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Examination of Academic Publications of Ankara Hacı Bayram Veli University through Social Network Analysis

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Abstract: Nowadays, social network analysis, used in many different fields, is a highly effective method for visualizing and modeling inter-community relationships by determining a network structure. Ankara Hacı Bayram Veli University (AHBV) was established on May 18, 2018, with units transferred from Gazi University. This study evaluates the academic works of AHBV University from its inception to the present, particularly those expected to stand out in the fields of social sciences and arts, based on their bibliometric characteristics according to the SCI, SSCI, and AHCI indexes, using social network analysis methods. The aim of the research is to identify the areas where publications affiliated with AHBV University between 2018-2023 are concentrated, the prominent research trends in scientific studies, and the universities and institutions with which collaborations have been made. In the study, the evaluation of the publications produced by AHBV University was analyzed and visualized using social network analysis software via the R program, and subsequently interpreted. Such visualization studies will provide data sources for evaluating the publications produced by universities and for developing scientific publication policies. Additionally, by determining the institutions and research areas that hold strong positions within network structures according to calculated centrality, closeness, and other measures, this study aims to contribute to the development of AHBV University's scientific publication policy.

Keywords: Bibliometrics, Scientific publication, Social network analysis, Ankara Hacı Bayram Veli University

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1. INTRODUCTION

In Türkiye, the requirements for academics to have works indexed in citation indices are considered solely on a numerical basis. Although researchers believe that the number of publications alone is not significant, current practices such as the criteria for academic promotions compel researchers to be evaluated based on their publication counts. However, in recent times, the quality of works has also become increasingly important in the evaluation of researchers.

In the assessment of publications, besides the number and quality of publications, parameters such as the fields in which the studies are predominantly conducted, institutional collaborations, and citation counts of the publications have gained significance. Particularly in recent years, universities have taken these various parameters into consideration for rankings by different organizations or for their internal evaluations.

Researchers have turned to bibliometric studies under different headings in terms of the publications made. In the literature, there are studies employing bibliometric techniques for comparison purposes (countries, universities, departments, etc.) or for the examination of works under various parameters.

Bibliometrics is the application of mathematical and statistical methods to books and other communication media (Pritchard, 1969). In their study, Al and Tonta (2004) defined bibliometric analysis as the quantitative analysis of the characteristics of publications or documents, such as authors, subjects, publication information, and cited sources. Bibliometric analysis allows for the identification of the most productive researchers on any given topic, comparison

between countries and institutions, and understanding how scientific communication occurs in various disciplines (Al, 2008).

In recent times, there have been various bibliometric analysis studies conducted in different fields in our country. Yılmaz (2021) aimed to introduce systematic reviews, meta-evaluations, and bibliometric studies and provide information about their use in social sciences and educational sciences. In his study, Öçal (2023) conducted a bibliometric analysis of graduate theses prepared in the field of container transportation in Türkiye between 1999 and 2022. The researcher concluded that the theses were mostly master's theses, written in Turkish, and primarily conducted in the field of business administration. Furthermore, he noted that most studies were conducted in public universities in Izmir and Istanbul.

There are also bibliometric analysis studies related to social media, which has rapidly become a societal communication tool rather than just a personal communication tool in recent years. Akyıldız and Yılmaz (2020) conducted a bibliometric analysis using the science mapping method on studies titled "Social Media" in the WoS database between 2015 and 2020. Yeşiltaş and Şeker (2021) conducted a similar study by narrowing the field to examine educational studies related to social media. Using the WoS database, they found that Hacettepe University was the institution with the most studies on social media in the field of education. The study also revealed that the United States, the United Kingdom, and Australia were the top three countries with the most studies on this topic. In his study, Karakuş (2024) analyzed studies on the highly popular topic of digital violence.

Studies on the prominent topic of artificial intelligence have also been examined using bibliometric analysis by researchers (Akyılmaz, 2022; Ekinci, 2022; Turgut, 2023).

Bibliometric analysis of university journals and universities' own publications has also been a subject of research. Birinci (2008) examined 861 articles from the Turkish Journal of Chemistry using bibliometric analysis to identify the most productive authors and the institutions contributing to the journal. A similar study was conducted by Polat et al. (2013), who analyzed the works of the Journal of Economics and Administrative Sciences at Atatürk University using bibliometric analysis.

Scientific publications reporting the results of bibliometric analyses are highly important within science policy. Transforming descriptive studies into explanatory and guiding research will contribute to more efficient use of national resources.

The aim of this study is to offer a different perspective on academic publication performance by examining the publications indexed under the address of AHBV, which has a new identity and target, and by revealing the research fields, focused topics, and network structure with collaborating institutions.

2. MATERIAL AND METHOD

The concept of a network can be defined in its simplest form as the connection between entities (Christakis and Fowler, 2012). The three main elements that constitute a network are (1) actors, (2) the relationships between actors, and (3) the structure emerging from the different combinations of these relationships (Öztaş and Acar, 2004).

Social network analysis is becoming increasingly popular as a general research approach and method to understand complex interaction patterns. The network perspective examines nodes that are directly or indirectly connected by one or more different relationships. Theoretically, individuals, groups, organizations, communities, or countries can be considered nodes as any unit of analysis that is meaningful.

Some definitions related to social network analysis are as follows:

Node: Actors within social structures (individuals).

Edge: Relationships between actors (ties).

Adjacency Matrix: A matrix representing the ties between nodes in a network.

Degree Centrality: The number of direct connections an actor has, indicating the most active and influential entity within the network.

In-degree: The number of incoming connections, indicating the importance of an actor within the network.

Out-degree: The number of outgoing connections, indicating the actor that establishes the most relationships within the network.

Diameter: The maximum distance between connected nodes.

Closeness Centrality: The degree of proximity of a node to other nodes, either directly or indirectly.

Betweenness Centrality: The degree to which a node lies on the shortest path between other nodes.

Social network analysis has a wide range of applications in fields such as health, economics, and education. It is particularly beneficial as it provides visual representations of the results. Social network analysis facilitates the visibility of social relationships and information flow, the evaluation, comparison, and measurement of these relationships and flows. It can be used to identify individuals, teams, and units with significant roles within the network structure, uncover isolated units, identify opportunities to accelerate information flow, and determine areas where information sharing would have a higher impact (Demirgil, 2018).

This study aims to examine the bibliometric characteristics of the works indexed in the Science Citation Index Expanded, Social Sciences Citation Index, and Arts & Humanities Citation Index under the address of AHBV

University and to evaluate the relationships of institutional collaborations through social network analysis. A search was conducted in the Web of Science database using the keyword 'Ankara Hacı Bayram Veli University' from the addresses, and 661 publications from the years 2018 to 2023, the founding year of the university, were identified.
The study utilized certain metrics, such as closeness and betweenness, to determine author and institutional collaborations. Closeness centrality is a measure of how quickly information can be disseminated. The formula for calculating closeness centrality, which measures the number of steps required to reach all other nodes from a specific node, is as follows:

$$C(x) = \frac{1}{\sum d(y,x)} \quad (1)$$

Betweenness centrality is a measure of the number of shortest paths that pass through a specific node;

$$\vartheta = \sum_{s \neq v \neq t} \frac{\sigma_{st}(v)}{\sigma_{st}} \quad (2)$$

is calculated as follows. In the equation;

$\sigma_{st}(v)$ = the total number of paths from s to t that pass through v
σ_{st} = represents the total number of shortest paths from s to t.
R programming language was utilized to obtain the network structure visualization of institutional collaborations at Ankara Hacı Bayram Veli University.

3. RESULTS

The total number of publications affiliated with AHBV University between 2018 and 2023 is 661. Of these publications, 92.6% are articles, 2.7% are book reviews, 1.7% are reviews, and 1.5% are full-text papers. The remaining 1.5% consists of editorials, biographies, corrections, and letters.

Table 1. Distribution of Publications by Type

Publication Type	Number	Percentage
Article	612	92.6%
Book Review	18	2.7%
Review	11	1.7%
Full-text Paper	10	1.5%
Editorial	7	1.1%
Biography	1	0.2%
Correction	1	0.2%
Letter	1	0.2%

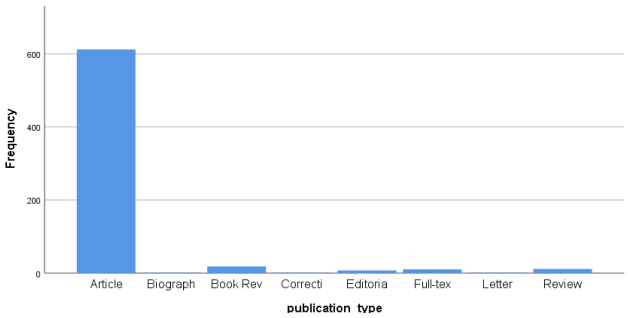

Figure 1. Distribution of Publication Types at AHBV University

In terms of publication language, it is evident that English is the predominant language. The languages following English are Turkish and Spanish, respectively. In this context, an increase in the number of articles in Turkish is anticipated, and encouraging efforts should be made in this direction.

Table 2. Distribution of Publications by Language

Publication Language	Number	Percentage
English	507	76.7%
Turkish	152	23.0%
Spanish	2	0.3%

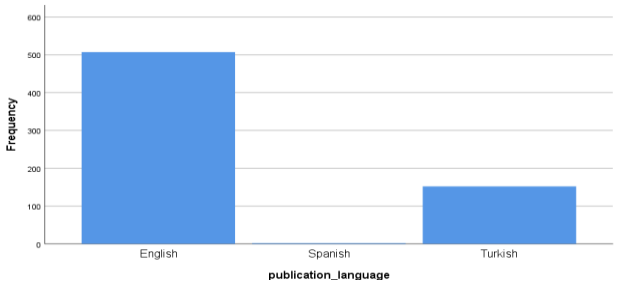

Figure 2. Distribution of Publication Languages at AHBV University

Examining the distribution of publication numbers by year, it is believed that the low number of publications in 2018 was due to some data being affiliated with Gazi University. It is observed that there was a significant increase in the number of publications over the subsequent three years, although there has been a slight decline in the number of publications over the last two years.

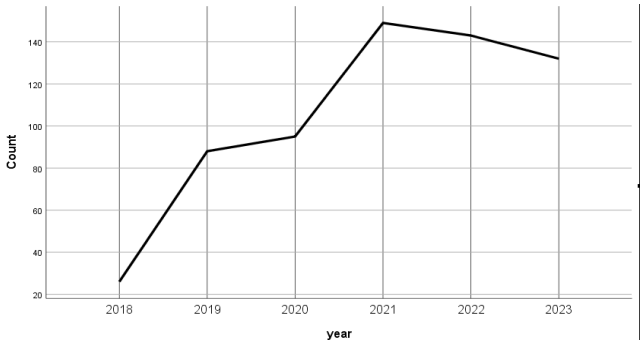

Figure 3. Distribution of AHBV University Publications by Year

The fields of study for publications affiliated with AHBV University have been evaluated based on the classifications defined by Web of Science. Between 2018 and 2023, authors at AHBV University have conducted research in 87 different fields

Table 3. Distribution of Publications by Field of Study

Field of Study	Number
Arts and Humanities	84
Business Economics	84
Physics	53
Chemistry	51
Materials Science	48
Mathematics	45
Engineering	37
Science and Technology	33
Fieldwork	24
Social Sciences	22

Table 3 displays the top 10 fields with the highest number of publications at AHBV University. As shown in the table, the highest number of publications, 84 each, are in the fields of Arts and Humanities and Business Economics. These fields are followed by Physics and Chemistry with 53 and 51 publications, respectively. It can be suggested that AHBV University, which aims to excel in Social Sciences and the Arts, should focus more on publishing in these areas. It is anticipated that the works in the Science field listed in the table were conducted by the Polatlı Faculty of Science at AHBV University.

Table 4. Distribution of Publications by Journal

Publication	Number	Index
Milli Folklor Dergisi	61	AHCI
Bilig	14	SSCI
Amme İdaresi Dergisi	10	SSCI
Journal of Gazi Academic View	9	ESCI
Journal of Art History	9	ESCI
Beytulhikme: An International Journal of Philosophy	8	ESCI
Journal of Mehmet Akif Ersoy University Economics and Administrative Sciences Faculty	8	ESCI
Sosyoekonomi	7	ESCI
Sanat ve Tasarım Dergisi	6	ESCI
Mathematics	6	SCI
Physica B: Condensed Matter	6	SCI

Publications affiliated with AHBV University have been made in 200 different journals. The journals with the highest number of articles are summarized in Table 4. Among the 11 journals listed in the table, 6 are indexed in the Emerging Sources Citation Index, 2 in the Social Sciences Citation Index, 2 in the Science Citation Index Expanded, and 1 in the Arts & Humanities Citation Index.

Table 5. Distribution of Publications by Publisher

Publisher	Number
Elsevier	87
Taylor & Francis	60
Springer Nature	59
Geleneksel Yayıncılık Ltd	46
Wiley	28
Emerald Group Publishing	19
MDPI	16
Milli Folklor	15
Ahmet Yesevi University	14
Sage Publishing	14

The top 10 publishers with the highest number of publications are summarized in Table 5. Table 5 is useful for identifying the publishers of journals not listed in Table 4.
Table 26 provides information on the top 26 universities with which AHBV University faculty members have collaborated. According to the table, the most significant collaboration, with 96 publications, was with Gazi University. This result is expected, given that the two institutions were under the same umbrella before 2018, making it natural to have established collaborative groups in previous years. The second and third universities with the most collaboration are Hacettepe and Ankara Universities, which are among Turkey's most prestigious institutions. These are followed by Atılım and Bilkent Universities. The top five universities with which AHBV University faculty members have collaborated are all located in the same city.

Table 6. Institutions in Domestic Publication Collaboration

University/Institution	Number
Gazi University	97
Hacettepe University	49
Ankara University	41
Atılım University	18
Bilkent University	14
Ankara Yıldırım Beyazıt University	11
Selçuk University	11
Atatürk University	10
Erciyes University	10
METU	10
Ahi Evran University	9
Istanbul University	9
Nevşehir Hacı Bektaş Veli University	9
Akdeniz University	8
Karabük University	7
Istanbul Gelisim University	7
Kastamonu University	7
National Police Academy	7
Başkent University	6
Beykent University	6
Kırıkkale University	6
Marmara University	6
Ministry of Health	6
Muş Alparslan University	6
Necmettin Erbakan University	6
Osmaniye Korkut Ata University	6

The network structure of institutions affiliated with co-authors in publications with AHBV University has been examined using social network analysis. While the results of the analyses are visually summarized, degree, closeness, and betweenness centrality measures have been utilized to facilitate the identification of roles within the network structure.

Table 7. Centrality Values of Institutional Collaboration in Joint Publications

University/Institution	Degree Centrality	Closeness Centrality	Betweenness Centrality
AHBV University	363	0.03846154	2.927653976
Gazi University	6834	0.03571429	11.393194339
Hacettepe University	9398	0.03448276	5.804784998
Ankara University	7704	0.03333333	1.491661819
Atılım University	1090	0.03333333	0.016489048
Bilkent University	987	0.03125000	0.002745894
AYBÜ	2994	0.03846154	5.609026928
Selçuk University	4752	0.03571429	1.750340029
Atatürk University	2353	0.03703704	2.131516637
Erciyes University	4714	0.03571429	2.024166105
METU	4647	0.03225806	1.513122991
Ahi Evran University	1063	0.03571429	0.711175849
Istanbul University	7198	0.03846154	6.718799980
NHBV University	428	0.03571429	0.029877658
Akdeniz University	2882	0.03703704	1.427162919
Karabük University	862	0.03703704	0.208304998
Istanbul Gelisim University	283	0.03333333	0.018208007
Kastamonu University	643	0.03225806	0.039751025
National Police Academy	14	0.02127660	0.000000000
Başkent University	3040	0.03448276	0.113633465
Beykent University	1795	0.03030303	0.130556995
Kırıkkale University	1556	0.03846154	1.502077532
Marmara University	6430	0.03703704	3.319443765
Ministry of Health	1410	0.03225806	0.017116592
Muş Alparslan University	270	0.02857143	0.016748138
Necmettin Erbakan University	5271	0.03703704	1.081401847
Osmaniye Korkut Ata University	205	0.02857143	0.001038468

The study includes institutions with at least six joint collaborations with faculty members of AHBV University between 2018 and 2023. Additionally, the joint collaborations among 26 institutions, excluding AHBV University, were examined. According to Table 7, and as seen from the data, the institutions with the highest number of joint collaborations are Hacettepe, Ankara, Istanbul, Gazi, and Marmara Universities, in that order.

The Closeness Centrality value pertains to the collaboration of each institution with the other 26 institutions. Since these 26 institutions are those that AHBV University has collaborated with, it is expected that AHBV University has the highest value of Closeness Centrality (0.03846154). Like AHBV University, Ankara Yıldırım Beyazıt University, Istanbul University, and Kırıkkale University have also collaborated with the other 26 institutions. The structure of these institutions' connections provides them with the ability to reach other institutions in the network more quickly and directly. Following these institutions are Akdeniz, Karabük, Marmara, and Necmettin Erbakan Universities, with a Closeness Centrality value of 0.03703704. The institutions with the least collaboration are the National Police Academy, Muş Alparslan University, and Osmaniye Korkut Ata University.

Betweenness Centrality is used to measure the strategic importance and mediation capacity of a node within a social network. In other words, it acts as a bridge. This measurement calculates how frequently a node appears on the shortest paths between other nodes. In essence, the higher the Betweenness Centrality of a node, the more it controls or mediates the flow of information or resources between other nodes. A node with a high Betweenness Centrality value in the network indicates that it has the greatest influence on relationships within the cluster. According to Table 7, the highest Betweenness Centrality value of 11.393194339 belongs to Gazi University. Thus, Gazi University holds the most prominent position in the institutional collaboration network related to AHBV University publications.

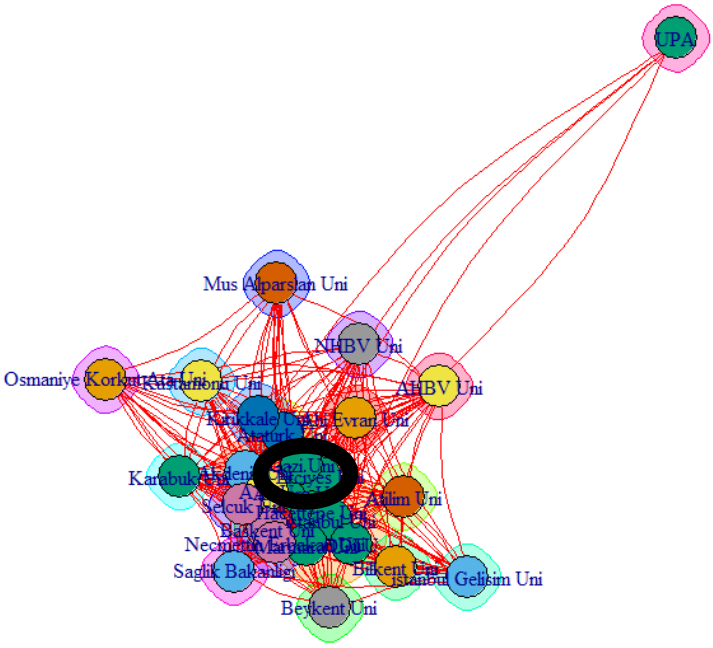

Figure 1. Institutional Collaboration Network Structure

Figure 1 illustrates the network structures among institutions collaborating with AHBV University. The figures are based on the number of publications and joint collaborations between the institutions. As indicated by the Betweenness Centrality value, Gazi University is positioned at the center of the network. Gazi University acts as a bridge between other institutions. Excluding the institutions at the outer edge of the figure, the remaining institutions are those with the highest number of publications and the most extensive joint collaborations. Institutions such as the National Police Academy, Muş Alparslan University, Osmaniye Korkut Ata University, Karabük University, the Ministry of Health, Beykent University, Istanbul Gelisim University, and Nevşehir Hacı Bektaş Veli University are the institutions with the lowest number of joint collaborations within this group.

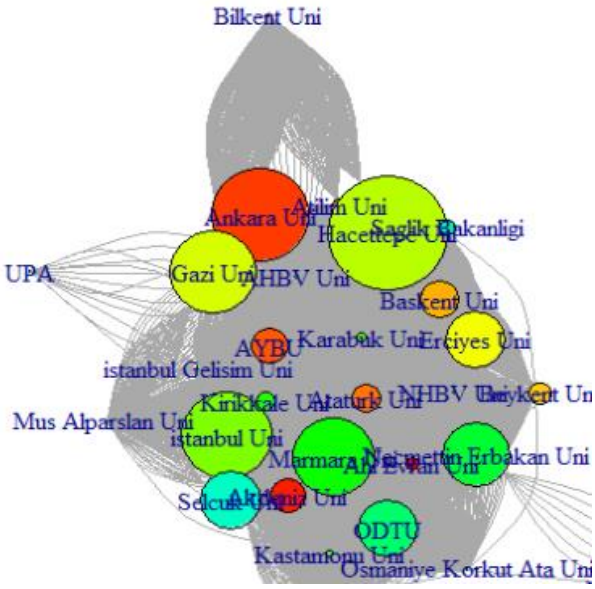

Figure 2. Institutional Network Structure by Centrality Measure

One of the primary goals of social network analysis is to visually present and interpret the obtained results. Figure 2 displays the network structures of institutions based on centrality measures. The size of the nodes is proportional to the centrality measures, which facilitates the interpretation of the figure. Upon examining Figure 2, it is evident that the institutions with the highest centrality measures, or in other words, those with the most extensive joint collaborations, are Hacettepe University, Ankara University, Gazi University, Istanbul University, and Marmara University. The institutions that follow are METU, Necmettin Erbakan University, Selçuk University, and Erciyes University.

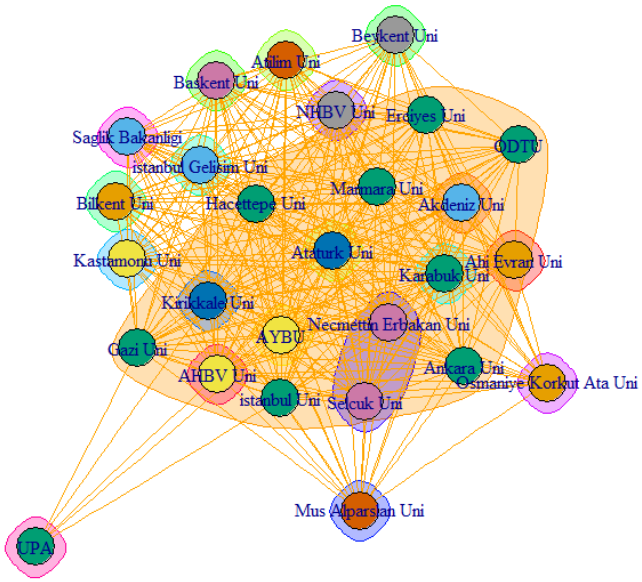

Figure 3. Network Structure Based on Institutional Communities

Figure 3 is designed to visualize groups of nodes that are densely interconnected. It can be observed that Necmettin Erbakan University and Selçuk University form a distinct group among themselves. Additionally, Figure 3 shows that Gazi University, Kırıkkale University, Hacettepe University, Nevşehir Hacı Bektaş Veli University, Ankara Hacı Bayram Veli University, Ankara Yıldırım Beyazıt University, Atatürk University, Marmara University, Erciyes University, Middle East Technical University, Akdeniz University, Istanbul University, Karabük University, Ankara University, Necmettin Erbakan University, and Selçuk University constitute another group. These universities are characterized by their dense interconnections and their role as bridging institutions among themselves.

4. DISCUSSION AND CONCLUSIONS

This study examines the institutions with which Ankara Hacı Bayram Veli University (AHBV) collaborates, based on the publications listed in citation indices. In this context, the institutions with which AHBV University has engaged in collaborative work, along with various aspects such as publication counts over the years, publication types, research areas, journals, and publishers, have been analyzed. The aim of this study is to contribute to the determination of AHBV University's scientific publication policy. According to the research findings, the majority of publications from the university are in English and are primarily articles. AHBV University has engaged in the most collaboration with some of Turkey's most prestigious and prolific universities, including Gazi, Hacettepe, and Ankara Universities.

The primary research areas of focus for the university are "arts and humanities" and "business economics." This aligns with AHBV University's objective to stand out, particularly in the fields of social sciences and arts.

The study, which evaluates various departments and research areas, uses bibliometric and social network analysis to highlight the areas where the university excels. This analysis will contribute to identifying not only the university's strengths but also areas where it needs to increase its research efforts, thus supporting the identification of priority areas in YÖK's strategic initiatives.

AHBV University has conducted its collaborative work with some of the largest and most research-intensive universities in Turkey. However, the university has fewer publications compared to these institutions. One of the primary reasons for this is the university's separation from Gazi University in 2018. The number of faculties, departments, and faculty members is significantly lower compared to the institutions with which it collaborates most. These highly collaborative institutions typically have faculties specializing in health sciences and engineering, which accounts for their high research output. AHBV University has demonstrated success in the areas it aims to excel in by engaging extensively in collaborative research with these institutions.

This study will assist in identifying the strengths and areas for improvement of the university based on parameters such as institutions, research areas, journals, and indices. It will also help in supporting the development of the departments that require enhancement.

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It should be written as short as possible and expressing the contribution made without giving the number.

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Author Contributions
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Conflict of Interest
The authors have no conflicts of interest to declare.

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