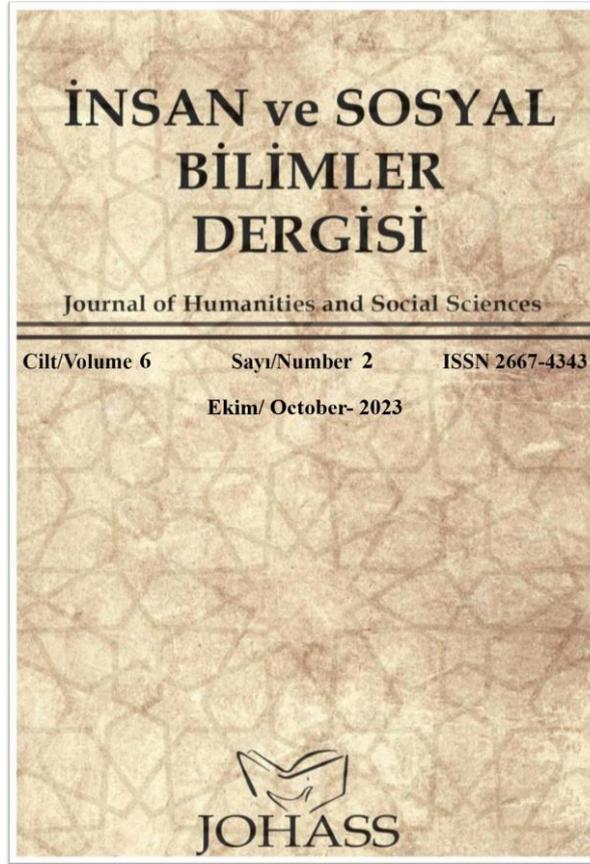


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Bibliometric Analysis of Higher Education Restructuring

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Abstract

The spread of competitive elements and the well-being of human capital increase productivity capacities in scientific content. Research and development activities are prioritized in higher education, international trends and modern paradigms are taken into consideration. In the study, a visual map of the studies prepared on the restructuring of higher education on a global scale was prepared and it was aimed to determine the trends in the literature with bibliometric analysis. Between 2002 and 2022, a total of 585 articles in the Scopus and WoS database were identified and analyzed by keyword analysis, cooperation network analysis, social network analysis methods. The most commonly used keywords were "higher education, education, university, restructuring and neoliberalism", the largest clusters defined in the network were "higher education, humanities, education policy", and the smallest cluster was "higher education policy". Among these clusters, the largest cluster is the "higher education" cluster, the average year of the publications cited jointly is 2011, and the newest issues are "humanities and higher education policy". According to the timeline map, there was a focus on the keywords "higher education, curriculum, neoliberalism, China, student, administration". In the early days, the focus was on "higher education, curriculum", then "higher education policy, innovation, management, organizational change, university reform, savings", and after 2020, the keywords "Covid 19, pandemic, distance education, student". The keywords with the most citation explosions were initially "Eurasia", in the middle "management, higher education, student", and after 2020, "student, Covid 19, human". The highest explosion of citations occurred from the word "Eurasia" between 2005 and 2009.

Keywords: Higher education, university, restructuring, bibliometric analysis

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Introduction

After the twenty-first century, higher education institutions are being revised through radical changes and continue to experience globalization processes with multidisciplinary and interdisciplinary perspectives. As a result of these processes, individualization, shifting from the understanding of central management to the understanding of decentralization, integration into the global perspectives and situations of individuals are realized (Keyman and Sarıbay, 2000). At the same time, the target audience of universities is constantly changing, and there is a concentration on different disciplines and research areas against all stakeholders.

The focus of determining the higher education systems at the international and national level is the structuring of universities and their reconstruction and design with scientific criteria. The change of societies in historical processes has revealed different generation concepts for universities. The first generation of universities is portrayed as a form of organization with a privileged position with a dominant educational and social aspect (Rashdall, 1895; Wissema, 2009). The second generation universities have taken on a structure that attaches importance to the national culture where the state influence is strengthened and serves the understanding of the nation state (Arab, 2010; Scott, 2004). Third generation universities are defined as entrepreneurship-based multiverse universities that spread all over the world with the twentieth century and converge to research, education, use of knowledge, value creation, modern and interdisciplinary understanding of science and follow a professional management approach in line with global trends (Çalık, 2019; Wissema, 2009). Fourth-generation universities are positioned as universities that have certain strategies, emphasize the thematic aspect of universities, have a transformative feature in society, and proactively shape their environment (Ayten and Göver, 2020; Erdem, 2016). After the generation classification format, new model approaches also contribute to the restructuring of universities and are adopted. Using the geographically based information infrastructure of the RIS 3 model regions, producing knowledge through the transfer of universities and other actors, performing interactive innovation processes; The eclectic university model assimilates a new type of scientific management approach that is interdisciplinary, heterogeneous, comprehensive, complex, compatible with methods in social fields; The participatory university model prioritizes the local development of universities, strengthens university-region-industry collaborations, and is shaped as a university model that plays an active role in shaping regional identity (Council of Higher Education [CoHE], 2020).

While there are structures in universities where the effect of a single model is strong, reflections of mixed models are seen in some of them.

The structuring of universities is instrumental in the development of higher education systems. Higher education institutions go through various stages in terms of education, research, function and management in order to realize structural transformation. The transition from classical methods to digital technology in terms of education-research, education centering on the student, creating international criteria and standards, international languages and programs, multidisciplinary and interdisciplinary approaches instead of disciplinary approaches, lifelong learning, practice-oriented education, caring about individual differences and abilities, collaborations between universities, internationalization in higher education are becoming widespread (Çetin, 2007; Leask et al., 2013; Mihut et al., 2017; Modernisation of Higher Education, 2014; Özpolat, 2013; Patria, 2012; Samancı and Ocakçı, 2017). In terms of functionality, the addition of research and community service function to the educational function of universities, the use of knowledge for the benefit of society, the transition to thematic concept universities instead of classical, the effect of pragmatism, transformation into universities, the activation of information and technology, global elements are taken as basis (Çalık & Sezgin, 2005; Erdem, 2006; Erdem, 2016; Ozalp, 2006; Wissema, 2009). In terms of management, local governments-oriented, horizontal forms of organization, diversity in funding sources, commercialization of higher education come to the fore (Çetin, 2007; Erdem, 2006; Mainardes et al., 2011). The development of universities in different aspects leads to the cumulative advancement of knowledge and brings with it the need to renew perspectives in research.

It is usual for countries that design their higher education systems in the direction of innovation to adopt innovative policies in research, science, technology and higher education, to strengthen their university infrastructure, to train qualified manpower and to increase their investments in higher education and research (Kearney, 2009). For modernity in universities, they should (i) provide managerial autonomy (ii) academic freedom (iii) quality (iv) productivity (v) effective use of resources (vi) financial freedom (vii) transparency (viii) differentiation (ix) participation conditions (xi) improve relations with society and make strategic approaches (Çelik and Gür, 2014; CoHE, 2007). In this context, higher education institutions should focus on research in areas such as more institutional structures, management processes, performance management, entrepreneurship and innovation, competition, globalization, managerial behaviors, quality, organizational climate, autonomy,

human resources management, internationalization (Aydın et al., 2018) and implement innovations in line with feedback.

The restructuring of higher education when the field is scanned in the literature (Acar and Bilir; 2013; Bingöl, 2012; Gunay, 2011; Öncel and Sevim, 2014), new generation universities (Alan, 2016; Gunay, 2018; Toprak et al., 2021), higher education models (Ekinci et al., 2018), but there were no studies examining new trends. With this research, it is aimed to eliminate the gap in the field literature and to contribute to the field of educational management. It is also envisaged that innovative approaches will be encouraged for higher education institution managers and researchers in Türkiye.

In the study, it was aimed to make a visual map of the studies prepared on the restructuring of higher education and to perform bibliometric analysis. In line with this approach, answers to the following sub-problems were sought:

- 1) What is the distribution of keywords used in the studies on the restructuring of higher education?
- 2) What are the clusters of keywords used in the studies on the restructuring of higher education?
- 3) What is the distribution of the studies that are co-cited in the articles on the restructuring of higher education?
- 4) What is the distribution of the most cited authors in articles on the restructuring of higher education?

Method

Research Model

In this study, scientific publications on restructuring in higher education were examined in terms of bibliometric indicators. Since it is aimed to describe an existing situation as it is, a descriptive survey model, one of the quantitative research approaches, was used (Karasar, 2005).

Data Collection and Analysis

During the data collection process, first of all, "higher education restructuring", "higher education" fields were entered separately for each of the "title", "abstract" and "keywords" fields in the Scopus database. "reconstruction", "higher education

reorganization", "restructuring in higher education", "reorganization in higher education", "reconstruction in higher education", " The expressions "reconstruction of higher education", "design of higher education", "reorganization of higher education", "restruction of higher education" were written. Then "2002-2022" in the "Publication Years" tab; "Article" in the "Document Types" tab; In the "Web of Science Categories" tab, "Education Educational Research" and "Management"; In the "Web of Science Index" tab, restrictions are made in the form of Science Citation Index Expanded® (SCIE), Social Sciences Citation Index® (SSCI) and Emerging Sources Citation Index® (ESCI). The search results were then filtered to cover the years 2002-2022.

In the data collection process, first of all, "higher education restructuring", "higher education reconstruction", "higher education reorganization", "restructuring in higher education", "reorganization in higher education", "reconstruction in higher education", "reconstruction of higher education", "reorganization of higher education", "restructioning of higher education" were added to each of the "title", "abstract" and "keywords" fields in the Scopus database. Then, in the "Publication Years" tab, "2002-2022"; in the "Document Types" tab, "Article"; in the "Web of Science Categories" tab, "Education Educational Research" and "Management"; and in the "Web of Science Index" tab, Science Citation Index Expanded® (SCIE), Social Sciences Citation Index® (SSCI) and Emerging Sources Citation Index® (ESCI) were restricted. The search results were then filtered to cover the period between 2002 and 2022. As a result of the searches, a total of 585 articles on the restructuring of higher education in the Scopus database between 2002 and 2022 were obtained. The articles were analyzed with the social network analysis method in line with the parameters of the evaluative bibliometrics method. Bibliometrics is a quantitative method that analyzes the bibliographic information of publications with statistical methods (Holden et al., 2005). Evaluative bibliometrics, on the other hand, is a method of analyzing scientific activities that focuses specifically on the quality of scientific performance (Narin, 1976). In this study, articles on the restructuring of higher education were analyzed using bibliometric analysis techniques according to criteria such as keyword network analysis and most cited publications. Collaboration network analysis was used to determine keyword analysis and source co-citation network analysis in the articles. Within the scope of the study, social network analysis method was used in the bibliometric analysis (Wasserman and Faust, 1994). In the analysis process, CiteSpace software, which uses both bibliometrics and social network

analysis methods together, was used. CiteSpace is a Java-based program used in the analysis and visualization of co-citation networks (Chen, 2004).

Findings

Distribution of Keywords

The most frequently used keywords in scientific studies on the restructuring of higher education were analyzed by social network analysis and the network map is presented in Figure 1.

Figure 1

Keyword Network Map

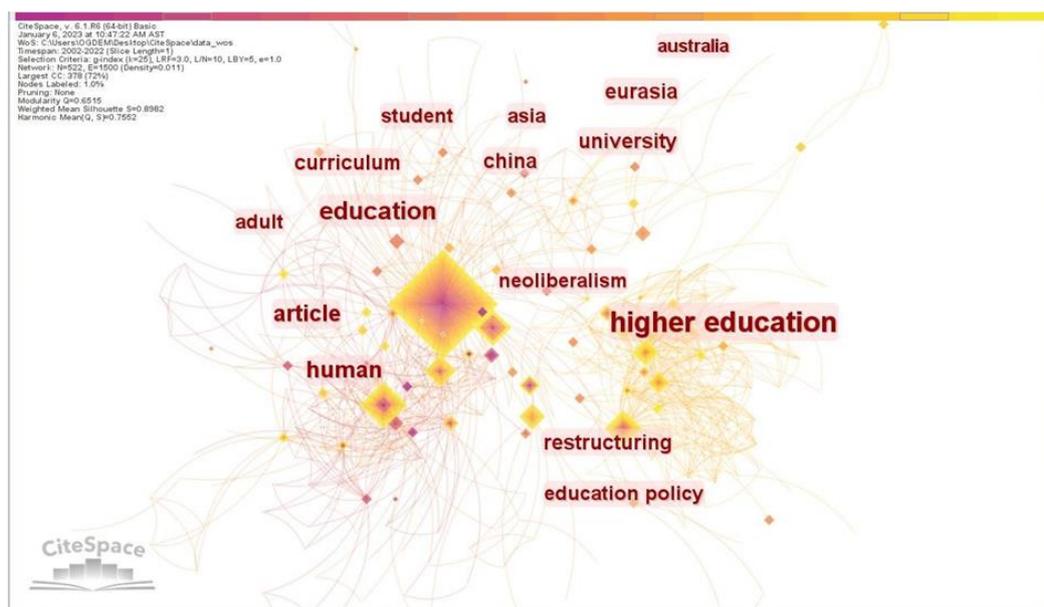


Figure 1 shows a network map of the most commonly used keywords in studies on the restructuring of higher education. Each node on the map represents a keyword. The size of the nodes varies according to the number of times the word is used. The node belonging to the more frequently used word is larger than the others. A few of the most frequently used words are presented in written form on the map. The font size of these texts also varies according to the frequency of use of the word. Accordingly, the five most used keywords are "higher education", "education", "university", "restructuring" and "neoliberalism". The network map of the clusters formed by the keywords is presented in Figure 2.

Figure 2

Network Map of Clusters Formed by Keywords

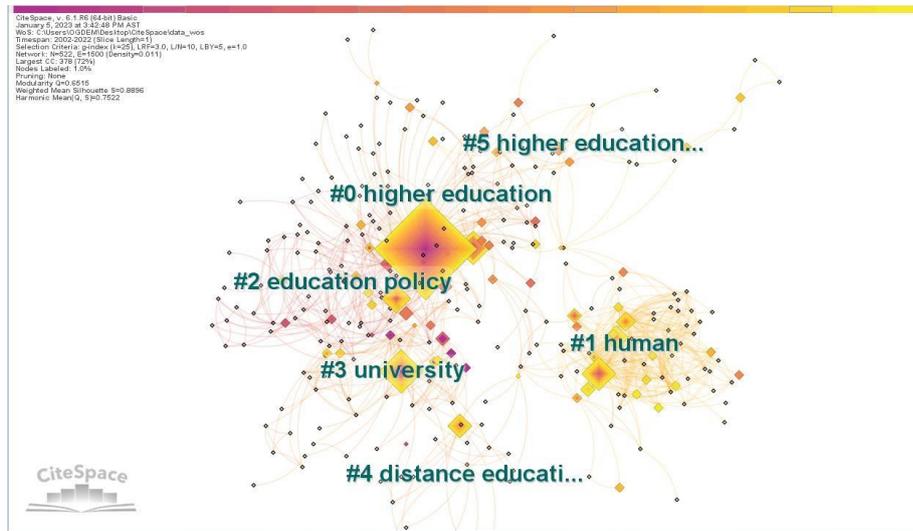


Figure 2 shows a network map of the clusters formed by keywords. There are two indices that show how good the clusters are. These are "modularity q" and "weighted mean silhouette" indices, which take values between 0-1 and indicate that the clustering is better as it approaches 1 (Chen, 2014). Figure 2 shows that the modularity q index of the network is 0.65 and the weighted mean silhouette index is 0.89. In the research, the first six clusters formed by the keywords used in scientific studies on the restructuring of higher education were defined. It is seen that the first and largest cluster defined in the network is "higher education". The cluster titled "human" ranks second, followed by "education policy" in third place. The smallest cluster in the network analysis is "higher education policy" in the last place. Statistics on clusters are presented in Table 1.

Table 1

Statistics on Clusters and Keywords

Cluster ID	Size	Silhouette	Year	Top terms (log-likelihood ratio, p-level)
Higher education	81	0.903	2011	higher education (39.13, 1.0E-4); restructuring (15.03, 0.001); hungary (11.96, 0.001); motivation (8.96, 0.005); birth rate (8.96, 0.005)
Human	63	0.891	2014	human (35.26, 1.0E-4); higher education (26.2, 1.0E-4); adult (21.07, 1.0E-4); curriculum (21.07, 1.0E-4); male (18.71, 1.0E-4)
Education policy	58	0.832	2007	education policy (19.26, 1.0E-4); globalization (16.44, 1.0E-4); education reform (16.44, 1.0E-4); china (15.54, 1.0E-4); eurasia (14.08, 0.001)
University	51	0.786	2008	University (29.2, 1.0E-4); australia (23.47, 1.0E-4); geography

Figure 3 shows the distribution of the words used in studies on the restructuring of higher education by year. The leftmost part of the map shows the most frequently used words on the basis of clusters in studies conducted in 2002 and the rightmost part in 2022. Accordingly, although there is a density in almost all clusters in the first years, it is seen that this density continues especially in the first two clusters. Clusters are listed in descending order from largest to smallest. Starting from the first cluster, the largest nodes in each cluster are listed as "higher education", "curriculum", "neoliberalism", "China", "student" and "governance". In the early years, the focus was mostly on words such as "higher education, curriculum"; later on, keywords such as "higher education policy, innovation, governance, organizational change, university reform, austerity" came to the fore. As of 2020, the phrases "Covid 19, pandemic, remote learning, student" (Covid 19, pandemic, distance learning, student) draw attention. Then, according to the social network analysis, the 6 keywords with the highest explosion values are presented in Figure 4.

Figure 4

Citation Burst Values of the 6 Keywords with the Highest Burst Values by Year

Top 6 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2002 - 2022
eurasia	2005	4.67	2005	2009	
governance	2012	3.62	2012	2014	
higher education	2002	6.2	2014	2015	
student	2015	3.13	2015	2022	
covid 19	2020	3.43	2020	2022	
human	2013	3.39	2020	2022	

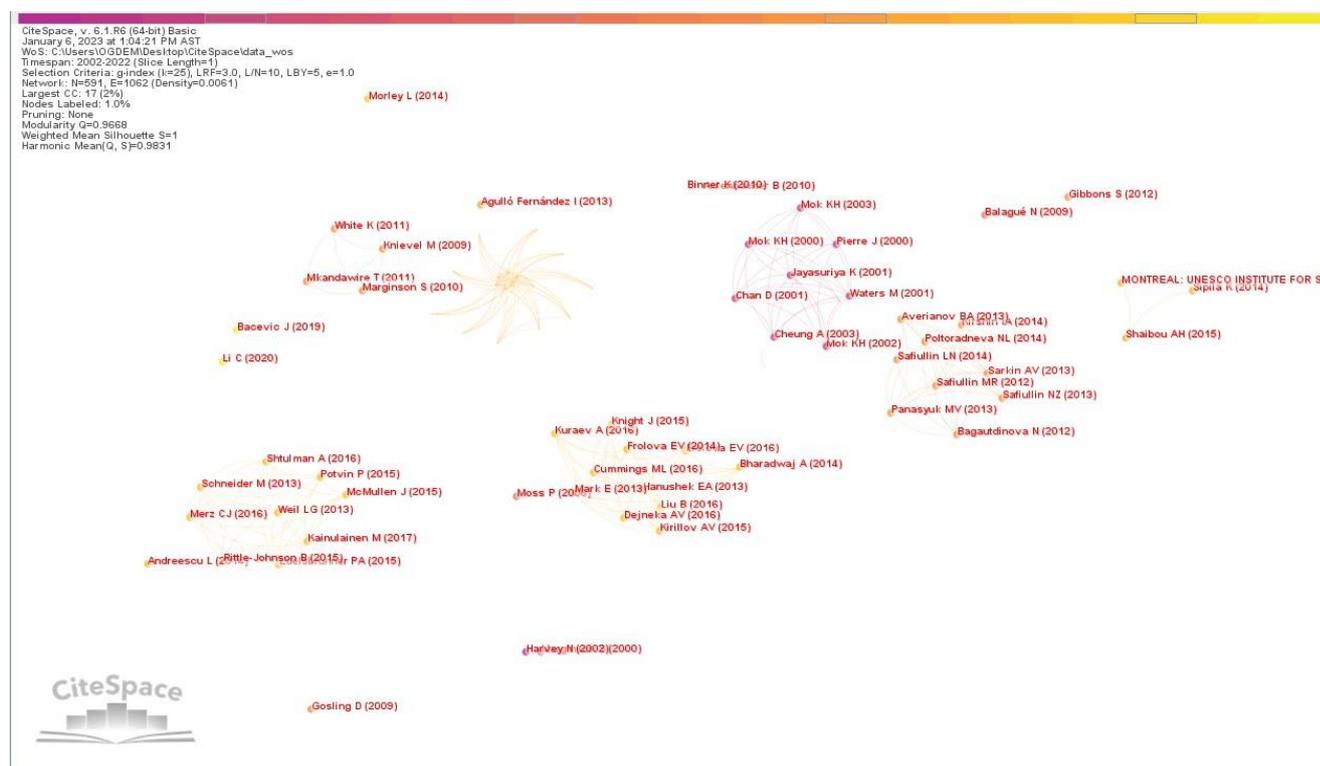
According to Figure 4, when the keywords with the highest citation explosion between the years analyzed within the scope of the research are examined; in the first years, the keywords "eurasia", in the middle, "governance, higher education and student"; in the last two years, "student, covid 19 and human". Citation explosion is observed. The highest citation burst value is 4.67 between 2005-2009 and belongs to the keyword "eurasia".

Co-Citation Analysis

The most co-cited publications in the studies examined within the scope of the research were analyzed by social network analysis and the network map is presented in Figure 5.

Figure 5

Co-Citation Analysis Network Map



In Figure 5, the network map of co-citations in the scientific studies examined on the restructuring of higher education consists of 591 nodes and 1062 links. Each node represents a study. The groups, each with different colors, show the clusters formed by the cited studies. It is seen that the modularity q index of the network is 0.97 and the weighted mean silhouette index is 1. Therefore, it can be said that the clustering in the network is perfect. As the effectiveness of the studies in the network increases, the font size increases. Accordingly, it can be said that the studies in the network are not superior to each other.

Discussion and Results

In line with the results obtained from the research, it is seen that the largest clusters defined in the network among the studies carried out for the restructuring of higher education between 2002-2022 are "higher education, human, education policy", while the smallest clusters are "higher education policy". Among these clusters, the largest cluster was determined as the "higher education" cluster with 81 studies, the average year of the publications cited jointly was 2011, and the newest issues attracted attention as "human and higher education policy". According to the timeline map, the focus is on the keywords "higher education, curriculum, neoliberalism, China, student, administration". In the early days, there is a concentration on the keywords "higher education, curriculum", then "higher education policy, innovation, management, organizational change, university reform, savings" and from 2020 onwards, "Covid 19, pandemic, distance education, student". The keywords with the most citation explosions were initially identified as "Eurasia", in the middle as "management, higher education, student", and after 2020, "student, Covid 19, human". The highest explosion of citations occurred from the word "Eurasia" in 2005-2009. In general, it is possible to perfectly characterize clusters in the network.

Since the research prepared is related to the restructuring of higher education, it is directly related to the studies on "higher education". There are many studies involving higher education and therefore university structures abroad and in Türkiye (İlhan and Yelkenci, 2021; Poplar, 2011; Meyer et al., 2007; Yaman and Özdemir, 2016). In these studies, it is often emphasized that higher education is transformed through "reforms" and "organizational change" in the light of global trends (Eroğlu and Alga, 2019; Toprak et al., 2021). The primary step in the restructuring of higher education is usually to establish a "higher education policy" and then put it into effect (Kaiser et al., 2014).

Since the target group of higher education is students, continuous research is carried out for university students in the field literature and in most universities, demands are tried to be fulfilled with a "student-oriented approach" and "human" elements are taken into consideration (İncik and Tanrıseven, 2012; Uçkun et al., 2013). With the Bologna processes, "curriculum" in higher education is created according to certain criteria and improvement studies are carried out with international participation (Güneş, 2012; Zahavi and Friedman, 2019). At the same time, higher education institutions develop and process knowledge and activate their capacity for "innovation" (Aslangilay and Özdemir, 2017).

In higher education, the concept of "Neoliberalism" is used as a synonym for globalization, indicates the transformation of all people into universal human beings, focuses on the changes of universities with the transition to the information society in order to adapt to the world, strengthens competition and finds a place in the field literature to a great extent (Akkutay, 2017; Toulmin, 1999, p. 906). In universities, forms of "management" and "autonomy" are often evaluated together and discussed within the scope of the restructuring of higher education (Enders, De Boer and Weyer, 2013). When the new trends in the literature are examined, it is determined that "Eurasia" and "China" countries come to the forefront. It can be concluded that universities in these countries prioritize research and development activities and increase their scientific publications (Bircan, 2017). After 2020, the declaration of the global pandemic caused the universities to be reshaped and the effects of "distance education", "Covid-19" and studies on the academic learning of students became widespread (Pokhrel and Chhetri, 2021). In addition to the main arguments for the restructuring of higher education, the ever-changing world conditions must be taken into account. Therefore, while innovative structures, types and paradigms are emerging in universities, there is a need to prepare a larger number of researches.

Recommendations

1. Based on the content of this research, the recommendations for the determinants and implementers of the higher education system are as follows:
 - Greater attention may be paid to global trends in the restructuring of higher education.
 - Changes occurring on a global scale can be dealt with on a national scale.
 - Accreditation procedures of more universities may be carried out within the scope of educational programs.
 - Within the framework of higher education policies, the structuring of universities can be accelerated with diversity and new models.
 - Reforms in universities can be updated and innovation efforts can be prioritized.
 - Certain arrangements may be made for the autonomy of higher education.
 - Student-centered research can be increased to reveal the changing expectations and needs of university students.
 - Academics may be encouraged to investigate the structures and trends of universities abroad.

- Effective use of distance education systems outside the pandemic can be ensured and international effectiveness can be ensured.
- 2. In line with the content of this research, the recommendations expressed for the researchers are listed as follows:
 - Bibliometric analysis of domestic publications for the restructuring of higher education can be carried out.
 - Bibliometric analysis can be performed for graduate levels that examine the structural conditions of higher education.
 - Bibliometric analysis researches related to the management of higher education can be prepared.

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