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Comparison of Academic Structure of Universities in Turkey by Multiple Correspondence Analysis Method

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Abstract. The purpose of this study is to reveal the similarities and differences between the universities in Turkey with regard to the numbers of academicians and departments. Within the scope of this objective, we included the first 100 universities among the total 185 universities in Turkey according the URAP data by the criterion sampling method. Conformity analysis, one of the multivariate statistical methods, was used in the data analysis. A two-dimensional graphic is obtained including the points representing the variable categories in the multi-dimensional space by using mathematical models to determine the structures of crosstabs consisting of the rows and columns through multiple conformity analysis. As a result of the study, it was determined that there was a conformity between the Ankara, Odtü, Marmara, Gazi, Hacettepe, İstanbul, Atatürk and İnönü Universities. In addition, a conformity was determined between the Ankara, İstanbul, İstanbul Teknik, Ege and Başkent universities according to the professor numbers within the academician categories. It was determined that there was no conformity between the Özyeğin, Bilkent, Kadir Has, Sabancı, Bahçeşehir, Koç and İstanbul Ticaret Universities regarding the variables addressed within the study. Based on the study, it is suggested that similar studies of multiple conformity analysis should be repeated with the different data groups.

Keywords: correspondence analysis; universities data management; country-specific developments; decision support strategies.

1. Introduction

Probability matrix is commonly employed in numbers of research areas. Archeologists, political scientists, sociologists, biologists, and educators harness

probability matrix to summarize classified data (Alberti G. , 2015). Multivariate statistical methods were utilized in order to determine the relationships between categorical variables, to demonstrate significant results from these relationships, and to test hypotheses (Reynolds, 1977). In analysis of data matrixes, multivariate statistical methods are employed to overcome difficulties encountered in assessment and summary of results regarding multiple variables (Suner A. , 2007). Although there is an extensive application area, it is rather difficult to fulfill assumptions of multivariate statistical analysis methods. One of the most prominent assumptions is that "p numbers of variables obtained from n numbers of unit display multivariate normal distribution" (Özdamar, 2004). In case this assumption is not met, data transform methods could be applied however they are not preferred mostly because of potential data loss (Tatlıdil, 1996). Correspondence analysis is not based on an assumption concerning data distribution, but it is sensitive to extreme values left outside in both rows and columns since it is a graphical method (Bayram, 2000).

The correlations among categorical variables in large tables could be determined by means of multiple correspondence analysis (MCA), one of the multivariate statistical methods. Unlike other multivariate statistical methods, it is possible to investigate similarities and differences that could be analyzed in columns of data matrixes in addition to correlations in rows in the multiple correspondence analyses (Clausen , 1998). Correlations among columns and rows in the frequency table could be reported in a visual form by means of two-dimensional maps (Greencare, 1984). The distance between objects on the map indicates similarities. Hence, the closer the objects, the more similar characteristics they display (Blazun, Kokol, & Vosner, 2015). In other words, while similar categories remain in closer locations in the space, dispersing categories are located at distant points to each other. In the next stage, all points known as categories of variables in multi-dimensional space are shown in the two-dimensional space by determining their most proximate axes (Nenadic & Greenacre, 2007).

In the MCA, the difference between variables is given by loss function in order to minimize loss function and maximize homogeneity among variables (Abdi & Valentin, 2007). The purpose of the correspondence analysis is to create more simple reduced data matrix from a complex data matrix without significant data loss (Beh & Lombardo, 2014). In order to exhibit the correlation among categories among rows and columns graphically, the relevant factors are created. These factors indicate the weights of column categories on the relevant row categories simultaneously (Greenacre & Hastie, 1987). Whereas the junction point of axes was referred as origin, the starting point is referred as centroid where it is considered that there is no difference among profiles (Alberti G. , 2015). As the distance from the origin increases, it is possible to observe the categorical variables effective on the relevant dimension. In the correspondence analysis, it is aimed to fracture total inertia value obtained by Pearson chi-square values instead of variance values or using Euclidian distances among variable categories (Camiz & Gomes, 2016). The corresponding term of variance used in other multivariate statistical analyses is the term of inertia in correspondence analysis. Total inertia term is considered as the measure of total distance of

profile points to the origin; and it is equal to total of multiplication of weight of individual points by the square of the individual distance of each point to the origin (Clausen , 1998). Hence, as total inertia value approaches to zero, row or column profiles are aggregated at the origin. As total inertia value withdraws from zero, row or column profiles withdraws from the origin at certain scale (Roux & Rouanet, 2010). Fractured form of total inertia by dimensions is referred as eigenvalue which indicate relative significance of eigenvalue dimensions or explained total inertia (Alpar , 2013).

Correspondence analysis has been harnessed in numbers of researches such as archeology (Bolviken, 1982); (Alberti F. , 2013), marine biology (J.H. Adams, 2013), fossil studies (Freudenthal, Martín-Suárez, Gallardo, Garcia-Alix Daroca, & Minwer-Barakat, 2009), market researches (Bendixen, 1995), analysis of meal preferences (Beh E. J., 2011), textual analysis (Blanco, 2007), crime investigations (Beh & Lombardo, 2014), (Blasius, 1998). Although there is such extensive application area, no study was determined on statuses of academic lecturers and numbers of departments at universities (Ulakbim, 2016). The present study aims to reveal similarity and discrepancy among the first 100 universities in Turkey in terms of numbers of academic personnel and departments. Based on the considered variables within the scope of the study, it was aimed to determine whether universities exhibit correspondence among themselves as well as convenient assessment of universities which exhibit similarity and discrepancy in the correspondence analysis by two-dimensional graphics. Thus, instead of ranking universities with respect to their data from the URAP database, it was aimed to contribute into the relevant literature by determining whether universities exhibit similarities according to their academic structure. In this respect, it is aimed to reveal similar and different aspects of the universities based on the academic structures and the number of faculty members, which are based on academic studies. Thus, it is aimed to determine how the similarities or differences of the first, middle and last ranked universities are compared according to the academic structure and the number of academic members. In this regard, it is considered important to expose similar and different aspects of the universities ranked in the first hundred in Turkey by means of correspondence analysis in terms of its contribution into the literature. The problem statement of the research is determination of whether the universities ranked among the first 100 in Turkey exhibit difference with respect to their numbers of departments and academic personnel. Accordingly, following sub-problems were tried to be answered.

- Is there correspondence among universities in Turkey according to their numbers of faculty, department, vocational college, and graduate study programs?
- Is there correspondence among universities in Turkey according to the number of their professor, assistant professor, lecturers and research assistants?

2. Method

The aim of this study was to determine whether universities exhibit difference or similarity with respect to numbers of their departments and academic personnel.

MCA, one of the multivariate statistical methods, was employed to describe the correlations in large tables composed of rows and columns (Alpar , 2013). Obtained maps as a result of the analysis facilitate assessment by locating units more closely in graphical images with respect to their similarities. Thus, with the help of two-dimensional graphics on the basis of academic structures and academic members of the universities determining how similarities and differences among the others can easily be detected.. Since this study aimed to describe a past or present status in its original form, it is considered as a descriptive study conducted in relational screening model, one of the screening models (Karasar, 2000).

Universe and Sampling: All of 185 universities in Turkey constitute the universe of this study (http://www.yok.gov.tr/, 2016). Although the entire universe was included in the analysis, sampling was preferred so that two-dimensional graphics obtained in the correspondence analysis could be assessed more conveniently. Criterion sampling method, one of the purposeful sampling methods among the random sampling methods was utilized. In selection process of universities to be included in sampling, the primary criterion was being ranked among the first 100 universities based on the University Ranking by Academic Performance (URAP) data. One of the reasons for setting such a criterion was the difficulty in distinguishing units and in assessment of findings, which would be experienced when universities more than 100 were included in the study. No any such comprehensive study was encountered in the relevant literature. The universities covered in the study and their abbreviations are shown in Table 1.

Table 1. First hundred universities according to URAB data

RowN	ShortN	University	RowN	ShortN	University
1	Ibu	Abant İz. Ba. Uni.	51	Inon	İnönü Uni.
2	Acıb	Acıbadem Uni.	52	Ista	İstanbul Arel Uni.
3	Adıy	Adıyaman Uni.	53	Itu	İstanbul Teknik Uni.
4	Adu	Adnan Men. Uni.	54	Tıca	İstanbul Ticaret Uni.
5	Aku	A. Kocatepe Uni.	55	Istu	İstanbul Uni.
6	Ahie	Ahi Evran Uni.	56	Ieu	İzmir Ekonomi Uni.
7	Akdu	Akdeniz Uni.	57	Iyte	İzmirInstitute of Tech.
8	Aksu	Aksaray Uni.	58	Khas	Kadir Has Uni.
9	Amas	Amasya Uni.	59	Kafk	Kafkas Uni.
10	Anka	Ankara Uni.	60	Ksu	Kastamonu Uni.
11	Atau	Atatürk Uni.	61	Karu	Karabük Uni.
12	Atıl	Atılım Uni.	62	Ktu	Karadeniz Teknik Uni.
13	Bahc	Bahçeşehir Uni.	63	Kmu	Karamanoğlu M. Uni.
14	Balk	Balıkesir Uni.	64	Kku	Kırıkkale Uni.
15	Bart	Bartın Uni.	65	Koca	Kocaeli Uni.
16	Bask	Başkent Uni.	66	Kocu	Koç Uni.
17	Batm	Batman Uni.	67	Malt	Maltepe Uni.
18	Bayb	Bayburt Uni.	68	Marm	Marmara Uni.
19	Bıng	Bingöl Uni.	69	Mehm	Mehmet Akif Ersoy Uni.
20	Beu	Bitlis Eren Uni.	70	Mers	Mersin Uni.
21	Boun	Boğaziçi Uni.	71	Muu	Muğla Sıtkı Koçman Uni.

22	Bozo	Bozok Uni.	72	Mku	Mustafa Kemal Uni.
23	Beun	Bülent Ecevit Uni.	73	Nku	Namık Kemal Uni.
24	Cbu	Celâl Bayar Uni.	74	Kony	Necmettin Erbakan Uni.
25	Cumh	Cumhuriyet Uni.	75	Nevs	Nevşehir H. B. Veli Uni.
26	Comu	ÇanakkaleO.M.Uni.	76	Nıgd	Niğde Uni.
27	Kara	Çankırı K. Uni.	77	Omu	Ondokuz Mayıs Uni.
28	Cova	Çukurova Uni.	78	Odu	Ordu Uni.
29	Dıcl	Dicle Uni.	79	Metu	Orta Doğu Teknik Uni.
30	Dogu	Doğuş Uni.	80	Osma	Osmaniye Korkut Ata Uni.
31	Deu	Dokuz Eylül Uni.	81	Ozye	Özyeğin Uni.
32	Duml	Dumlupınar Uni.	82	Pau	Pamukkale Uni.
33	Duzc	Düzce Uni.	83	Erdo	Recep Tayyip Erdoğan Uni.
34	Ege	Ege Uni.	84	Saba	Sabancı Uni.
35	Ercı	Erciyes Uni.	85	Saka	Sakarya Uni.
36	Erzı	Erzincan Uni.	86	Selc	Selçuk Uni.
37	Ogu	Eskişehir O. Uni.	87	Sıno	Sinop Uni.
38	Fatı	Fatih Uni.	88	Sdu	Süleyman Demirel Uni.
39	Fıra	Fırat Uni.	89	Etu	Tobb Eko. Ve Tek. Uni.
40	Gsu	Galatasaray Uni.	90	Trak	Trakya Uni.
41	Gazı	Gazi Uni.	91	Turg	Turgut Özal Uni.
42	Gant	Gaziantep Uni.	92	Ufuk	Ufuk Uni.
43	Gopu	Gaziosmanpaşa Un	93	Ulud	Uludağ Uni.
44	Gtu	Gebze Teknik Uni.	94	Yalo	Yalova Uni.
45	Gumu	Gümüşhane Uni.	95	Yasa	Yaşar Uni.
46	Hace	Hacettepe Uni.	96	Yedı	Yeditepe Uni.
47	Harr	Harran Uni.	97	Yıld	Yıldız Teknik Uni.
48	Hıtı	Hitit Uni.	98	Yyu	Yüzüncü Yıl Uni.
49	Isık	Işık Uni.	99	Zırv	Zirve Uni.
50	Bılk	İ. D. Bilkent Uni.	100		

Data Collection and Analysis: Study data was compiled from the statistical page at the official website of the Turkish Higher Education Council regarding academic personnel and university statistics. In data analysis process, correspondence analysis, one of the multivariate statistical methods, was employed. SPSS 21 and Statistica 7 package programs were utilized in the analysis of the data. This analysis allows investigation of correlation between two or more categorical variables from row and column of the data set by differentiation in row and column areas in the data matrix (Suner & Çelikoğlu, Uygunluk Analizinin Benzer Çok Değişkenli Analiz Yöntemleri ile Karşılaştırılması, 2008). In the analysis process, two dimensional graphic was obtained which included points representing variable categories in the multi-dimensional space by means of mathematical models to determine structures of cross-sectional tables. Based on the eigenvalues estimated at the end of the analysis, it is possible to determine weight of a variable on an individual dimension. Since normality, linearity and homogeneity assumptions are not necessary in the correspondence analysis unlike other multivariate statistical methods, only extreme values were analyzed. The Mahalanobis distances were examined for multivariate extreme values. The Mahalanobis distance estimated for each unit based on the chi square distribution is the distance from each unit

to the intersection point of mean values of all variables, the weight cente (Fidel, 2001). The extreme values estimated for universities were exhibited in Figure 1.

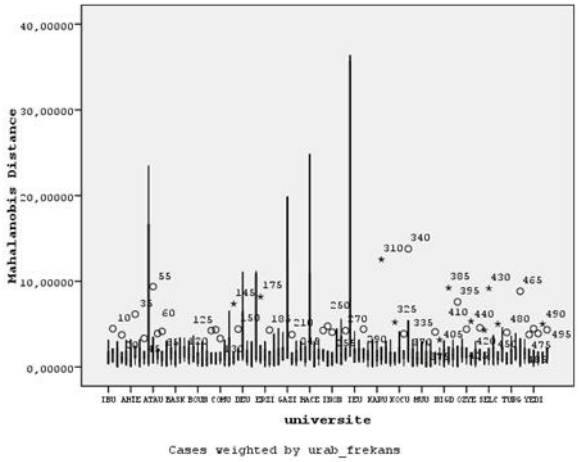

Figure 1. Mahalanobis Distances Regarding Multivariate Extreme Values

In a study with two continuous variable, the critical value for Mahalanobis distance is 13.82. Mahalanobis values estimated greater than the critical value is considered as extreme value (Pallant, 2005). In this study, Hacettepe (24.83) and İstanbul Universities (36.35) were determined as extreme values. Instead of excluding extreme values from the analysis in this study, they were weighted based on their frequencies so that all data set could be included in the analysis.

3. Findings

In order to determine whether universities in Turkey exhibit correspondence with respect to their numbers of department and academic personnel, first Chi-Square test was conducted and then decomposition of variables was obtained in formation of dimensions, finally two-dimensional graphics were prepared.

Findings Regarding First Sub-Problem: In order to determine whether there is correspondence among universities in Turkey with respect to their numbers of faculty, department, vocational school, master, and doctorate studies, Chi-Square test was conducted. Findings obtained as a result of the analysis were exhibited in Table 2.

Table 2.Chi-Square Analysis Results

Dimension	Singular value	Inertia	Chi-Square	p	Rate of Inertia	Std. Deviation
1	.324	.105			.972	.024
2	.055	.003			.028	.029
Total		.108	168,59	.000[a]	1.000	

a. Degree of freedom is 4.

According to Table 2, it was determined that numbers of faculty, department, vocational college, master, and doctorate studies were differing with respect to universities; and number of departments was not independent of universities by means of Chi-Square test ($\chi 2=168.59$; $p<.05$). The inertia used in place of the concept of variance in the integration analysis is the total measure of the distance to the center of the value profile points. And 97.2% of the total inertia is explained by the first dimension whereas 2.9% is explained by the second dimension. On the other hand, 10.5% of the total 10.8% of the inertia is explained by the first dimension whereas 0.3% is explained by the second dimension (Becker, 1995). Additionally, eigenvalue about dimensions were $\lambda 1=.321$ and $\lambda 2=.130$, respectively. Estimated eigenvalues yield the correspondence between the real graph and the one plotted by the software. Thus, it is possible to conclude that there was medium level correspondence between the real graph and the one drawn by the software ($\lambda 1+2=.451$). After it was determined that number of departments was not independent of universities, decomposition measures containing singular values were obtained in order to determine contribution of independent variables considered on dimensions. Contribution of variables into dimensions was exhibited in Table 3.

Table 3.Contribution of Variables into Dimensions

Departments	**Dimension**	**Dimension**
Faculty	.011	.532
Department	.987	.006
Vocational college	.371	.091
Master	.906	.083
Doctorate	.676	.301

Contribution of variables in Table 3 is their squared correlation coefficients. In this case, it could be observed that variables of department, vocational college, master, and doctorate studies were contributing into the first dimension; variable of faculty number was contributing into the second dimension. In other words, while categories of department, vocational college, master, and doctorate studies were concentrated on the first dimension; faculty category was concentrated on the second dimension. In the correspondence analysis, after inertia values which indicate contribution of points into dimensions, are determined, the variables effective on the first and second dimensions were visually exhibited on Figure 2.

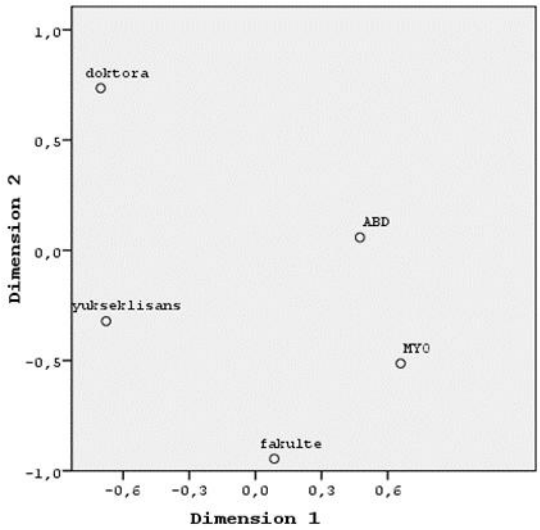

Figure 2. Correspondence Analysis Graph Regarding Departments

According to the correspondence analysis graph, it could be observed that number of faculty constitute one dimension on its own, variables of number of department, vocational college, master, and doctorate studies constituted the second dimension. After examination of number of departments, multiple correspondence analyses were conducted to reveal degree of correspondence of the first 100 universities in Turkey with respect to the 5 categorical variables. As a result of analysis, departments and universities' degree of correspondence to these departments were indicated on the two-dimensional graph in Figure 3.

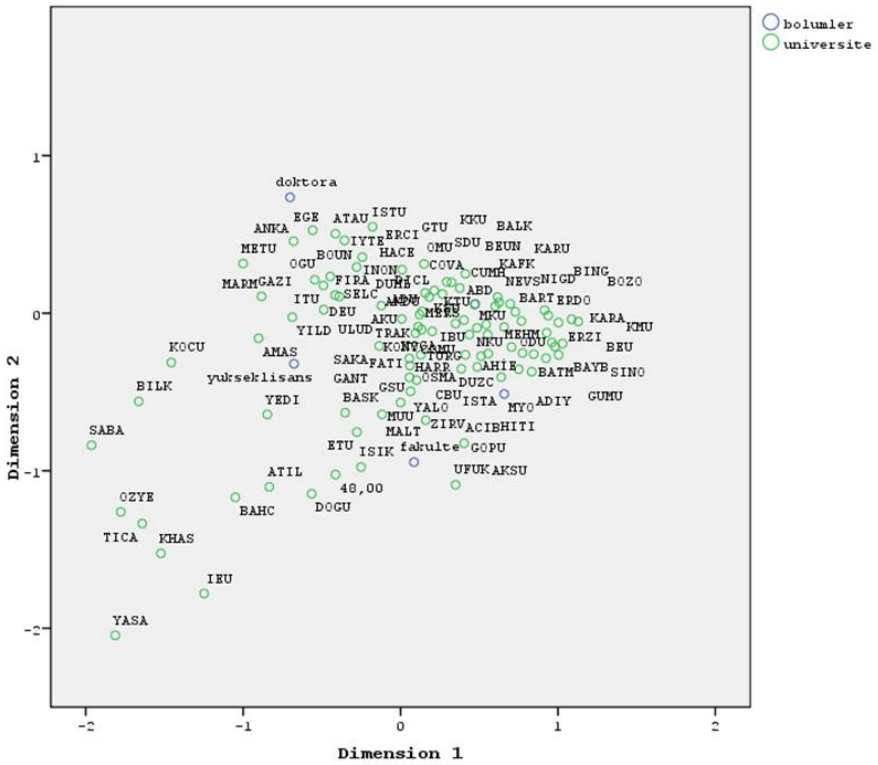

Figure 3. The Multiple Correspondence Analysis (MCA) Graph Regarding Departments and Universities

In Figure 3, the blue dots show the academic sections, while the green dots show the relevant university. According to this, the blue dots show the doctorate, master's, bachelor's, vocational college and university branches and it is understood that among these academic units, which universities have a distinct structure according to the relevant characteristic. MCA reveals correspondence among Ege, Ankara, ODTÜ, Marmara, Gazi, Hacettepe, İstanbul, Atatürk and İnönü Universities with respect to number of doctorate programs. In other words, these universities exhibit correspondence on the basis of number of doctorate programs. In terms of number of faculty, Işık, Maltepe, Zirve, Acıbadem, Gazi Osman Paşa, Ufuk and Aksaray Universities exhibit similar characteristics. It was observed that Amasya and Yeditepe universities exhibited correspondence in terms of number of master programs, İstanbul, Hitit, Adıyaman and Ahi Evran Universities exhibited in terms of number of vocational schools. In addition, it was observed that other universities were having rather similar characteristics with respect to their number of terms departments. Yet, according to Figure 3, it was observed that universities were clustered around the department variable. Besides, it was determined that Konya, Galatasaray, Turgut Özal,

Maltepe, Acıbadem, İstanbul ve Ufuk Universities were structurally different in contrast with other universities; and they were exhibiting differences in terms of variables taken into consideration within the study.

Findings Regarding the Second Sub-Problem: Chi-Square test was conducted to determine whether universities in Turkey exhibit correspondence with respect to numbers of Professors, Associate Professors, Assistant Professors, Lecturers and Research Assistants. Table 4 summarizes analysis findings.

Table 4.Chi-Square Analysis Results

Dimension	Singular Value	Inertia	Chi-Square	P	Rate of Inertia	Std. Deviation
1	.275	.076			.636	.003
2	.151	.023			.192	.002
3	.127	.016			.136	
4	.066	.004			.037	
Total		.119	13541.79	.000[a]	1.000	

b. Degree of freedom is 736.

According to Table 4, it was determined that universities exhibited difference with respect to numbers of Professors, Associate Professors, Assistant Professors, Lecturers and Research Assistants and that number of academicians was not independent of universities by means of Chi-Square test ($\chi 2=13541.79$; $p<.05$). Moreover, eigenvalues of dimensions were estimated at $\lambda 1=.636$ and $\lambda 2=.192$, respectively. Estimated eigenvalues reflect the complete correspondence between the real graph and the one plotted by the software. Thus, it is possible conclude that there is high level of correspondence between the real graph and the one plotted by the software ($\lambda 1+2=.828$). After it was determined that the number of academicians was not independent of

universities, degrees of decomposition containing singular values were obtained in order to expose contributions of considered independent variables into dimensions. Contributions of variables were presented in Table 5.

Table 5. Variables' Contribution into Dimensions

Depart.	Dim.	Dim.
Professor	.892	.059
Associate Professor	.245	.247
Assistant Professor	.508	.208
Lecturer	.747	.002
Research Assistant	.042	.929

Table 5 displays squared correlation values which indicate contribution of variables into dimensions. Thus, it could be seen that whereas variables of Professor, Associate Professor, and Lecturer were contributing into the first dimension, variable of Research Assistant were to the second dimension; and number of Associate Professor was contributing into the both dimensions equally. In other words, Professor, Associate Professor and Lecturer categories were concentrated in the first dimension, Research Assistant category was in the second dimension. In the correspondence analysis, after inertia values which indicate contribution of points into dimensions were estimated, variables effective on the first and second dimensions were visually displayed in Figure 4.

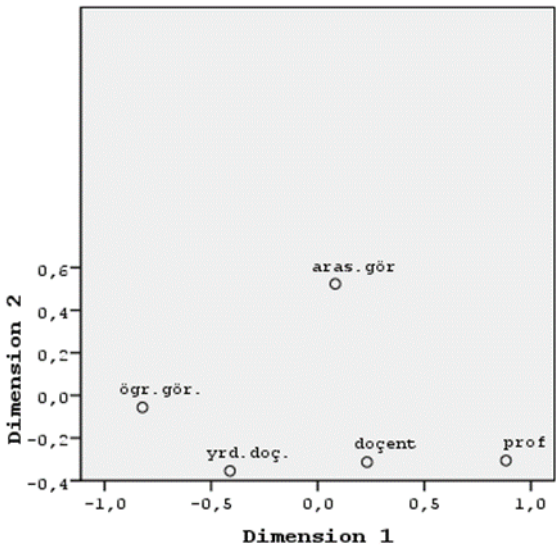

Figure 4. Correspondence Analysis Graph of Departments

On the basis of correspondence analysis graph, it could be seen that whereas numbers of Lecturers, Assistant Professors, Associate Professors and Professors were composing the first dimension, number of Research Assistant was composing the second dimension. After the academician categories, MCA was conducted to degree of correspondence of the 100 universities in Turkey with respect to the 5 categorical variables evaluated within the scope of the study. As

a result of the analysis, correspondence between academicians and universities was exhibited in the two-dimensional graph in Figure 5.

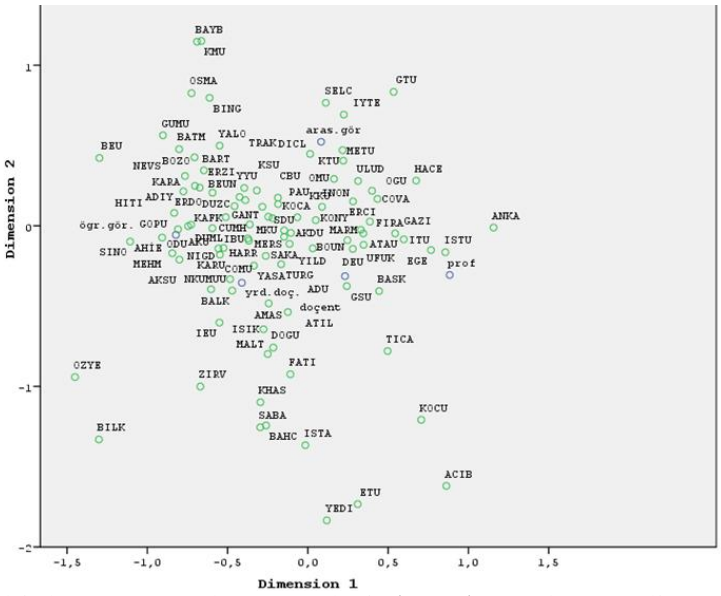

Figure 5. Multiple Correspondence Analysis (MCA) Graph Regarding Categories of Academicians and Universities

As a result of the MCA, a correspondence was determined among Ankara, İstanbul, İstanbul Teknik, Ege and Başkent Universities with respect to number of Professors. In other words, these universities exhibit similarity according to number of Professors. In terms of number of Research Assistants, Selçuk, İzmir Yüksek Teknoloji, Trakya, Dicle, Karadeniz Teknik and Orta Doğu Teknik Universities were exhibiting similar characteristics. Additionally, it was also seen that other universities have similar characteristics in terms of numbers of Associate Professors, Assistant Professors and Lecturers. Yet, according to Figure 3, it was observed that universities were clustered around Associate Professor, Assistant Professor and Lecturer categories. In addition, Özyeğin, Bilkent, Yeditepe, TOBB Ekonomi and Teknoloji and Acıbadem Universities were in different structure in comparison with other universities; and thus, exhibited difference in terms of considered variables.

4. Results, Discussion and Suggestions

This study was conducted to determine whether departments at universities in Turkey have similarities in terms of academician categories by means of MCA and to display results in visual form. Furthermore, the present study was considered important since number of studies employing correspondence analysis, one of the multivariate statistical methods, is quite limited in the educational area. This study is valuable and important because the universities in Turkey are not graded according to academic structure and academicians' numbers. As a matter of fact, even though the Council of Higher Education (YÖK) has created boards and evaluation reports for institutional evaluation in accordance with the national and international quality standards related to the quality levels of education, research and administrative services of higher education institutions according to Annex 35 of Law No. 2547, it appears that no

rating has been made for the year 2018. In this study, an attempt was made to determine which universities have similarities and differences according to different variables.

When studies using the MCA were taken into consideration, it was observed that interpretations of graphs created by Suner and Çelikoğlu (2010) (Suner & Çelikoğlu, Toplum Tabanlı Bir Çalışmada Çoklu Uygunluk Analizi ve Kümeleme Analizi ile Sağlık Kurumu Seçimi, 2010) in their study by means of the MCA were supported by clustering methods. It was reported in the aforesaid study that findings yielded by the MCA were in conformity with the results obtained by the Kohonen method, one of the clustering methods. Das and Sun (2016) (Das & Sun, Association Knowledge for fatal run-off-road crashes by Multiple Correspondence Analysis, 2016) investigated in their study that whether causes of accidents were corresponding with each other with respect to age and gender. In this analysis, combination clouds were determined so that frequency of accidents could be determined according to age and gender groups. Filiz and Çemrek (2007) (Filiz & Çemrek, 2007) investigated whether housing status of university students exhibited correspondence with respect to gender and type of faculty. In the study conducted by Jalayer, Pour-Rouholamin and Zhou (2018) (Jalayer, Pour-Rouholamin, & Zhou, 2018), traffic accidents in the last 15 years were examined and it was determined that against long odds; the accidents did not originate from "female drivers", "safety belt use" and "vehicle age" variables. It has been determined that the largest contributor to the accidental dimensions in the study is the aged drivers and adverse weather conditions. Moreover, researchers also tried to determine whether reason of dissatisfaction with accommodation place displayed difference with respect to gender and faculty by means of MCA method. In the study of Alberti (2015) (Alberti G. , 2015), it was aimed to develop coding necessary for better interpretation of MCA results in the R software. For better comprehension of obtained graphs during study, 15 different commands were prepared and a series of tests were developed for significance of results. In the study of Dönmez, Kutluk and Terzioğlu (2015) (Dönmez , Kutluk, & Terzioğlu, 2015), opinions of graduate students regarding innovations in Turkish Commercial Law and Turkish Financial Reporting Standards were determined with respect to some demographical variables such as age, gender, graduated school type and experiment status and whether they were exhibiting correspondence to courses and information resources. In a similar study conducted by Das and Sun (2014) (Das & Sun, Exploring Clusters Of Contributing Factors for Single-Vehicle Fatal Crashes Through Multiple Correspondence Analysis, 2014), the single vehicle fatal accidents between 2004 and 2011 were examined by multiple suitability analysis and the results of the analysis showed that generally accidents were caused by young ladies on undivided roads, unfamiliar and partly slippery grounds whereas by old ladies on rugged terrains.

In the study in which MCA was employed, it was reported that being knowledgeable about law and report was corresponding to course type and way of acquisition of knowledge. In the study of D'Esposito, Stefano and Ragozini (2014) (D'Esposito, Stefano, & Ragozini, 2014), an effort to determine whether

MCA could be employed to analyze data files with dual mode and to interpret plotted graphs. Afterwards of the empirical study conducted on the data with dual-mode composed of actors and events, it was reported that various methods such as subset correspondence analysis could be more beneficent by providing more detailed information about a special case or status (Greenacre & Pardo, 2006). Blazun, Kokol and Vosner (2015) (Blazun, Kokol, & Vosner, 2015) investigated whether nursing students' opinions about their competencies were corresponding to six different competency areas. In the aforesaid study conducted MCA, similar and different areas of competency areas were interpreted based on the competency areas scored according to the 5-point Likert scale by means of two-dimensional graphs. According to available studies in the literature, the most remarkable characteristic of MCA is the scarce amount of relevant studies. In addition, it was seen that almost half of the studies were theoretical researches employing the MCA and the ones concentrated on different analysis software. It is also considered that number of applied studies employing MCA is quite limited. In the present study, an attempt was made to determine that whether universities in Turkey conform to their academic structures, or not. Especially, it was determined that departments of ODTÜ, Ege, İstanbul, İstanbul Teknik, Hacettepe, Gazi and Ankara Universities ranked among the prominent universities according to the URAP data exhibit correspondence with respect to their number of doctorate programs. This result suggested that doctorate departments have significant weight for universities ranked at the prominent places according to the URAP data. Additionally, it was observed that again prominent universities were exhibiting similarity in terms of number of Professors, among the academician categories. This finding revealed that number of Professors was significant effect on prominent universities according to the URAP data. When all findings were considered as together, it was determined that reputable universities in Turkey were exhibiting correspondence in terms of Professors and Doctorate Programs. Additionally, according to other categorical variables considered within the scope of the study, Özyeğin, Bilkent, Kadir Has, Sabancı, Bahçeşehir, Koç and İstanbul Ticaret Universities were not exhibiting correspondence; in other words, these universities were in different structure with respect to other universities. Correspondence was also determined among the reputable universities, and universities apart from the ones exhibiting different characteristics in two dimensional graphs in comparison with others; and that they were exhibiting conformity with respect to both their numbers of department and academicians.

5. Summary

This study attempted to determine whether there is conformity between the universities regarding their academic structure. Particularly, it was determined that the METU, Ege, İstanbul, İstanbul Technical, Hacettepe, Gazi and Ankara Universities, the top universities according to the URAP data, were similar in their number of post graduates studies at their departments. This result indicates that post graduate departments have significant effect for the universities that are leading according to the URAP data. In addition, the leading universities were found to have similarity with respect to the professor numbers within the category of academicians. This result indicates that the number of professors has

a very significant effect for the universities that are leading according to the URAP data. When these results are evaluated as a whole, the most reputable universities in our country were found to have conformity with respect to the number of professors and pHd programs. In addition, according to the other categorical variables addressed under the study, Özyeğin, Bilkent, Kadir Has, Sabancı, Bahçeşehir, Koç and İstanbul Commerce Universities didn't have conformity. In other words, these universities were found to have a different structure than the other universities. The study also determined that the reputable leading universities and the universities with different properties in the two-dimensional graphics had similar qualities and conformity with respect to the numbers of departments and academicians.

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