Original Article

Investigating social factors affecting academic ranking and providing a comprehensive model

Ali Namaki[1], Nadergholi Ghourchian[1*], Parivash Jafari[1]

[1] Department of Higher Education Management, Science and Research Branch, Islamic Azad University, Tehran, Iran

Corresponding author and reprints: Nadergholi Ghourchian. Department of Management and Economics, Faculty of Science and Research, Islamic Azad University, Tehran, Iran.

Email: naghourchian@gmail.com

Accepted for publication: 19 Aug 2018

Abstract

Background: A new competitive factor between universities is the production of knowledge, in which the material benefits are gained. Competition in achieving such a situation has created the new systems of ranking and evaluation of universities. The purpose of the present study was to present an appropriate model for university ranking and to evaluate the effectiveness of social factors in the final ranking model.

Methods: First, the indices of 29 global ranking systems were studied and analyzed using content analysis method. Then, an interview was conducted with faculty members and the model was presented through theme analysis and open coding. A questionnaire was designed for the study and to confirm the reliability of the questionnaire, Cronbach's alpha coefficient was used. Also, the validity of the questionnaire was confirmed using the expert opinions. Convergent validity technique was also used using Amos graphics software.

Results: The importance of social factors affecting academic ranking was obtained through calculation of the means. Based on our results, the importance of the factors from the largest to the smallest was as follows: educational performance; research performance; entrepreneurship and employment; scientific rank, national and international image; and the ability of the university to meet the needs of the society. All of which show moderate to high levels.

Conclusion: Based on the results, the calculated values of fitness indices were in desirable range and the proposed model for the ranking of universities was suitable with empirical data and enjoys a favorable situation.

Keywords: Educational Function; Faculty; Scientific Ranking, Universities; Research

Cite this article as: Namaki A, Ghourchian N, Jafari P. Investigating social factors affecting academic ranking and providing a comprehensive model. SDH. 2018;4(3):124-136. DOI: http://dx.doi.org/10.22037/sdh.v4i3.22186

Introduction

Today, knowledge is considered as the most important factor in creating value added in modern economies and promoting the competitiveness of the country at the level of international markets (1). Universities as educational and research institutions are one of the most important centers in knowledge-based economies, which have a significant impact on the innovative performance of countries (2). By equipping human resources with skills and knowledge, universities provide the efficient workforce needed by other active economic institutions and disseminate the knowledge of university researchers (3).

A new competitive factor between universities is the production of knowledge and the acquisition of material benefits derived from it. The importance of evaluating higher education is so high that scholars refer to it as the guarantor of the survival of universities (4). Academic rankings, in addition to informing people about the performance of universities and institutes of higher education, make a comparison between universities, which ultimately results in the development of the sense of competition among them (5). Universities use ranking results to advance their goals in branding and attracting students, leading professors and researchers. In addition, policymakers of Higher Education Centers use the results of rankings as information resources in policy making and planning (6).

Ratings are the most effective way the universities can use to identify themselves and their activities (7). The first international ranking of universities was published by the Shanghai University of Jaipur in 2003 in order to examine the status of its universities compared with international scientific centers. Given the widespread acceptance of the results of this ranking during the recent years, different organizations, with a variety of goals, have published lists of universities and higher educational institutes (8). Today, there are about 30 ranking systems in the world that compare and rank universities in countries at national or international levels. The three influential global rankings are those produced by Shanghai Ranking Consultancy (the Academic Ranking of World Universities; ARWU), Times Higher Education (THE), and Quacquarelli Symonds (QS) (9).

Research activities are among the most influential indicators, which in some way indicate the scientific output of the university (10). Another important indicator in ranking is the international image of the university. Of course, ranking systems use different criteria for this indicator. For example, the most influential parameter of this index in QS ranking is the views of prominent university professors, in Shanghai ranking it is the quality of faculty and professors, and in the G-factor ranking it is the number of links to the university's website among the websites of other universities. Currently, the most important indicators of science production in the world are the number of scientific articles indexed in internationally recognized scientific databases and their citation (11).

Most researchers believe that the international rankings began with the publication of the first Shanghai Ranking Report. According to this report, grades 1-20 often belonged to American and English universities. It ranked as high as 100, and after publishing, it quickly and significantly influenced higher education, politics, and the public domain (12). Research into rating systems can be divided into two categories: some researchers compared the results and ranking systems, while others provided critical feedback on different aspects of rating systems (13). The ranking of universities is challenging, according to the environment in which they are located and their functional aspects, because each higher education institution offers educational and research programs focusing on programs and missions that it is self-explanatory (14). For many years, the competition was conducted only by evaluating the implicit reputation of universities and there was no objective information to support this reputation. In other words, the popularity of a higher education institution, often due to propaganda and government support, was the judging index of a university (15).

Systems provided for ranking have many shortcomings and are not worthwhile. They often use inappropriate indicators for quality assessment, and often pay less attention to quantitative and available data, and neglect quality data that is often difficult to access (9). Also, a combination of different indicators has been proposed to achieve a final result, because in the process

of rating, in some cases, the weight of a specific indicator in different domains is considered too high or too low, or the weight is given with no specific rationale; in other words, weighting different indicators in order to evaluate the quality and composition has no theoretical and conceptual support. As a result, the lists of these ranking systems will seriously compromise the students' decisions who make an attempt to select on the basis of these lists (16). In 2011, a study entitled "The Comparison of Three Basic Academic Systems in the Academic Ranking of Universities of the World" was conducted by Huang et al. In this research, the difference between the top 20 universities introduced in these three systems was examined. Comparing the results of these three systems, with the exception of Harvard, which earned the highest rank in all three systems, there is a significant difference between the other rankings of the universities in these three systems (17). Vernon et al. emphasizes that rating systems alone cannot provide a comprehensive assessment of scientific quality, and better results can be achieved using the combination of Leiden, Thomson Reuters, and Scimago ranking systems. Rankings based on mental or luxury indicators are not suitable for scientific improvement. In this case, standard and comprehensive indicators should be used (18). Other developed or undeveloped countries need to be aware of their position at global ranking. Therefore, the incentive for designing a rating system was created that could assess the wider and larger number of universities. Thus, the Middle East Technical University Institute of Informatics has a ranking system based on academic performance of the universities named "UREP" in 2007, which highlighted 2000 highest ranking universities. The approach of this system emphasized scientific and research indicators (19).

The Indicators of Islamic World Science Citation Database (ISC) were prepared by the Organization of the Islamic Conference (OIC) and ranking experts in the years 2006 and 2007. Nowadays, Islamic Republic of Iran universities and research institutes are ranked by the ISC on an annual basis (12). The purpose of the present study was to present an appropriate model for university ranking and to evaluate the effectiveness of social factors in the final ranking model.

Method

The statistical method in the present study was mixed method. First, qualitative data was collected. Then, based on the findings of the data, the research tool was developed. Finally, the suggested model was presented.

The first part of the qualitative method (review document) was the review of social factors ranked in 29 different rating systems. The second part, i.e. interview with experts and academic managers, included faculty members and university experts familiar with the field of higher education employed in Islamic Azad University. As for the quantitative section, the population was 3528 (1523 women and 2005 men). To estimate the sample size, formula for the limited population (Cochran) was used; therefore, the total volume of the sample was calculated initially according to the following formula:

$$n = \frac{N\left(Z^2_{\alpha/2}\right)p.q}{(N-1)\varepsilon^2 + \left(Z^2_{\alpha/2}\right)p.q}$$

N: The size of the population (in this research: 3528 people)

Z: The level of significance and degree of freedom (1.96)

ε: The maximum acceptable error was assumed to be 5% here

P: the success rate among individuals, which was considered to be 50%

q: the failure rate (1-p= q)

$$n = \frac{3528(1.96)^2./5\times./5}{(3528-1)./05^2 + (1.96)^2./5\times./5} = 347$$

Considering that the study population was extensive and access for all was difficult, clustered-stratified sampling method was used. To this end, faculties of the six branches of Islamic Azad University in Tehran (i.e. Science and Research Unit, Tehran North Branch, Central Tehran Branch, South Tehran Branch, West Tehran Branch, and Tehran East Branch) were considered as the statistical population.

Table1. The components of the researcher-made questionnaire

Components	Questions
University's ability to meet community needs	1. The university's performance in reducing unemployment rates reflects the university's ability to meet the needs of the community. 2. The University's performance in reducing social damages reflects the university's ability to meet the needs of the community. 3. The University's performance in poverty eradication and increasing productivity in the economy reflects the university's ability to meet the needs of society. 4. The university's performance in strengthening young people's self-confidence reflects the university's ability to meet the needs of society. 5. The university's performance in the production of an expert in accordance with the needs of the community reflects the university's ability to meet the needs of society.
Educational function	1. The number of post graduate students is effective on university performance. 2. The number of professors holding a special doctorate degree is effective at the university's academic performance. 3. The number of valid references given to the curriculum and university education indicates the functioning of the university.
Research function	1. The number of articles and books published by the professors reflects the research work of the university. 2. The number of articles and books published by the students reflects the research work of the university. 3. The number of citations to the scientific production of professors reflects the research performance of the university. 4. The number of citations to the scientific production of students reflects the research performance of the university. 5. Research centers at the University indicate the research work of the university. 6. The number of books and publications of the library represents the research work of the university. 7. The number of laboratories available at the university indicates the research work of the university. 8. University's use of appropriate information technology and appropriate access to scientific resources in the world indicates the research work of the university.
Entrepreneurship and employment	1. Working Graduates from a university represent their success in employability and entrepreneurship 2. Successful graduates in their field of expertise express the University's success in employability and entrepreneurship 3. Students and graduates entrepreneur indicate the success of the university in employability and entrepreneurship 4. Patent and invention of students indicate the success of the university in creating jobs and entrepreneurship.
Scientific rank and national and international image	1. The national and international prizes won by the professors and students of a university are effective on the academic rank and national and international image of that university. 2. The national and international conferences held by a university are effective on the national and international academic rank of university. 3. The foreign elite students applying for study at a university are effective on the academic rank and national and international image of that university. 4. The university's rank is effective in terms of reputable scientific references to the national and international image of that university. 5. Scientific interaction with other scientific and academic centers is effective on the academic rank and national and international image of that university. 6. Referrals given to scientific sources published by a university are effective on the academic rank and national and international image of that university.

Table 2. Cronbach's alpha coefficients for variables

Variables	Number of Items	Cronbach's alpha coefficients
University's ability to meet community needs	5	0.821
Educational function	3	0.746
Research function	8	0.903
Entrepreneurship and employment	4	0.841
Scientific rank and national and international image	6	0.884

Then, three universities (Science and Research Unit, Tehran North Branch and Central Tehran Branch) were selected randomly. The college of humanities and a non-humanities college were selected from each university. The data collection tool was a researcher-made questionnaire. In fact, the main structure of the questionnaire was the components and sub-components extracted from the studies conducted by researches in the past together with the relevant correspondence with expert opinions (interview with faculty members) (Table1). The questionnaire was designed and implemented according to the 5-point Likert scale (I fully agree, agree, do not comment, disagree, totally disagree). Descriptive and inferential statistics were used to analyze the data. For data analysis, IBM SPSS Statistics for Windows, Version 25.0., was used in the descriptive analysis section and the analysis of the proposed model was done using Amos Graphics software.

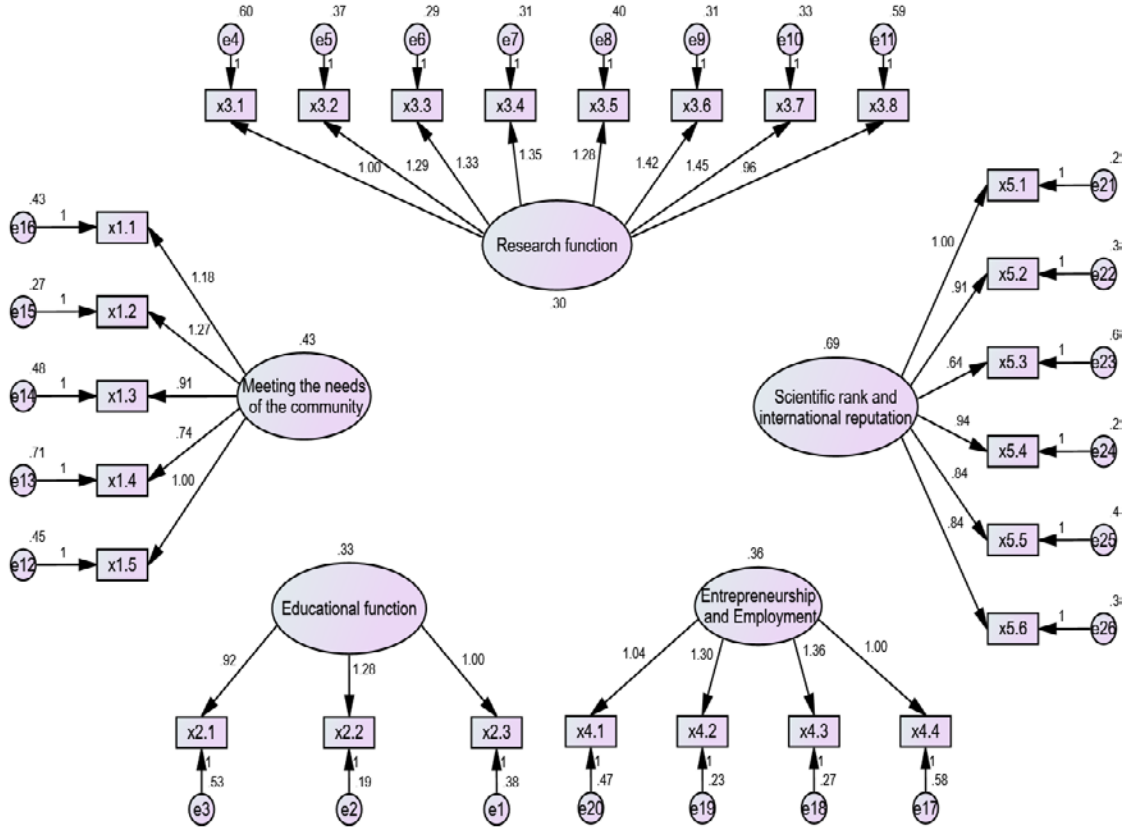

Figure 1. Confirmatory Factor Analysis Results: Oval shapes are hidden variables or components, and rectangular shapes (x2.1,…) are the observed variables. The items are listed in the questionnaire table. Also, the numbers on the arrows are the factor load and the numbers on the observed variables (questions) are the coefficients of determination of the items (factor load to the power of two).

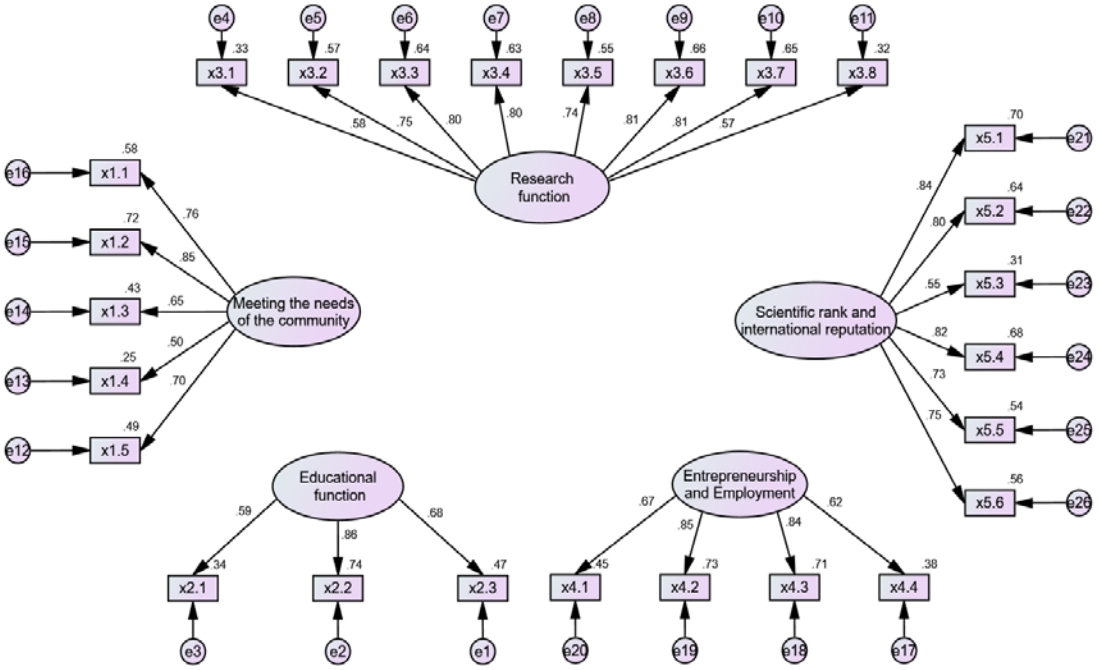

Figure 2. Unstandardized model of Confirmatory Factor

In order to confirm the validity of the questionnaire, the opinions of faculty members and university experts about the content of the questionnaire were considered. Also, the convergent validity techniques were used. The Confirmatory Factor Analysis (CFA) was performed in Amos Graphics software. In figure 1, the results of the CFA are shown in each questionnaire (An example of unstandardized coefficients for CFA is presented in figure 2).

Convergent validity was calculated at two levels of the item and the factor. At the item level, the factor load should be above 0.7 and the factor loads below 0.3 should be eliminated. In figure 1, the factor loads of all observed variables were in a satisfactory condition and the factor load below 0.3 was not observed (Table 3).

In the level of convergent validity, the AVE index was also used, which means the average variance was extracted. In order to obtain this index, the coefficients for determining the factors (factor load to the power of two), which are located on the top of the rows, were taken as the average. For this index, a minimum of 0.5 was considered. The results of the average variance extracted in Table 4 indicated that convergent validity was appropriate at the operating level. Overall, the results for the reliability of the questionnaire through Cronbach's alpha coefficient and convergent validity in the two levels of item and factor indicated that the researcher-made questionnaire was reliable. The results of structural equation modeling are presented in figure 4.

Results

In general, the creation of the proposed model took the following steps: reviewing documents and interviews, analyzing data, extracting key factors for the presentation of the model, building a questionnaire, collecting quantitative data, analyzing the proposed model, and interpreting the results. In the interview section, the statistical results were as follows: The obtained demographic data showed that 43.2% of respondents were female and 56.8% were male (To make the meaning of scores more visible, all scores were transferred into the 0-100 interval).

Table 3. Factor load of observed variables and significance level

Hidden variables	Observed variables	Factor loads	*P*
Educational function	The number of postgraduate students affects university performance	0.59	<0.001
	The number of professors holding a special doctorate degree affects the performance of the university's teaching	0.86	<0.001
	The number of valid references given to university resources and university education indicates the functioning of the university.	0.68	<0.001
Research function	The number of articles and published articles by the professors represents the research work of the university.	0.58	<0.001
	The number of articles and books published by the students represents the research work of the university.	0.75	<0.001
	The number of citations to the scientific production of the professors represents the research work of the university.	0.8	<0.001
	The number of citations to the scientific production of students represents the research work of the university.	0.8	<0.001
	University research centers indicate the research work of the university.	0.74	<0.001
	The number of books and publications in the library represents the research work of the university.	0.81	<0.001
	The number of laboratories available at the university indicates the research work of the university.	0.81	<0.001
	University's use of appropriate information technology and appropriate access to world-wide scientific resources indicates the research work of the university.	0.75	<0.001
Entrepreneurship and employment	Graduates from a university show their success in job creation and entrepreneurship.	0.67	<0.001
	Successful graduates in their field express the University's success in creating jobs and entrepreneurship.	0.85	<0.001
	Entrepreneurship students and graduates express their University's success in job creation and entrepreneurship.	0.84	<0.001
	Patent and invention of college students and graduates express the University's success in creating jobs and entrepreneurship.	0.62	<0.001
Scientific rank, national and international reputation	The national and international prizes won by the professors and students of a university are effective on the academic rank and national and international image of the university.	0.84	<0.001
	The national and international conferences held by a university are effective on the academic rank and national and international image of the university.	0.8	<0.001
	The foreign elite students applying for a university degree are effective in determining the academic rank and national and international image of the university.	0.55	<0.001
	The university's rank is effective from the point of view of credible scientific references on the national and international image of the university.	0.82	<0.001
	Scientific interaction with other academic and academic centers is effective on the scientific rank and national and international image of the university.	0.73	<0.001
	References given to the scientific resources published by a university are effective on the academic rank and national and international reputation of that university.	0.75	<0.001

Table 4. Average variance extracted of variables

Hidden variable	Average variance extracted
University's ability to meet community needs	0.49
Educational function	0.51
Research function	0.54
Entrepreneurship and employment	0.57
Scientific rank and national and international image	0.57

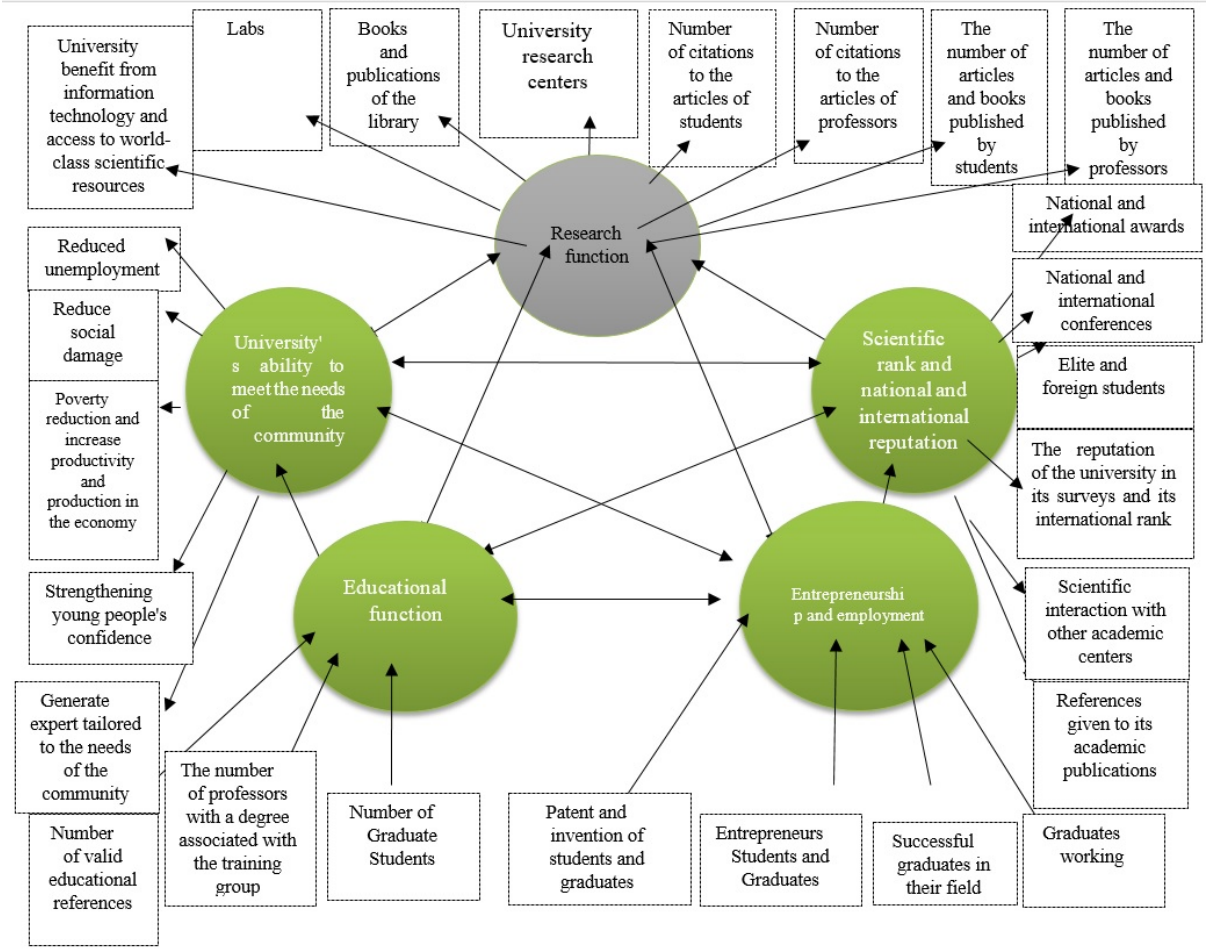

Figure 3. The proposed final ranking of the universities and higher education institutions

The employment record was as follows: 45.2% of the respondents aged 11 to 15 years, 29.4% with less than 10 years of experience, 14.7%, between 16 and 20 years of experience, and 10.7% had more than 20 years of experience.

In the analysis section of the questionnaire, the average of main variables ranked the following: 1. Educational performance (74.61), 2. Research performance (68.33), 3. Entrepreneurship and employment (66.26), 4. Academic rank and national and international image (64.69), and 5. The ability of the university to meet the needs of society (62.44), which show moderate to high levels in all variables (Table 4).

Table 4. Central Indicators and Variable Distributions (For the meaning of scores to be perceptible, they all range from 0 to 100)

Variable	Mean (SD)	Median	Mode	Maximum	Minimum
University's ability to meet community needs	62.44 (18.40)	60	55	100	30
Educational function	74.61 (17.62)	75	75	100	33.33
Research function	68.33 (18.14)	68.75	75	100	31.25
Entrepreneurship and employment	66.26 (19.49)	68.75	75	100	31.25
Scientific rank and national and international image	64.69 (19.09)	62.5	75	100	29.17

The Kendall's W test has been used to test the ranking of each of the components. This test can be used to compare the different dimensions of a variable. According to Table 5, the ranks of university ranking components were significant and the error level ≤0.01. Therefore, it can be concluded that these rankings were meaningful and generalizable to the statistical community (Table 6).

The proposed university rankings tested using the structural equation modeling (SEM) technique and Amos graphics software. The results are presented in figure 4.

Table 5. Kendall's W Ranks

Variable	Mean Rank
University's ability to meet community needs	2.02
Educational function	3.90
Research function	3.35
Entrepreneurship and employment	3.13
Scientific rank and national and international image	2.61

Table 6. The result of the Kendall's W test

	N	Kendall's W[a]	Chi-Square	df	*P*
Test Statistics	347	.263	364.541	4	<0.001

[a] Kendall's Coefficient of Concordance

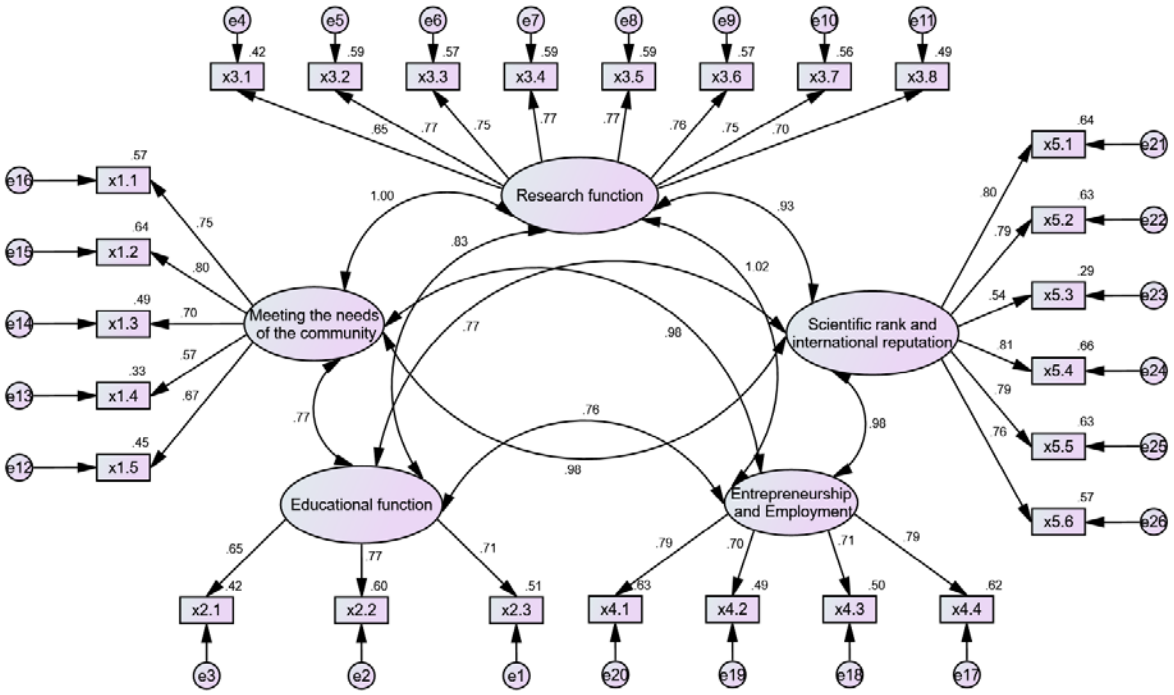

Figure 4. Results of the structural equation modeling

The statistical significance of the correlation coefficients between the hidden variables as well as the weight of each of them were listed from the highest to the lowest, respectively. Then, the fit and significance of the whole model were tested. In Table 7, the correlation coefficients between the hidden variables that were obtained from the output of the software Amos are presented. According to the results, the significance level of all the correlation coefficients were smaller than 0.05. All significant coefficients were also close to one and were strong (Table 7).

In the last step, the fitness indicators of the tested model were examined to determine if the proposed model is suitable for ranking universities with empirical data (Table 8). According to Table 8, the calculated values of fitness indices in general was in desirable condition and the proposed model for the ranking of universities was suitable with empirical data and has a favorable situation**.**

Discussion

The proposed model included five main themes: the university's ability to meet community needs, educational function, research function, employment and entrepreneurship, and national and international image. According to the results of the Kendall's W test (Table 4 and 5), this model is meaningful and extended to the statistical community.

Table 7. The statistical significance of the correlation coefficients between the hidden variables (with respect to the upper and lower limits, we can also check the significance of the parameter, so that if zero is not within this range, the parameter is significant)

Parameter	Estimate	Lower	Upper	*P*
Educational function and entrepreneurship and employment	.756	.653	.859	<0.001
Educational function and academic rank and national and international image	.773	.672	.860	<0.001
University's ability to meet the needs of the community and the academic rank and national and international image	.977	.933	1.017	<0.001
University's ability to meet the needs of society and entrepreneurship and employment	.982	.923	1.026	<0.001
University's ability to meet community needs and research function	1.003	.958	1.044	<0.001
Research function and scientific rank and national and international image	.927	.874	.969	<0.001
Entrepreneurship and employment, and academic rank and national and international image	.982	.932	1.026	<0.001
University's ability to meet community needs and educational performance	.771	.675	.869	<0.001
Educational function and research function	.828	.715	.935	<0.001
Research function and entrepreneurship and employment	1.019	.977	1.056	<0.001

Table 8. The Fitness indicators for Conceptual Model

Indicator	Calculated amount	Desirable amount
CMIN/NI	5.294	<5
CFI	0.889	>0.9
GFI	0.956	>0.9
RMSEA	0.159	<0.8
AGFI	0.961	>0.9
NFI	0.886	>0.9

The importance of the components was obtained with the mean value and the confirmatory factor analysis was used to determine the effect of each of the sub-components. The results showed that among the five indicators, the importance of educational and research function was more than that of others. Also, all factor loads related to the structures were meaningful and the model has a good fit of data. On the other hand, the structural equation model was confirmed. Indicative features of the proposed model include: relying on macro indicators and the lack of entry into details of in-university activities, expanding the model for years to come with a long-term planning, combining the results of this ranking with global rating systems, facilitating collaboration of academic units to improve the quality of the university, and complying with major country needs and programs.

Evaluation of the previous studies suggested that the findings of the present study had some overlaps with those of some previous researches and differed from the results of others. For example, the results of the Shanghai ranking model for all indicators (6 indices of the Shanghai Ranking Model) were similar to those of the present study, but this ranking did not mention other indicators such as the number of citations, research function, the status of labs, etc. On the other hand, in the Shanghai model, only the indicators related to the research function are emphasized and the educational function and the ability of the university to meet the needs of the community remain are neglected. Also, the same conditions apply in the case of the Times Ratings Model and some indicators such as research status, citation rates, and industrial income were consistent with the indicators of this model, but other indicators such as educational indicators related to faculty members, graduate and postgraduate groups, and the university's ability to meet the needs of the university community are not mentioned.

did not consider the quality of research and In the current research, in addition to the research function, indicators on the educational function, job creation, and the ability to meet the needs of society were also mentioned. Leiden rankings are only based on research impact indicators and the participation of publications and books. Also, the ISC rating system did not take into account the employment efficiency and university graduates, but considered the research status.

One of the criteria in the present research was the national and international images of the university. The Times Rating System, too, pointed to the impact of these indicators on the university rankings.

Compared to global and national ranking systems, Cakir et al. stated that the most global ranking systems uses fewer indexes and focuses on the research performance of universities and its indicators (20), However, national ranking systems have only focused on organizational and educational components. In contrast, contrary to the current research, national research was less comprehensive, and discussions about national and international image and the job creation of elite and normal graduates were not considered.

Compared to global and national ranking systems, Cakir et al. have stated that most global ranking systems had fewer indices, with a major focus on research performance of universities and its indicators (20). On the other hand, national rating systems focused on educational function. Contrary to the current research, national research has been less comprehensive, and the national and international image and the job creation of elite and ordinary graduates were not considered. Schwekendiek et al. has focused on attracting foreign professors and students and on attempting to publish research papers in various journals, and considered these factors to be effective in the ranking of universities (21). In addition, Blanco-Ramírez et al. (22) and Halai et al. (23) in their ranking indices have paid attention to the educational quality and they entrepreneurship in this field. Some other

researchers have considered weighting mechanisms in the process of ranking higher education institutions. For example, Marope et al. measured the weight gain acquired by each of the indicators in valid rating systems. The researchers have considered different indicators for educational quality indicators including college quality, research outputs, and performance per dollar budget, and by introducing the challenges and methodological problems in each rating system, they have stated that no indices can be considered ideal and each has a particular role in the educational system (24).

Nevertheless, the present research endeavor has certain limitations. We carried out the study solely on faculty members of Islamic Azad University. Therefore, the results should be generalized with caution. Also, it is possible that according to the prevailing conditions of investigation and spatial and temporal conditions, the degree of generalization of the results may change.

The present study evaluated a large number of ranking systems and assessed the weaknesses and strengths of each. Then, interviews were conducted with experts and university professors to present a suitable model for ranking universities. By creating a questionnaire and statistical analysis, a model with five main components and a number of sub-components was developed and the importance of indicators in this ranking pattern was analyzed. This template can be an appropriate model for helping experts rank universities and higher education institutions.

Conflict of interest

Authors declare no conflict of interests.

References

1. The World Factbook — Central Intelligence Agency. Available from: https://www.cia.gov/library/publications/the-world-factbook/geos/pk.html. Accessed February 26, 2018.

2. Human Development Reports. Available from: http://hdr.undp.org/en/countries/profiles/PAK. Accessed February 28, 2018.

3. Aziz SZ, Hanif I. Primary care and health system performance in Pakistan: A study of basic health units of South Punjab. J Pak Med Assoc. 2016;66(12):1632-1636.

4. World Health Organization. Health Systems Performance Assessment. Available from: http://www.who.int/publications/2003/hspa/en/. Accessed February 26, 2018.

5. Pasha O, Saleem S, Ali S, Goudar SS, Garces A, Esamai F, Patel A, Chomba E, Althabe F, Moore JL, Harrison M. Maternal and newborn outcomes in Pakistan compared to other low and middle income countries in the Global Network's Maternal Newborn Health Registry: an active, community-based, pregnancy surveillance mechanism. Reprod Health. 2015; 12(Suppl 2): S15.

6. Basharat S, Shaikh BT. Primary oral health care: a missing link in public health in Pakistan. East Mediterr Health J. 2016;22(9):703-706.

7. Tabriz AA, Sohrabi MR, Parsay S, Abadi A, Kiapour N, Aliyari M, Ahmadi F, Roodaki A. Relation of intelligence quotient and body mass index in preschool children: a community-based cross-sectional study. Nutr Diabetes. 2015; 5(8): e176.

8. Ettorchi-Tardy A, Levif M, Michel P. Benchmarking: a method for continuous quality improvement in health. Healthc Policy. 2012;7(4):e101-19.

9. Health systems performance assessment. Available from: http://www.euro.who.int/__data/assets/pdf_file/0019/160813/HSPA_A-tool-for-health-governance-in-the-21st-century.pdf. Accessed February 26, 2018.

10. Denost Q, Saillour F, Masya L, Martinaud HM, Guillon S, Kret M, Rullier E, Quintard B, Solomon M. Benchmarking trial between France and Australia comparing management of primary rectal cancer beyond TME and locally recurrent rectal cancer (PelviCare Trial): rationale and design. BMC Cancer. 2016;16:262.

11. Thonon F, Watson J, Saghatchian M. Benchmarking facilities providing care: An international overview of initiatives. SAGE Open Med. 2015; 3: 2050312115601692. 5;3.

12. Ellis J. All inclusive benchmarking. J Nurs Manag. 2006;14(5):377-83.

13. Comité de coordination de l'évaluation clinique & de la qualité en Aquitaine. Available from: http://www.ccecqa.asso.fr/. Accessed February 26, 2018.

14. Papanicolas I, Kringos D, Klazinga NS, Smith PC. Health system performance comparison: new directions in research and policy. Health Policy. 2013;112(1-2):1-3.

15. Papanicolas I, Smith P. Health system performance comparison: an agenda for policy, information and research: an agenda for policy, information and research. McGraw-Hill Education (UK); 2013.
16. Carinci F, Van Gool K, Mainz J, Veillard J, Pichora EC, Januel JM, Arispe I, Kim SM, Klazinga NS; OECD Health Care Quality Indicators Expert Group. Towards actionable international comparisons of health system performance: expert revision of the OECD framework and quality indicators. Int J Qual Health Care. 2015;27(2):137-46.
17. Chevreul K, Berg Brigham K, Durand-Zaleski I, Hernandez-Quevedo C. France: Health System Review. Health Syst Transit. 2015;17(3):1-218, xvii.
18. Tashobya CK, da Silveira VC, Ssengooba F, Nabyonga-Orem J, Macq J, Criel B. Health systems performance assessment in low-income countries: learning from international experiences. Global Health. 2014; 10: 5.
19. Kruk ME, Freedman LP. Assessing health system performance in developing countries: a review of the literature. Health Policy. 2008;85(3):263-76.
20. Yavangi M, Sohrabi MR, Alishahi Tabriz A. Effect of Iranian Ministry of Health protocols on cesarean section rate: a quasi-experimental study. J Res Health Sci. 2013;13(1):48-52.
21. Aloosh M, Alishahi Tabriz A, Meysamie A. Select Public Health Policies in Iran: Recommendations for Action. World Medical & Health Policy. 2016;8(2):201-7.
22. European Observatory on Health Systems and Policies. Available from: http://www.euro.who.int/en/about-us/partners/observatory. Accessed February 18, 2017.
23. Wechkunanukul K, Grantham H, Clark RA. Global review of delay time in seeking medical care for chest pain: An integrative literature review. Aust Crit Care. 2017;30(1):13-20.
24. Tabriz AA, Sohrabi MR, Kiapour N, Yazdani S. Factors associated with delay in thrombolytic therapy in patients with ST-elevation myocardial infarction. J Tehran Heart Cent. 2012; 7(2): 65–71.
25. Schäfer WL, Boerma WG, Murante AM, Sixma HJ, Schellevis FG, Groenewegen PP. Assessing the potential for improvement of primary care in 34 countries: a cross-sectional survey. Bull World Health Organ. 2015; 93(3): 161–168.
26. Suhail A, Azhar A. Managing Human Resources in Public Health Care System in South Asia: Case Study of Pakistan. South Asian J Hum Resour Manag. 2016;3(1):75–83.
27. Malik MA, Van de Poel E, Van Doorslaer E. Did contracting effect the use of primary health care units in Pakistan? Health Policy Plan. 2017;32(7):1032-1041.
28. World Health Organization. Country profiles. Available from: http://www.who.int/violence_injury_prevention/road_safety_status/country_profiles/en/. Accessed February 18, 2017.
29. Kleven HJ, Waseem M. Tax notches in pakistan: Tax evasion, real responses, and income shifting. Q J Econ Forthcom. 2011;
30. Shah SM, Zaidi S, Ahmed J, Rehman SU. Motivation and retention of physicians in primary healthcare facilities: a qualitative study from Abbottabad, Pakistan. Int J Health Policy Manag. 2016; 5(8): 467–475.
31. Lantz PM. Gender and leadership in healthcare administration: 21st century progress and challenges. J Healthc Manag. 2008 Sep-Oct;53(5):291-301; discussion 302-3. Erratum in: J Healthc Manag. 2009;54(1):1.
32. Malik MA, Nahyoun AS, Rizvi A, Bhatti ZA, Bhutta ZA. Expenditure tracking and review of reproductive maternal, newborn and child health policy in Pakistan. Health Policy Plan. 2017;32(6):781-790.
33. Mossialos E, Wenzl M, Osborn R, Sarnak D. 2015 international profiles of health care systems. Canadian Agency for Drugs and Technologies in Health; 2016.