BMIJ
ISSN: 2148-2586

bmij (2021) 9 (2):513-531
doi: https://doi.org/10.15295/bmij.v9i2.1793

Research Article

Positioning universities based on the preference network of economics department students

İktisat bölümü öğrencilerinin tercih ağına dayalı olarak üniversitelerin konumlanması

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Abstract

The research aims to determine the positioning of universities according to the preferences of university students based on the perceptions of stakeholders receiving service. In the study, the number of preferences for each university included in the YKS preference lists of all students placed in the Department of Economics at universities in Turkey in 2019 were evaluated using the integer method. The data were collected separately from the preference pages of each university through the "Higher Education Program Atlas". In the study, "Modularity Based Community Analysis" was applied with the Gephi program. In the research, the universities with the most critical position in terms of the Economics department were determined. In the preference network, it has been determined that clusters are generally formed based on physical proximity in Istanbul, Izmir, and Eastern and Southeastern Anatolia. The study also showed that the positioning of universities in student preferences might be effective in different criteria such as research potential of universities apart from geographical reasons. Since there is no similar research in the literature regarding obtaining the data and the technique used, it is expected that the study will contribute to the studies in this field.

Keywords: Positioning, Higher Education, Preference Network

Jel Codes: D85, I21, I23

Öz

Araştırma, hizmet alan paydaşların algılarına dayalı olarak üniversitelerin, üniversite öğrencilerinin tercihlerine göre konumlandırılmasını belirlemeyi amaçlamaktadır. Çalışmada 2019 yılında Türkiye'deki üniversitelerde İktisat Bölümü'ne yerleştirilen tüm öğrencilerin YKS tercih listelerinde yer alan her üniversite için tercih sayıları tamsayım yöntemi kullanılarak değerlendirilmiştir. Veriler, "Yüksek Öğretim Program Atlası" aracılığıyla her üniversitenin tercih sayfalarından ayrı olarak toplanmıştır. Çalışmada Gephi programı ile "Modülerite Tabanlı Topluluk Analizi" uygulanmıştır. Araştırmada İktisat bölümü açısından en önemli konumda bulunan üniversiteler belirlenmiştir. Tercih ağında kümelerin genel olarak İstanbul çevresi, İzmir çevresi ile Doğu ve Güneydoğu Anadolu Bölgesi'nde fiziksel yakınlık temel alınarak oluştuğu saptanmıştır. Çalışma ayrıca öğrenci tercihlerinde üniversitelerin konumlanmasında, coğrafi nedenler dışında üniversitelerin araştırma potansiyeli gibi farklı kriterlerin de etkili olabileceğini göstermiştir. Verilerin elde edilmesi ve kullanılan teknik açısından literatürde benzer bir araştırmaya rastlanmadığından, çalışmanın bu alanda yapılacak çalışmalara katkı sağlaması beklenmektedir.

Anahtar Kelimeler: Konumlama, Yükseköğretim, Tercih Ağı

JEL Kodları: D85, I21, I23

Submitted: 6/03/2021

Revised: 26/05/2021

Accepted: 31/05/2021

Online Published: 25/06/2021

Citation: Gülpınar Demirci, V., Positioning universities based on the preference network of economics department students, bmij (2021) 9 (2): 513-531, doi: https://doi.org/10.15295/bmij.v9i2.1793

Introduction

The rapid increase in higher education institutions (HEI) has forced universities to become internationalized, have to research activities in different fields in an academic sense, and legitimise themselves regionally and locally in economics, technology, and innovation (Fumasoli, Barbato and Turri, 2020, p. 306). HEI is also expected to generate information and human capital that meets the requirements of information society and contribute to regional development and global problems (Van Vaught and Huisman, 2013, p. 24).

In parallel with the increase in the number of especially in foundations/private universities, primarily in developed countries, the competition between HEI has accelerated (Maringe, 2006; Brankovic, 2014). The rapid increase in the number of foundation universities in Turkey, the presence of a university nearly in each city, the opening of some departments, and the inability of some departments to even admit students show that dynamics in higher education are changing rapidly. Whereas during this competition, a group of universities focuses on different marketing techniques to become an institution preferred by successful students, some universities strive to maintain their existence. The literature includes researches that compare universities according to different criteria. In addition to existing researches, the university follow-up and assessment reports published by the Council of Higher Education (YÖK) show the success levels of universities in Turkey.

Existing studies provide information about the sequencing of universities and how they are positioned. Despite this, the literature has not clarified the positions of universities vis-à-vis each other. Based on the review of the related studies in the literature, it was noticed that the literature does not include conclusive information on the following issues: i) The way that the students position universities as per their preferences; ii) The areas the universities are being assessed as being close to each other; iii) The existence of the physical proximities' impact on preference tendency, and iv) the actors/universities efficient in the preference network created. Therefore, this research may help fill the gap related to the above-listed issues to determine the base criteria when determining the positions of universities.

This research aims at finding answers to questions in the literature, which can be generalized for the target audience by using contemporary and valid methods. The "student preferences" criterion was primarily heeded while determining the positions of universities. That is because the values of universities are directly related to the extent to which they are preferable universities. In other words, it is no longer critical to sequence a university, which is not preferred by the student, according to brand value or national/international standards. The "preferred universities" in the preferred forms of students admitted to the Economics department were heeded while researching universities' positions. The preference network thus obtained was analyzed using the network centrality analysis and clustering approach. Likewise, the HE has accentuated the need for making more studies to harmonize and test other relational indicators that are already adapted by Social Network Analysis (SNA), such as centrality and coreness measures (Seeber, Lepori, Agasisti, Tijssen, Montanari and Catalano, 2012, p. 303). According to Jun and Park (2017), brands need to analyze the interests and relationships of the consumers to create their advertising marketing strategies. The ties that their competitors have created with the customers should be included in this analysis process. The network analysis provides valuable information on how a consumer perceives the brand compared to the competitors' brands and identifies such points required for improvement and strengthening to meet this requirement. In addition, another solid and practical advantage of this method is that the matrixes offer ease of use to identify these relationship networks.

Including economics departments, many departments in universities face quota gaps and even life struggles. Knowledge of the positions in higher education will make it possible to take strategic decisions that include information on brand value and advance those with such knowledge in this competition. However, the literature has not clarified the positions of universities vis-à-vis each other. Another problem is to determine the base criterion when determining positions. The value of a university is directly related to the extent to which it is a preferable university. In sum, this research has tried to reveal the positions of economics departments by considering the preference lists of Economics department students for the YKS exam of 2019 admitted to Turkey's state and foundation universities. The research aims to determine the factors that impact university preferences through preference network analysis, reveal the positions of universities in the preference network, manifest how the universities are clustered based on preference networks, and determine the properties of clusters. The research has used the student preference lists to determine higher education institutions' positions (HEI) and analyzed the preference network. The literature has no similar research in terms of obtaining the said data and the technique used.

The research has handled students' ratios in the Economics Departments of state and foundation universities during 2019 regarding their preferences for each university in their YKS (The Exam for Higher Education Institutions) preference lists. The data was obtained from yokatlas.gov.tr.

The research represents a first in literature in terms of data obtainment. However, the following limitations are present for obtaining data: Firstly, it is normal for a student admitted to the Economics department to select different departments. The Higher Education Program Atlas shares information on the total number of preferences for Economics and other university departments. However, this value does not show the preference numbers based on universities. The research has shared this information in a separate table, and this was also considered during interpretations. Therefore, the research does not show the status of universities that do not have economics departments. Secondly, the preference networks of universities were limited to the Economics department. Researches made on different departments may lead to differences in the positions of universities in the preference networks. For example, although a university has a vital position in its Economics department, its legal department may not be an efficient network component. On the other hand, the researcher assumed that the universities included in the YKS preference list of the students show their brand positions about the universities.

Positioning as a marketing concept

Positioning represents an essential strategic concept developed in the consumer markets but offers the same implementation opportunities for industrial goods & services (Webster, 1991, p. 102). Positioning is an aggregate of perceptions that manifests its difference in its target distribution and its rivals (Arlı, 2012, p.100). According to a different description, positioning represents designing images and quotations by companies to create a different image in the minds of individuals in the target market. In other words, positioning represents a strategic management decision about where products or services will be handled in a specific market (Özdaşlı, 2015, p. 2927).

According to Ries and Trout (1986), creating a positioning strategy is a significant difficulty for marketers because these stand at the focal point of customers' perceptions and choices. Positioning is the differentiation of the product for meeting the mental expectations of customers. However, this procedure is performed as per the image in minds, not the product. Moreover, according to Arlı (2012), positioning is an activity imposed on people's minds about any image. Özdaşlı (2015) has handled this description for university departments and defined positioning as an "act of explaining an image in people's minds about a department".

Arlı (2012) has gathered positioning methods under nine subtitles as:

-product features,

-price-quality relation,

-product use,

-product class,

-product users,

-comparison with rivals,

-cultural symbols,

-living style,

-brand personality.

Positioning in higher education

For universities, creating a unique profile that cannot be replicated will differentiate them from their rivals and gain a competitive advantage (Martinez and Wolverton, 2009; Fumasoli and Huisman, 2013). Creating a unique position can be obtained through a combination of used resources (inputs), provided activities (outputs), and an efficient process. Furthermore, this requires a skill for HEI senior management to design & implement the input-process-output combination (Fumasoli et al., 2020, p. 319).

Strategic planning is official & rational processes where universities detail how to execute their missions, visions, and values, meaning their activities, where they define and assign their roles. The first scientific study on universities' strategic planning was made in the USA due to private HE sectors and the Carnegie classification, which permits universities to find their positions (Fumasoli, 2018, p. 1). An

essential result of strategic planning is institutional positioning (Fumasoli and Huisman, 2013, p. 157). Therefore, to better understand the strategic position, it is pretty essential to disclose the determinants of university positioning and consider this (Fumasoli et al., 2020, p. 328).

Institutional positioning in HE is the process where HEI places itself into specific niches within the HE system. This concept differs from the traditional positioning in the profit-oriented sector because many HE institutions are not profit-oriented. Therefore, status and prestige allow better access of universities to the financial resources they need, and legitimacy, on its own, constitutes an essential strategic being. Accordingly, institutional positioning is strategic because it requires a decision on the efficient use of university skills to attract resources related to its operation and survival (Fumasoli and Huisman, 2013, p. 160). Hence, the concept of strategic planning comes to the forefront here, and especially for HE.

According to which universities will be positioned, the criteria represent a fundamental problem for researchers and policymakers (Fumasoli et al., 2020, p. 306). As positioning examines how the universities position themselves, the research in the marketing literature instead focuses on its impact on preferences by students (Bakewell and Gibson-Sweet, 1998; Maringe, 2006; Niculescu, 2006; Dorozhkin et al., 2016).

Dimensions of positioning and central position

Positioning in higher education is multi-dimensional. It may depend on material resources such as students, academic-administrative personnel, and financing. It may also depend on reputation. In addition, handling institutional positioning as a consequence of leadership intentions, meaning environmental determinism such as strategic planning, market competition, public policies, etcetera, will enable understanding the change dynamics of universities and HE (Fumasoli, 2018, p.4).

The lower the variety of environmental conditions, the closer the positioning of universities with each other. Many factors play a role when universities characterize themselves. Even under pressures from increased competition, legitimacy still seems like a critical determinant that significantly impacts how universities characterize themselves (Fumasoli et al., 2020, p. 319). The fundamental dimension of positioning is "understanding and coping with competition". Being at a central point in positioning means serving more resources and also being characterized by more competition. In this direction, centrality represents a measurement of universities and continuity between the centre and the periphery.

Similarly, centrality can be handled in a way that covers geographical, economic, and social aspects. Geographical centrality shows whether a university is located in a metropolis, in an urban area, in the countryside, or regions with intense or scarce populations. The connected resources consist of infrastructures, large and diversified student bodies, and a workforce representing the aggregate of mass transportation and communication tools. Political centrality points to the closeness of universities to political institutions and public authorities. Furthermore, economic centrality points to universities that operate in economically advanced areas such as industry, business, and technology in addition to public-private partnerships, Research & Development Activities, innovation, and information transfer. Finally, social centrality characterizes closeness to other universities and university-related actors. Social centrality includes higher competition, but it also provides opportunities for collaboration with rivals. More generally, universities may activate relations based on the collaboration with other universities through typical education and project-based networks that obtain resources, status, and critical mass from embedded universities (Fumasoli et al., 2020, p. 327).

Fumasoli et al. (2020) claimed that the more central the university's location in geographical, political, economic, and social terms, the more access it has over symbolic resources over finance and reputation and that they, therefore, have a strategic position proportionally efficient. Moreover, if a university is more centrically located in social terms, it will have a competitive level that affects its strategic position, and this situation offers an opportunity for collaboration with rivals and other actors that affect its strategic position.

Literature review

The literature has frequently examined how universities position themselves. In one of these studies, the Framework was examined by applying content analysis on videos published on universities' websites to identify the universities' positioning strategies wish to place in students' minds in a distinguished format. The research covers the universities in Istanbul. As a result, eight positioning strategies that the universities followed were identified: internationalization, education systems, academic success, social and sportive facilities, job opportunities, physical opportunities, scholarship & dormitory options, and deep-rooted history (Çatı, Kethüda and Bilgin, 2016, pp. 219-234). Similarly,

Wilkins (2020) used the secondary data obtained from the HEI websites in the United Arab Emirates (UAE) and researched how they positioned themselves and how they competed. The research showed that corporate accreditation and program accreditation is essential in the UAE market. Finally, Özdaşlı (2015) examined the department course plans of the Business Administration Departments in 14 universities established in Turkey in 2006 and researched whether universities positioned themselves for training personnel for the private sector or public institutions. He also examined the general information, missions, and visions of the departments classified according to course intensity and whether the personnel training statements showed linearity with the curriculum. It was concluded that all departments focused on creating human resources as much as their capacities and the country's capacities allowed.

The literature has also positioned universities according to the preferences of students. Furthermore, research conducted in Romania collected information on the expertise perceptions of 344 students, and a perceptual map was created accordingly. The second phase of the research performed a cluster analysis to identify groups amongst 1.390 students with expertise preferences such as marketing, management, accounting, etcetera. The study identified the presence of three market segments are "pragmatics", "socials", and "diploma hunters" (Niculescu, 2006, pp. 725-737). And research performed in a state university in Russia questioned 1000 students who had applied for enrollment about the source information they so far learned about the university. The research developed a series of marketing activities for positioning a higher education institution. The system developed aims at promoting the universities as a brand in the market of educational services, fortifying their competitive positions and increasing the attractiveness of universities for prospective students (Dorozhkin et al., 2016, pp. 9328-9338). And a quantitative study that handled the ZCAS University of Zambia as a brand applied a survey to 110 first-class students in ZCAS and 280 first-class students from seven universities in the country. Features of branding were quality of education, fees, course availability, learning environment and chances of employment. The study showed that ZCAS possessed a powerful brand position in Zambia's HE sectors and that it had to distance itself from competition to create a more appropriate image in the minds of potential and existing customers. It was recommended that this university, which has a central position, collaborates with universities in the periphery (Kayombo and Carter, 2017, pp. 6-21). A different study on universities' positioning, generally mentioned by the literature, aims to identify the factors that the students consider essential while choosing a university and deciding about courses. Three hundred eighty-seven students from the fifth and sixth classes of Southampton University's Partnership Program participated in the study. The study used a survey that is based on a 10-decimal Likert scale and included selection factors for 35 universities. The study shows that students adopt a consumer approach during the HE decision making processes. On the other hand, it was seen that students attached more importance to issues related to programs & fees than to other factors included the universities' marketing mixture (Maringe, 2006, pp. 466-479).

The literature also includes studies that use the positioning to identify the strategic position in higher education. One of these researches focused on disclosing the determinants of a university's positioning to understand better its strategic position. Environmental determinism, which is one of the two-discrepancy hypotheses, claims that external forces define university positioning. On the other hand, the executive rationale presupposes that a university positions itself according to the intentional design of its senior-level leadership. In order to improve the theoretical concept related to university positioning, it was emphasized that the organizational dimension should be evaluated as a variable that affects both environmental and executive hypotheses (Hou et al., 2012, pp. 841-857). Other research has used the growth-sharing matrix as a part of a university's strategic positioning analysis. It later expanded the model by including social inclusion in the analysis as a third dimension. The study shows that in the model recommended for the Belgian academic program, and increased social inclusion can be simultaneously achieved with higher performance parameters such as the number of enrolled and graduated students (Haezendonck, Willems and Hillemann, 2017, pp.31-47). Another study that researches the impact of HEI strategies on system variety explains institutional positioning by using the intentionality positioning on the one hand and the compatibility and differentiation dimensions on the other hand. The research model includes multiple dimensions and relations that reflect how HEI's position themselves in particular niches (Fumasoli and Huisman, 2013, pp. 155-169). Fumasoli et al. (2020) stated that hypothesizing the determinants of corporate strategic positioning has contributed to discussions on the status of a university as an organizational actor. The research asserts that in addition to environmental forces and the rationalism of the management, the organizational dimension should also be taken into account.

The literature includes a minimal number of studies that use the network analysis method to determine universities' positions. One of these studies was performed in Italy, and it collectively examined the

relational structure where universities are embedded together due to the impact of policies. The research shows that the presence of universities intensifies in highly-populated regions. The research concluded that highly-populated regions have more muscular transportation systems. Students tend to be present where universities are densely found and that the attraction of significant universities is increased by correlating the perception of reputation with the dimension of the university (Seeber et al., 2012, pp. 291-305). In his study, Arthur (2016) aimed at better understanding the HE networks structure in Northern America and developed a modularity-class approach for categorizing colleges and universities according to their own-defined peer networks. The research covers 525 colleges and universities. As colleges and universities are represented by knots within the network, peripheries represent the self-defined peer relations. The results show that although the positioning of Hub/Authorities is the most important, the entirety of network centrality measurements did not equally foresee the results of organizational change. The research accentuates that a modularity approach to classifying the HE will become more critical through its examination vis-à-vis more typical approaches based on prestige or perceived organizational features.

Furthermore, using network analysis, Miller (2020) analyzed which institutions represent Comprehensive Institutions (CI) qualified as interim universities and which organizational features are related to being a CI. Since 2005 IPEDS has, and under the name of comparison groups, enabled institutions to select up to 100 other high schools or universities within their comparison groups. The study implemented modularity maximization that is a technique for identifying the communities within networks. The analysis result shows that institutions that nominate a joint candidate represent a shared organizational identity.

Moreover, a section in the literature tried to identify the types of universities based on their positions. A longitudinal study was conducted between the years of 2004-2014, and the analysis on the positioning paths of HEI was considered for determining the variety of HE institutions. This research examined the HEI in Italy and England, especially looked into which HE groups had a more significant impact on the level of variety in a single HE. The research concluded that more similarities existed in the public HEI of England and Italy in terms of research intensity and that this showed a higher differentiation than internationalization levels. In terms of positioning, it is seen that some clusters are learning-focused, and some others are more research-focused (Barbato and Turri, 2019, pp. 1-14). A different study comparing the German and Dutch systems concluded that an essential aspect of creating corporate profiles is "high-level quality" and "perfection" in both countries. It was seen that the positions of German and Dutch universities are significantly important (Klumpp, De Boer and Vossensteyn, 2014, pp. 156-176).

Furthermore, a study conducted in Italy focused on how different competition levels affect universities' diversification, expertizing and positioning strategies over time. The study analyzed the relation between competition-based and program-based diversification in 75 Italian universities between the academic years of 2004-2012. The results show that local competition impacted program-based diversification rather than national competition (Cattaneo, Horta, Malighetti, Meoli and Paleari, 2018, pp. 1222-1240).

Apart from those, the literature has also examined how the universities will diversify and the factors affecting the same. The study also touched upon how the universities will diversify during doctorate training, how their positions will be measured, and it recommended them to move in a more integrated manner in order to diversity their finance flows and to more appropriately compete in their selected markets to cope with idled or shrunk public resources (Bonaccorsi, 2009, pp. 90-121). Moreover, other research that aimed at identifying the powers that may affect the positioning of private universities in the Balkans concluded that despite efforts by policymakers to equalize public and private HE, the corporate conditions under which these two subsectors operate are essentially different and that as a result, this had an impact on the positions of private institutions. The research underlines that the HEI that succeed in positioning themselves create a profitable niche in the student market or that the HEI that ensures a higher level of legitimacy than other private institutions has higher chances of survival (Brankovic, 2014, pp. 121-144).

Method

The information provided by the Higher Education Program Atlas was used to reach the objectives of the article. Accordingly, all universities having Economics departments and having admitted students were listed, and records were created about which universities were placed how many times in the preference lists of students admitted to these universities. For instance, 25 students were admitted to the Economics Department of Adıyaman University. The preference lists of students have included

Adıyaman University 121 times, Gaziantep University 42 times, Manisa Celal Bayar University 35 times and the İnönü University 23 times. By looking at the departments included in the preference lists of students admitted to the Economics department of Adıyaman universities, one could provide info about their preference networks and how they position the universities. The research has included information on each university separately. A matrix was therefore obtained, which shows the preference frequencies for all universities.

Nevertheless, as YÖK does not share data other than those included in the Higher Education Program Atlas website, it was not easy to obtain a purified data structure. The fundamental problems encountered are: (i) Quota difference between the admitted students and the total number of preferences: Universities have different quotas. Therefore, the number of students that were admitted to the Economics departments of universities also varies. (ii) Differences concerning secondary education, education in a foreign language, scholarship education and faculty: In addition to formal education, some universities include Economics departments in secondary education, and some provide education in the English language and Turkish. Foundation universities also provide scholarship opportunities at specific ratios. iii) Situations where students use their preference rights partially: Students were provided 24 preference options following the YKS exam. However, students are not obliged to use all 24 preference options, and they can limit this to 1 if they wish. This situation will again create a quantitative difference. The following technique was used for solving these three problems: The Higher Education Program Atlas shares information on how many times the students, who have been admitted to the Economics department of a university, gave preference to other universities in their preference forms. This data has been proportioned with the total number of preferences, and efforts were made to eliminate the impact of quantitative differences such as the quota numbers of universities, the number of students admitted, secondary education, education in foreign language, or scholarship education analysis. On the other hand, the open education Economics programs were not included in the scope of research.

Appendix 1 shows the quota numbers of Economics departments, the number of students admitted, the preference numbers of such students for the Economics departments and the preference number of such students for departments other than Economics.

The Higher Education Program Atlas shares information on how many times the students, who have been admitted to the university's Economics department, gave preference to other universities in their preference forms. This data has been proportioned with the total number of preferences, and efforts were made to eliminate the impact of quantitative differences such as the quota numbers of universities, several students admitted, secondary education, education in foreign language, or scholarship education analysis.

The research population consists of the university preferences of all students, in their preference forums, who have been placed in the economics bachelor's programs in Turkey during 2019. The research consequently did not include universities in Northern Cyprus. Differences such as secondary education, education in a foreign language, etcetera were not taken into account. All economics programs of a university were gathered and represented with a single value. The research, therefore, considered all units in a population.

The analyses used the SNA. In addition, the Gephi software was used for visualizing the network, determining its general properties and obtaining centrality measurements.

The betweenness centralization is calculated as follows, as n_{st}^{i} shows the number of geodesic paths passing from s to t via i, and g_{st} shows the number of geodesic paths from s to t, the betweenness centralization of the edge i (Newman, 2010, p. 187):

$$B_i = \sum_{st} \frac{n_{st}^{i}}{g_{st}}$$

As the closeness centralization is calculated as follows, as d_{ij} shows the geodesic distance from i to j,

$$C_i = \frac{1}{\sum_j d_{ij}}$$

Findings

Primarily, the network was analyzed, created by the universities in Turkey with economics departments and admitted students therein during 2019. As seen in Appendix 1, 104 universities have economics departments as of 2019. The view of the network in Figure 1 was given using the Reingold network

view. Primarily, the network was analyzed, which was created by the universities in Turkey that have economics departments and admitted students therein during 2019. As seen in Appendix 1, 104 universities have economics departments as of 2019. The view of the network in Figure 1 was given using the Reingold network view.

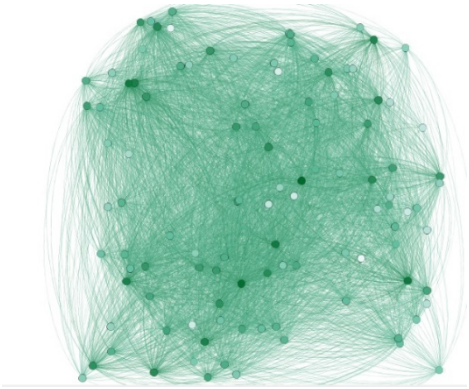

Figure 1: General View of the Network (Fruchterman Reingold)

There are 104 knots and 5562 connections in the network structure that is seen in Figure 1. The general properties of the network are shown in Table 1.

Table 1: General Properties of the Network

Chart Type	**Directional**
Number of the Knots	104
Number of Connections	5562
Average Degree	53.883
Maximum Diameter	3
Average Geodetic distance	1.479
Chart Density	0.528
Modularity	0.339
Average Clustering Coefficient	0.678

As seen in Table 1, an extensive network was created that has 5562 connections. Each knot here represents a university. On the other hand, the omnidirectional connection corresponds to a single preference of students in the university preference forums admitted to the Economic department of a university. As students frequently prefer a different university department where they are admitted, some connections are self-managing (self-edges). As this situation can significantly affect centrality measurements, it was considered within the scope of the research.

Table 2 shows 20 universities with the highest degree centrality measurements, and Figure 2 shows the distribution graphic of the universities according to their degree centralities.

The input degrees shown in Table 2 show the preference number of students who are enrolled in different universities for the university in question. Furthermore, the output degrees show the preference number of the students in the related university for different universities. Therefore, it shows that universities with high input centrality are intensely included in the preference list of students placed in other universities. According to the Table 2, the universities with the highest whole degree centralities are sequential as follows: Anadolu, Muğla Sıtkı Koçman, Dokuz Eylül, Selçuk, and Uludağ Universities. Figure 2 shows the name labels of all universities in proportion to their degree centralities. The Figure has gathered the universities with the highest degree centralities in the centre and has located the universities with lower degree centralities towards the network's periphery.

Table 2: Economics Departments Preference Network Degree Centrality Measurements

No.	Degree Centrality					
	Input degree centrality		Output degree centrality		All degree centrality	
1	Akdeniz U.	90	Anadolu U.	93	Anadolu U.	182
2	Anadolu U.	89	Muğla Sıtkı Koçman U.	92	Muğla Sıtkı Koçman U.	173
3	Selçuk U.	85	Dokuz Eylül U.	91	Dokuz Eylül U.	171
4	Uludağ U.	85	Karadeniz Technical U.	90	Selçuk U.	169
5	Aydın Adnan Menderes U.	83	İstanbul U.	88	Uludağ U.	169
6	Çanakkale Onsekiz Mart U.	82	Ege U.	87	Pamukkale U.	166
7	Muğla Sıtkı Koçman U.	81	Marmara U.	86	Çanakkale Onsekiz Mart U.	162
8	Pamukkale U.	81	Pamukkale U.	85	Ege U.	161
9	Kırıkkale U.	80	Selçuk U.	84	Marmara U.	161
10	Balıkesir U.	80	Uludağ U.	84	Karadeniz Technical U.	160
11	Dokuz Eylül U.	80	Erciyes U.	84	Mersin U.	159
12	Ondokuz Mayıs U.	78	Mersin U.	81	İstanbul U.	158
13	Ankara Hacı Bayram Veli U.	78	Çanakkale Onsekiz Mart U.	80	Eskişehir Osmangazi U.	158
14	Mersin U.	78	Eskişehir Osmangazi U.	80	Aydın Adnan Menderes U.	157
15	Eskişehir Osmangazi U.	78	Manisa Celâl Bayar U.	77	Erciyes U.	156
16	Bolu Abant İzzet Baysal U.	76	Bandırma Onyedi Eylül U.	77	Kırıkkale U.	156
17	Ankara Yıldırım Beyazıt U.	76	Kırıkkale U.	76	Ondokuz Mayıs U.	154
18	Necmettin Erbakan U.	75	Ondokuz Mayıs U.	76	Ankara Hacı Bayram Veli U.	153
19	Sakarya U.	75	Ankara Hacı Bayram Veli U.	75	Ankara Yıldırım Beyazıt U.	151
20	Marmara U.	75	Ankara Yıldırım Beyazıt U.	75	Akdeniz U.	151

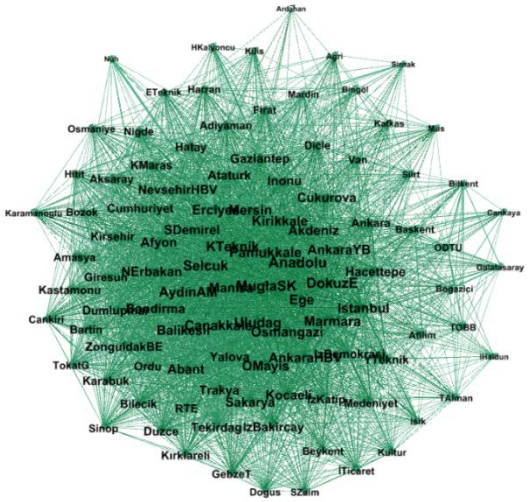

Figure 2: Degree Centralities (Label Adjust Function)

Whereas degree centralities provide vital information about the location of knots on the network, it falls insufficient because it considers the number of connections rather than their weights. For this reason, the closeness, betweenness and eigenvector centralities have also been calculated, which also consider the connection weights of these knots. Table 3 shows 20 universities that have the highest closeness, betweenness and eigenvector centrality measurements. Furthermore, Figure 3 shows the universities' distribution graph according to these measurements.

According to Table 3, the universities with the highest closeness centralities are sequential as follows: Anadolu, Muğla Sıtkı Koçman, Dokuz Eylül, Karadeniz Technical and İstanbul Universities. A university with a high closeness centrality can reach other universities through the shortest path and is placed at the network. The universities with the highest betweenness centralities are sequential as follows: Anadolu, Dokuz Eylül, İstanbul, Marmara and Muğla Sıtkı Koçman Universities. A university with a high betweenness centrality is located on the shortest path between other universities and therefore assumes a role for binding other universities or university clusters. The universities with the highest eigenvector centralities are sequential: Anadolu, Akdeniz, Selçuk and Uludağ Universities.

Whereas betweenness and closeness centralities focus on the knots' neighbouring knots, the eigenvector centrality also calculates the neighbours' connections.

Table 3: Preference Network of Economics Departments - Closeness, Betweenness and Eigenvector Centrality Measurements

	Closeness Centrality		**Betweenness Centrality**		**Eigenvector Centrality**	
1	Anadolu U.	0.9107	Anadolu U.	227.29	Anadolu U.	0.0146
2	Muğla Sıtkı Koçman U.	0.9026	Dokuz Eylül U.	192.96	Akdeniz U.	0.0143
3	Dokuz Eylül U.	0.8947	İstanbul U.	168.38	Selçuk U.	0.0142
4	Karadeniz Technical U.	0.8869	Marmara U.	166.58	Uludağ U.	0.0136
5	İstanbul U.	0.8717	Muğla Sıtkı Koçman U.	151.26	Kırıkkale U.	0.0132
6	Ege U.	0.8644	Ankara Yıldırım Beyazıt U.	145.05	Aydın Adnan Menderes U.	0.0132
7	Marmara U.	0.8571	Selçuk U.	131.89	Çanakkale Onsekiz Mart U.	0.0132
8	Pamukkale U.	0.8500	Uludağ U.	128.69	Ankara Yıldırım Beyazıt U.	0.0130
9	Erciyes U.	0.8429	Kırıkkale U.	118.4	Muğla Sıtkı Koçman U.	0.0129
10	Selçuk U.	0.8429	Erciyes U.	118.14	Marmara U.	0.0129
11	Uludağ U.	0.8429	Pamukkale U.	115.41	Dokuz Eylül U.	0.0129
12	Mersin U.	0.8225	Karadeniz Technical U.	114.9	Pamukkale U.	0.0128
13	Eskişehir Osmangazi U.	0.816	Mersin U.	111.56	Necmettin Erbakan U.	0.0127
14	Çanakkale Onsekiz Mart U.	0.816	Ege U.	108.1	Ondokuz Mayıs U.	0.0126
15	Manisa Celâl Bayar U.	0.7968	Hacettepe U.	98.54	Balıkesir Ü	0.0125
16	Bandırma Onyedi Eylül U.	0.7968	Ankara Hacı Bayram Veli	94.48	Mersin U.	0.012
17	Ondokuz Mayıs U.	0.7906	Eskişehir Osmangazi U.	92.63	Ankara Hacı Bayram Veli U.	0.0125
18	Kırıkkale U.	0.7906	Çanakkale Onsekiz Mart U.	91.49	Eskişehir Osmangazi U.	0.0125
19	Çukurova U.	0.7846	Necmettin Erbakan U.	79.53	Bolu Abant İzzet Baysal U.	0.0124
20	Ankara Hacı Bayram Veli U.	0.7846	Aydın Adnan Menderes U.	79.34	İstanbul U.	0.0123

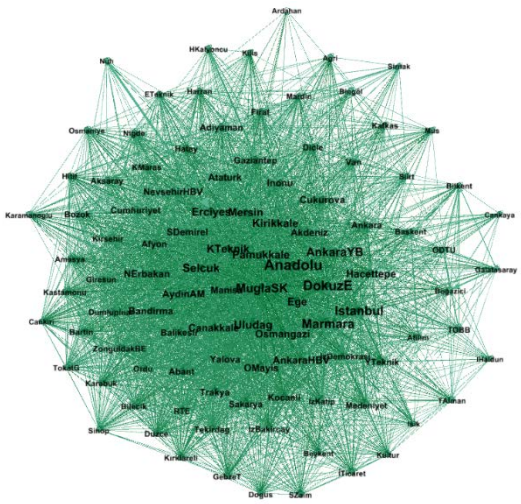

Figure 3: Betweenness Centralities

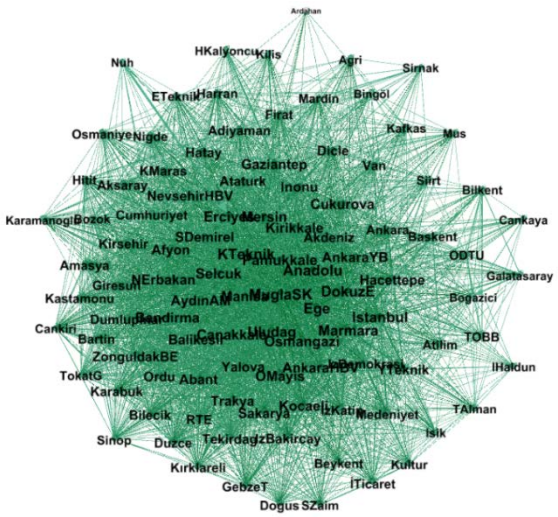

Figure 4: Closeness Centralities

The degree distribution of the network has been shown in Figure 5. Here, preference numbers have been proportioned according to the number of preferences, making interpretation difficult.

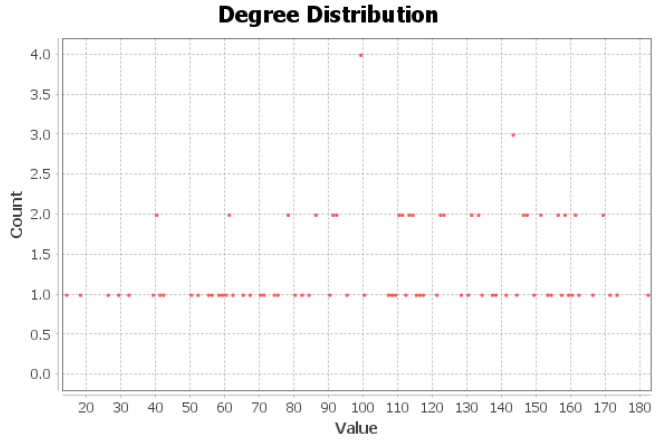

Figure 5: The Degree Distribution of the Network

In order to attain the most crucial target of the research, an analysis was made on the locations of universities in preference networks using clustering analysis. The Modularity Based Community Analysis technique that Newman and Girvan have developed was used for clustering analysis. For this purpose, the "*modularity*" analysis was performed in the Gephi software. Table 4 collectively shows the universities that are included in each cluster under clustering analysis. Moreover, Figure 6 shows analysis results in a graph.

The vast majority of the universities included in the first cluster of Table 4 are located in the Eastern Anatolia and Southeastern Anatolia regions. Attention is drawn because although Mersin, Karamanoğlu Mehmet Bey and Niğde Ömer Halisdemir Universities are not located in these regions, they are geographically close. It is seen that the universities included in the second cluster are in the City of Izmir and its periphery. It is conspicuous to see that the Anadolu and Osmangazi Universities in Eskişehir have been positioned in this group. All universities in the third cluster are in the City of Istanbul and its periphery. It was seen that all universities in the first three clusters are determinant in their positions within the preference network. It is seen that in addition to physical closeness, the fourth cluster includes universities that are similar in terms of base points. It is possible to say that the universities in this cluster are located within the City of Ankara and its periphery. Despite this, the existence of the Galatasaray University and the Boğaziçi University can be explained by base points. That is because the Boğaziçi, ID Bilkent, Galatasaray, TOBB Economics & Technology and the Middle East Technical Universities have the highest base points for Economics Departments in 2019.

Table 4: Results of Clustering Analysis

Cluster	Universities
1 (Brown)	Hasan Kalyoncu U., Kilis 7 Aralık U., Osmaniye Korkut Ata U., Kahramanmaraş Sütçü İmam U., Ardahan U., Siirt U., Muş Alparslan U., Hatay Mustafa Kemal U., Erzurum Technical U., Şırnak U., Mardin Artuklu U., Harran U., Fırat U., Dicle U., Sivas Cumhuriyet U., Ağrı İbrahim Çeçen U., Gaziantep U., İnönü U., Atatürk U., Van Yüzüncü Yıl U., Kafkas U., Adıyaman U., Çukurova U., Bingöl U., Mersin U. Karamanoğlu Mehmet Bey U., Niğde Ömer Halisdemir U.,
2 (Red)	İzmir Bakırçay U., İzmir Katip Çelebi U., İzmir Demokrasi U., Süleyman Demirel U., Aydın Adnan Menderes U., Manisa Celâl Bayar U., Eskişehir Osmangazi U., Akdeniz U., Ege U., Pamukkale U., Muğla Sıtkı Koçman U., Dokuz Eylül U., Anadolu U.
3 (Pink)	Gebze Technical U., İstanbul Commerce U., Beykent U., Doğuş U., Işık U., İstanbul Sabahattin Zaim U., Türk-Alman U., İstanbul Kültür U., Sakarya U., Kocaeli U., Yıldız Technical U., İstanbul Medeniyet U., İbn Haldun U., Yalova U., Marmara U., İstanbul U.
4 (Purple)	Çankaya U., Galatasaray U., Atılım U., Boğaziçi U., Başkent U., İhsan Doğramacı Bilkent U., Ankara U., TOBB Economics & Technology U., Middle East Technical U., Hacettepe U., Ankara Hacı Bayram Veli U., Kırıkkale U., Ankara Yıldırım Beyazıt U.
5 (Green)	Çankırı Karatekin U., Sinop U., Amasya U., Tokat Gaziosmanpaşa U., Nuh Naci Yazgan U., Kastamonu U., Giresun U., Karabük U., Kırklareli U., Zonguldak Bülent Ecevit U., Bartın U., Düzce U., Kütahya Dumlupınar U., Ordu U., Hitit U., Kırşehir Ahi Evran U., Recep Tayyip Erdoğan U., Bilecik Şeyh Edebali U., Bolu Abant İzzet Baysal U., Aksaray U., Tekirdağ Namık Kemal U., Yozgat Bozok U., Trakya U., Nevşehir Hacı Bektaş Veli U., Afyon Kocatepe U., Balıkesir U., Necmettin Erbakan U., Ondokuz Mayıs U., Bandırma Onyedi Eylül U., Çanakkale Onsekiz Mart U., Selçuk U., Erciyes U., Karadeniz Technical U., Uludağ U.

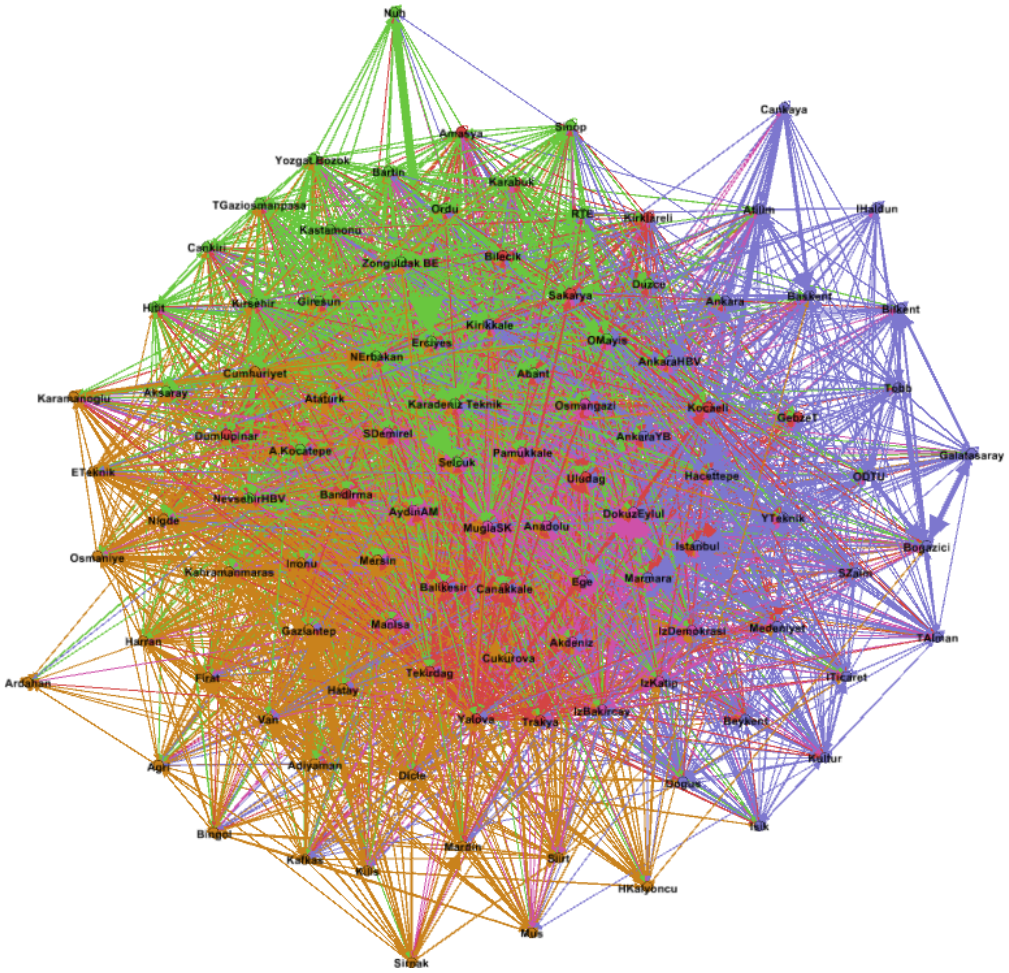

Figure 6: University Preference Network Clustering

Conclusion

The rapid increase in the number of universities has rendered it mandatory for them to keep pace with extreme competition conditions for maintaining their existence. This has also introduced discussions about the efficient use of marketing methods in higher education institutions. One of such marketing techniques is to manifest how the universities position themselves and differentiate themselves from

other universities. Mainly foundation universities use advertisement and similar tools to show how they position themselves and the features they want to emphasize. Despite the efforts by universities to show how they position themselves, the way that students perceive and position universities bear great importance. Without a doubt, the importance attached to each university by students is measured by preferability. Many criteria affect the university selection by students. Many factors can be determinant, including the university's physical location, the language of education, brand value, etcetera.

In Turkey during the last years, Economics Departments are among those that witness a rapid decrease in the number of students. As seen in Appendix 1, many universities have been unable to fill their quotas. For understanding the causes of this rapid fall, it is essential to understand the preference tendencies of university students and how they position universities. This can be a determinant for foreseeing the future of Economics departments and the steps to be taken by university administrations.

Many researchers use surveys and scales that help understand students' university preference tendencies in many fields and economics departments. Furthermore, this research has used university preference forms for identifying students' preference tendencies and how they position universities. This has taken into account the preferences of all students admitted to Economics departments in 2019, and these preferences were converted into a preference network amidst universities. Unfortunately, similar research was not found in the global literature.

The research has used the Higher Education Program Atlas that provided information on how many times the students, who have been admitted to the university's Economics department, preferred other universities in their preference forms. These values, where the number of admitted students and the preference number of each student vary, have been proportioned to the total preference numbers of students in the related university. The preferences made here were not limited to Economics departments. Therefore, Appendix 1 includes the number at which departments other than Economics were preferred in preference forms. Accordingly, the preference ratios of Economics departments in all preferences vary between 20 and 40 per cent. Students have given economics departments in İstanbul Commerce (0,44), Muğla Sıtkı Koçman (0,43), Hasan Kalyoncu (0,42) and Doğuş (0,41) universities higher preference. Whereas this ratio stands at 0.67 for Erzurum Technical University, the number of admitted students was limited to 5.

A network was created, and SNA was implemented to have the knots to show the universities and have the peripheries to show the total number of preferences made by students who were admitted to the Economics department of a university for other universities. The network has 104 universities and 5562 connections, and it was analyzed using the Gephi software. The analyses show that the universities with the highest whole degree centralities are sequential as follows: Anadolu, Muğla Sıtkı Koçman, Dokuz Eylül, Selçuk and Uludağ Universities. Other centrality measurements were also calculated, which, apart from degree centrality, also consider connection weights rather than connection numbers. According; the universities with the highest closeness centralities are sequential as follows: Anadolu, Muğla Sıtkı Koçman, Dokuz Eylül, Karadeniz Technical and İstanbul Universities. These universities may be positioned at a central point within the network. The essential point worth attention about 20 universities, which have the highest closeness centrality, is that universities from different regions are included. This shows that peripheral regions have a high preference for the universities in question. The results of the clustering analysis confirm this situation. The universities with the highest betweenness centralities are sequential as follows: Anadolu, Dokuz Eylül, İstanbul, Marmara and Muğla Sıtkı Koçman Universities. In addition to the fact that these universities are important actors within the network, one can state they play an intermediary role as they are located on the shortest paths. The universities with the highest eigenvector centralities are sequential: Anadolu, Akdeniz, Selçuk and Uludağ Universities. In terms of eigenvector centrality, the network locations of the neighbours of other universities, to which a specific university is connected, bears as much importance as the universities that this university is connected. For this reason, the eigenvector centrality also bears importance for manifesting the prestigious actors within the network.

Here, closeness centrality corresponds to the social centrality as mentioned by the literature. Fumasoli et al. (2020) emphasised that social centrality characterizes closeness to other universities and actors related to the university. Accordingly, universities with a high closeness centrality in the network analysis face more competitive environments, but they nevertheless possess collaboration opportunities. Furthermore, when the entirety of centrality measures within the network is considered together with universities' geographic locations, it is seen that it also bears the features of geographical centrality during positioning. Therefore, it supports the hypothesis that universities with centrality measurements are located in regions with more intense populations (Sebeer et al., 2012, p. 302). For example, Sebeer et al. (2012) determined that 76 per cent of students are enrolled in universities in

Milano, which has a central location in terms of population density and transportation system, but only 31 per cent of these students live in Milano. This result confirms a process where universities and students tend to populate more central and accessible regions. The findings obtained are consistent with the findings in the literature.

SNA was performed using the Modularity Based Community Analysis technique that Newman and Girvan have developed to visualise students' preference tendencies and position the universities. These two clusters were directly positioned as universities located in Istanbul, Izmir and their peripheries. Furthermore, one cluster generally consists of universities that are located in the Eastern and Southeastern Anatolia Regions. This situation bears importance as it shows the impact of universities' physical locations regarding students' preference for them. In light of the rapid decrease in the number of students in economics departments, it is vital that universities administrations pay attention to this issue. It is essential for universities with multiple campuses to place their Economics departments in more central locations of the city and for universities close to cities such as Istanbul, Ankara and Izmir, to move economics departments to campuses in the proximity of such cities. In addition to physical change, one can recommend intensifying advertisement, promotion, etcetera activities for the target audience in physically close locations to the university.

In addition to physical closeness, universities that are similar in terms of base points are found in different cluster. It is possible to say that the universities in this cluster are located within the City of Ankara and its periphery. Despite this, the existence of the Galatasaray University and the Boğaziçi University can be explained by base points. As a result of the modularity analysis, Boğaziçi, Bilkent, Galatasaray, TOBB, and Middle East Technical universities, which are in the same cluster, are the first five universities to receive students with the highest scores in the economics department base scores in 2019. On the other hand, Boğaziçi and the Middle East Technical University, which are in this cluster, are among the top three in the list of "Research and Candidate Research Universities in 2019", reported under the titles of "research capacity", "research quality" and "interaction and cooperation", prepared in cooperation with YÖK and TUBITAK (The Council of Higher Education (YÖK) Research and Candidate Research Universities Report, 2020). According to the 2019 "Foundation Higher Education Institutions" report, ID Bilkent, Çankaya, Atılım, and TOBB universities are among the top 10 universities in the "Foundation Universities by Total Research Budgets" (The Council of Higher Education (YÖK) Foundation Higher Education Institutions Report, 2019). As can be seen, most of the universities in the fourth cluster are among the best universities according to different success criteria rather than their geographical proximity. These show that in addition to the physical location, other success criteria such as research capabilities are also effective in the positioning of universities.

It is expected that the research will primarily contribute to the literature in terms of using student preferences in positioning universities and using preference lists as an alternative to using questionnaires and scales as research tools. In addition, the use of SNA techniques in the positioning of universities has the potential to contribute to the literature. Similarly, in future studies, each node in the network can represent a business or institution, and institutions or businesses in different sectors within the sector according to customer preferences can be researched with the SNA approach.

Without a doubt, interpretations made for the Economics department may not be valid for other departments. For this reason, future studies may include performing a similar study for different departments and supporting the results by a survey technique implemented on students through sampling.

Future studies recommend examining how the education-learning methods, modified due to the Covid-19 pandemic, have impacted positioning in higher education. It is also recommended that in addition to preference network analysis, future research compares the results via surveys and interviews with students.

Peer-review:

Externally peer-reviewed

Conflict of interests:

The author(s) has (have) no conflict of interest to declare.

Grant Support:

The authors declared that this study has received no financial support

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Appendix

Appendix 1: The Quotas of Economics Departments and the Number of Students Admitted (2019)

	University	Quota Numbers	Number of Students Admitted	Preference Number for the Economics Department	Preference Number for Other Departments	Total Number of Preferences
1	Adıyaman U.	41	25	75	264	339
2	Afyon Kocatepe U.	62	62	352	783	1135
3	Ağrı İbrahim Çeçen U.	24	4	9	27	36
4	Akdeniz U.	93	93	408	774	1182
5	Aksaray U.	31	31	135	308	443
6	Amasya U.	31	14	70	139	209
7	Anadolu U.	277	261	1191	2276	3467
8	Ankara Hacı Bayram Veli	144	144	600	1478	2078
9	Ankara Yıldırım Beyazıt U.	62	62	311	763	1074
10	Ankara U.	62	62	214	468	682
11	Ardahan U.	21	3	3	25	28
12	Atatürk U.	82	64	206	637	843
13	Atılım U.	63	63	306	557	863
14	Aydın Adnan Menderes U.	186	176	1140	1853	2993
15	Balıkesir U.	72	72	435	746	1181
16	Bandırma Onyedi Eylül U.	62	62	383	751	1134
17	Bartın U.	31	24	99	302	401
18	Başkent U.	65	62	363	548	911
19	Beykent U.	80	77	352	723	1075
20	Bilecik Şeyh Edebali U.	41	38	233	487	720
21	Bingöl U.	31	4	6	40	46
22	Boğaziçi U.	103	103	183	525	708
23	Bolu Abant İzzet Baysal U.	104	103	648	1232	1880
24	Uludağ U.	308	308	1565	2796	4361
25	Çanakkale Onsekiz Mart U.	196	196	1124	1982	3106
26	Çankaya U.	25	12	51	112	163
27	Çankırı Karatekin U.	41	7	39	70	109
28	Çukurova U.	155	155	538	1089	1627
29	Dicle U.	62	62	232	503	735
30	Doğuş U.	80	52	300	429	729
31	Dokuz Eylül U.	446	436	2392	3727	6119
32	Düzce U.	31	31	170	391	561
33	Ege U.	206	206	985	1784	2769
34	Erciyes U.	145	145	609	1352	1961
35	Erzurum Technical U.	26	5	57	28	85
36	Eskişehir Osmangazi U.	206	206	1318	2049	3367
37	Fırat U.	41	38	100	373	473
38	Galatasaray U.	31	31	86	267	353
39	Gaziantep U.	124	115	380	825	1205
40	Gebze Technical U.	62	62	267	579	846
41	Giresun U.	41	21	76	244	320
42	Hacettepe U.	206	206	660	1799	2459
43	Hakkâri U.	31	1	1	3	4
44	Harran U.	41	41	134	366	500
45	Hasan Kalyoncu U.	20	16	52	71	123

46	Hatay Mustafa Kemal U.	52	52	194	513	707
47	Hitit U.	31	13	50	125	175
48	Işık U.	26	24	107	176	283
49	İbn Haldun U.	10	10	14	90	104
50	İhsan Doğramacı Bilkent U.	140	140	434	959	1393
51	İnönü U.	62	62	167	613	780
52	İstanbul Kültür U.	50	34	161	313	474
53	İstanbul Medeniyet U.	52	52	266	502	768
54	İstanbul Sabahattin Zaim U.	30	30	121	305	426
55	İstanbul Commerce U.	48	48	262	322	584
56	İstanbul U.	390	390	1677	3187	4864
57	İzmir Bakırçay U.	62	62	349	720	1069
58	İzmir Demokrasi U.	62	62	375	577	952
59	İzmir Katip Çelebi U.	62	62	287	495	782
60	Kafkas U.	21	8	21	85	106
61	Kahramanmaraş Sütçü İmam U.	62	62	197	586	783
62	Karabük U.	41	41	166	541	707
63	Karadeniz Technical U.	154	154	870	1628	2498
64	Karamanoğlu Mehmet Bey U.	31	3	4	31	35
65	Kastamonu U.	51	15	68	166	234
66	Kırıkkale U.	123	123	463	1417	1880
67	Kırklareli U.	31	31	218	319	537
68	Kırşehir Ahi Evran U.	31	15	70	214	284
69	Kilis 7 Aralık U.	31	16	42	115	157
70	Kocaeli U.	175	175	763	1582	2345
71	Kütahya Dumlupınar U.	82	59	348	679	1027
72	Manisa Celâl Bayar U.	205	184	1065	2084	3149
73	Mardin Artuklu U.	31	8	44	71	115
74	Marmara U.	226	226	975	2004	2979
75	Mersin U.	134	134	586	1142	1728
76	Muğla Sıtkı Koçman U.	248	248	1814	2350	4164
77	Muş Alparslan U.	31	4	6	34	40
78	Necmettin Erbakan U.	62	62	262	681	943
79	Nevşehir Hacı Bektaş Veli U.	41	41	222	365	587
80	Niğde Ömer Halisdemir U.	62	12	47	126	173
81	Nuh Naci Yazgan U.	35	9	23	60	83
82	Ondokuz Mayıs U.	113	113	502	1042	1544
83	Ordu U.	52	33	122	355	477
84	Middle East Technical U.	93	93	184	611	795
85	Osmaniye Korkut Ata U.	41	16	40	147	187
86	Pamukkale U.	267	267	1555	2580	4135
87	Recep Tayyip Erdoğan U.	41	38	110	340	450
88	Sakarya U.	155	155	750	1527	2277
89	Selçuk U.	154	154	781	1580	2361
90	Siirt U.	31	7	21	107	128
91	Sinop U.	31	7	45	96	141
92	Sivas Cumhuriyet U.	52	26	82	276	358
93	Süleyman Demirel U.	62	62	330	567	897
94	Şırnak U.	31	5	13	51	64
95	Tekirdağ Namık Kemal U.	62	62	251	615	866
96	TOBB Economics & Technology U.	40	40	165	309	474

97	Tokat Gaziosmanpaşa U.	41	15	38	159	197
98	Trakya U.	88	88	500	879	1379
99	Türk-Alman U.	45	45	95	339	434
100	Van Yüzüncü Yıl U.	41	41	84	453	537
101	Yalova U.	62	62	328	642	970
102	Yıldız Technical U.	160	160	600	1292	1892
103	Yozgat Bozok U.	41	4	16	50	66
104	Zonguldak Bülent Ecevit U.	41	28	141	312	453