.(0,703214)
Özyeğin U.	0,968	Abdullah Gül U.(0,674881); Çankaya U.(0,090256); Hasan Kalyoncu U.(0,007059); TOBB Ekonomi ve Teknoloji U.(0,632171)
Pamukkale U.	0,225	Bezm-İ Âlem Vakıf U.(0,409177); Çankaya U.(3,873683)
Sabancı U.	1	Sabancı U.(1,000000)
Sakarya U.	0,201	Abdullah Gül U.(0,391566); Çankaya U.(1,309774); Hasan Kalyoncu U.(3,495641); TOBB Ekonomi ve Teknoloji U.(0,117063)
Selçuk U.	0,171	Abdullah Gül U.(0,389028); Çankaya U.(5,385530); Hasan Kalyoncu U.(1,073801)
Süleyman Demirel U.	0,157	Abdullah Gül U.(0,916372); Çankaya U.(4,143045); Hasan Kalyoncu U.(0,585985)
Tekirdağ Namık Kemal TOBB Ekonomi ve Teknoloji U.	0,311	Bezm-İ Âlem Vakıf U.(0,061355); Çankaya U.(2,709309)
Yaşar U.	1	TOBB Ekonomi ve Teknoloji U.(1,000000)
Yeditepe U.	0,909	Bezm-İ Âlem Vakıf U.(0,080947); Çankaya U.(0,960140)
Yıldız Teknik U.	0,275	Abdullah Gül U.(0,092739); Çankaya U.(0,717499); Hasan Kalyoncu U.(1,763254); TOBB Ekonomi ve Teknoloji U.(0,560915)
Yıldız Teknik U.	0,266	Abdullah Gül U.(1,860127); Hasan Kalyoncu U.(3,371518); TOBB Ekonomi ve Teknoloji U.(0,707709)