Winter 3-12-2018

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Abstract

This studies aim is to analyze the scientific interactions of Islamic Azad University in the field of humanities and social sciences between 2010-2014.

method: This study uses a co-occurrence analysis method in scientometrics as well as social network analysis to investigate the interactions governing scientific cooperation networks in the field of humanities and social sciences in Islamic Azad University.

Results:the collaboration network in the field of humanities and social sciences in Islamic Azad University has the density of 0.004that Masoud Hashemi,Saeed Sadeghi and Akbar Mohammadi are the important and influential authors in collaboration network of researchers at the individual level in terms of the different indicators.Tehran University,Allameh Tabatabaei University,Tarbiat Modares University,Tarbiat Moalem University,Ferdowsi University and also University of

Isfahan is one of the main colleagues of the Islamic Azad University in the field of humanities and social sciences, based on various indicators of network analysis Islamic Azad University collaborates on average with approximately 25 other countries in the production of its scientific outputs in this field. Malaysia, America, Britain are the main and important partners of the Islamic Azad University based on the different indicators of network analysis.

Conclusion: The interaction and communications between the researchers is low and no many connections are formed between the authors of university in this field and accordingly the authors are so far away from each other for collaboration in the network. The Islamic Azad University has shaped scientific interactions in its scientific outputs with Iran's top universities in the field of humanities and social sciences.

Key words: Social Sciences, Humanities, Scientometrics, scientific interaction, Azad University

Introduction and problem Statement

One of the indicators of the growth and development of any country is its scientific ability and capacity.

Promoting this ability depends on improving the status of production of scientific information. Among the social institutions, the society, universities and research centers play an important role in the production of scientific and technical information. The production of knowledge in universities is the result of scientific and research activities of faculty members, teachers, and researchers which is typically found in the form of research articles (Fahimnia and Jafari, 2009). The researchers, universities and scientific institutions that publish an article jointly,

according to the above, the present study seeks to the relationships are established between them. The relationships established between the authors and organizations and scientific institutions make the scientific networks between researchers and universities as well as at the macro level between the countries. The hidden structures in the interaction between different universities pay (Hudson, 1996).

To evaluate the scientific activities of universities and scientific institutions, the scientometrics methods and tools are used. In fact, the data on scientific and research activities of the universities that are indexed in the citation databases is a basis for qualitative and quantitative evaluation of countries, universities and authors (Wilson, 2011). Actually, the aim of scientific evaluation-based studies is providing the representations of the research field structures in the form of different groups and networks (Zupic, Čater, 2014) that facilitate and make more concrete the understanding of process of research and scientific fields and the interactions between different actors in it.

One of the important outputs of scientometric studies is drawing the network of scientific interactions of institutes and universities as maps of science. The maps of science are the symbolic representations of the actors and the interactions between them within the scientific network in which the map elements are correlated. The elements correlated are placed adjacent to each other and the elements that are not similar to each other are placed more distant from each other (Noyons, 2001,). The elements appeared in the maps of science can be authors, publishers, institutions, topics in science, etc. The purpose of mapping science actually helps users to better understand the relationships between these elements (Rafols, 2010).

Given the abovementioned subjects, this study seeks to answer the question how the status of scientific interactions in the scientific network of Islamic Azad University in the field of humanities and social sciences is. In other words, this study analyzes the scientific networks of Islamic Azad University in the field of humanities and social sciences at three levels of scientific network between researchers, universities and also the scientific network of Azad University with other countries by using the social network analysis approach to provide the real information regarding the status and the process of development and formation of the scientific network of university with the policy makers in this field to be able to develop the scientific policies of university with the full knowledge of the scientific network of university.

Research History

Rodriguez et al (2015) studied the scientific outputs in Latin American countries in the field of public health. They studied the scientific output and visibility of this output based on data provided by Scopus citation database by using the bibliometric indicators, economic sociology and health. The results showed that Brazil and Mexico have the research systems with more capacity and Argentina and Colombia also have the potential to increase the capacity of their research systems. Uruguay and Puerto Rico and Peru have the highest international cooperation and in this way they have been able to occupy the first ranks based on visibility.

Kutlacha et al (2015) In their study, analyzed the qualitative and quantitative indicators of scientific outputs of these countries to determine the volume of scientific outputs of countries of South East Europe in the period from 2005 to 2010 and also determine the growth level of specific scientific disciplines and study the scientific outputs in these countries qualitatively. In their study, they studied the scientific outputs of 13 countries in South East Europe. They showed

that the countries with more scientific productions usually had more citation than the countries with moderate scientific productions and the countries with less scientific productions received less citation.

Aminpoor and Heydari (2008) In their paper, studied the research outputs of Isfahan University of Medical Sciences. In their research, they studied the scientific outputs of Isfahan University of Medical Sciences in 2006 and compared it with the scientific outputs in 2005. Research results showed that the research outputs of university have had 100% growth in publishing the scientific papers indexed in reputable databases in 2006 compared to 2005. In general, studying the scientific productions of Isfahan University of Medical Sciences indicates the significant growth of the university in 2006 compared to 2005.

Mobasheri et al (2012) studied the scientific outputs of Shahrekord University of Medical Sciences in ISI-SCIE database by the end of 2011, based on scientometric indicators in their article. In their study, they showed that the total number of documents of university authors in the citation database by the end of 2011 was 142 documents that had been published in 89 different journals. The total number of citation to the university articles was 352 and the average of citation was 2.48. The highest scientific productions of university in the field of General Internal Medicine had been 22 records (15.5%).

In a research, Rasolabadi et al (2012) studied the status of scientific outputs of Kurdistan University of Medical Sciences scientometric indicators by the end of 2011. Totally, they studied 157 scientific documents of university in the Science Citation database by the end of 2011 that had been indexed in the database. The research articles with 111 documents allocate the highest scientific outputs of Kurdistan University in terms of the kind of document for itself. In terms of the

topic, the environmental and occupational public health with 35 records and Tropical Medicine with 24 records had the highest topical coverage. The highest collaboration of university has been with Canada with 7 records at the international level and with Tehran University of Medical Sciences with 29 records at the national level. In general, the academic outputs of the Kurdistan University of Medical Sciences have been increased in the years studied.

Research objectives

- Analysis of scientific interactions of Azad University researchers

- Analysis of scientific interactions of Islamic Azad University with other universities and scientific institutions

- Analysis of scientific interactions of Islamic Azad University Azad University with other countries

Research questions

1. Which researchers play an important and key role in scientific interactions of collaboration network of Azad University researchers based on indicators of degree, medial and closeness centrality?

2. Which universities and institutions play an important and key role in scientific interactions of collaboration network of Azad University based on indicators of degree, medial and closeness centrality?

3. Which countries in collaboration network of Azad University play an important and key role in scientific interactions of the network actors based on indicators of degree, betweenness and closeness centrality?

Research method

In this study, the co-occurrence analysis methods which are scientometric methods, were used. Thus, first all the scientific outputs of Islamic Azad University researchers indexed in the Scopus Citation Index between the years 2010 and 2014 were derived and stored in the personal computer. Then, they were studied to answer the research questions.

The study population is comprised of all scientific articles that have been indexed in the Scopus Citation Index with affiliation of Islamic Azad University and in the field of humanities and social sciences between 2010 and 2014. So, the following query was used to derive the data from Scopus database. 6364 records were derived from the citation database and stored on personal computers.

(AFFIL (Iran) AND AFFIL (Azad)) AND SUBJAREA (social Science, Humanities and Arts) AND PUBYEAR > 2010 AND PUBYEAR < 2014

The social network analysis is used to analyze the scientific interactions in the scientific networks of Azad University. The network analysis method is one that studies the different forms of relationship between documents, authors, vocabulary, institutions, organizations, etc. that form a social network. This method studies the interaction between people, organizations, groups, etc. and reveals the pattern of interactions between these cases for identification of important groups to facilitate more effective collaboration between them (Soheili and Osareh, 2013). The statistical software of Excel, scientometric software such as Bibexcel, as well as software for the network mapping and analysis such as Ucinet, Pajek, and NetDraw was used to analyze the data.

Research findings

Collaboration network of Azad University researchers in the field of social sciences and humanities

In order to draw a scientific network of researchers in the field of humanities and social sciences of the Azad University, co-authorship of the authors in the articles was studied.

Generally, 12950 authors participated in the production of scientific researches in the field of humanities and social sciences of Azad University. The co-authorship network is shown in Figure 1, which is illustrated by the network's only major authors on the network.

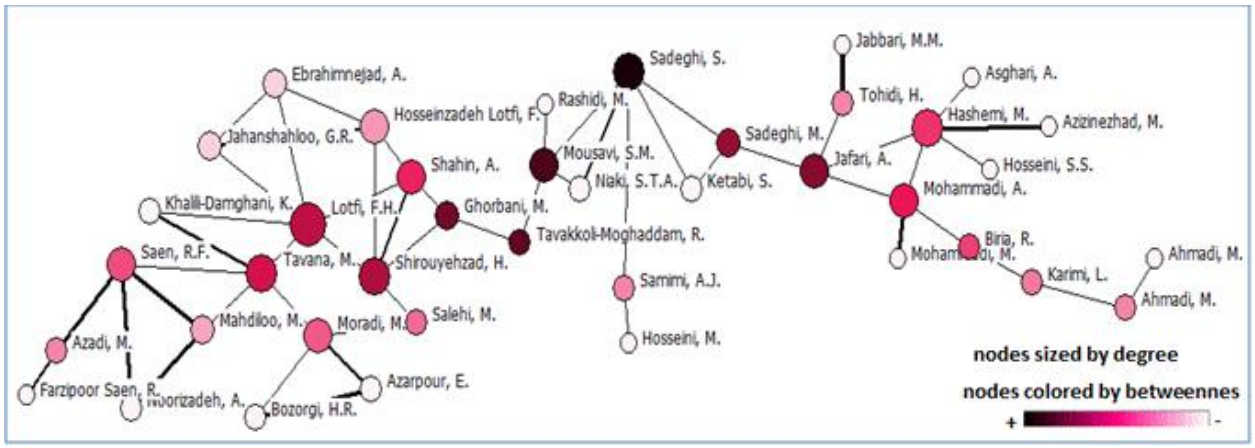

Figure 1: Collaboration Network of researchers in the field of Humanities and Social Sciences of Azad University

The collaboration Network of researchers in the field of Humanities and Social Sciences of Azad University has been comprised of 873 nodes that indeed, from amongst 12950 authors in the field, 7% of researchers present in the collaboration network. The collaboration network with the density of 0.004 indicates that is extremely loose and the researchers have not been able to establish many links between each other and the highest links have been established between the number of authors and the average degree of network with 3.22 shows that the authors have been collaborated with at least 3.22 others on average in the

development of their scientific outputs. The average distance of nodes in the collaboration network of authors is 7.68 indicating that the authors should averagely take 7 steps to go from one side to the other side of network to collaborate in the scientific collaboration network. So, the distance between the authors is high to work together.

Table 2: indicators of cohesion of Azad University researcher collaboration network in the field of Humanities and Social Sciences

Number of vertices	Avg. Degree	Density	Avg. Distance
873	**3.22**	**0.004**	**7.68**

The important and central authors of collaboration network of researchers are presented in table 6 based on different indicators such as the number of records and the degree, betweenness and closeness centrality indicators. As observed in Table 1, Massoud Hashemi with production of 44 records has had the highest productions between the researchers in the field of humanities and social sciences. The researcher also has the highest degree based on the degree centrality indicators. It means that the author has had the highest collaboration in the scientific collaboration network of Azad university researchers. So the author plays the central role and polarity to form a collaboration network and increase the interactions between researchers in the field of humanities and social sciences. In terms of the betweenness indicator, Mr. Saeed Sadeghi has the highest degree of betweenness and it suggests that the author plays an active role in the network cohesion and the relationship of different nodes with the network body, although the author is not included as an author full of publications. In other words, this author is like a bridge that links various authors in the network to each other. As observed in the collaboration network of researchers in Figure 3, the author has

been able to make the relationship and link between these two components and as a result make the dissemination of information possible among the components, If the node is removed from the network, the connection between the two researchers will be completely interrupted.

Table 3: Ranking Azad University researchers based on the number of production and centrality indicators in the field of Humanities and Social Sciences

Record	score	Degree	score	Betweenness	score	closeness	Score
Hashemi, M	44	Hashemi, M	72	Sadeghi, S.	7.04	Mohammadi, A.	0.490
Toushmalani, R.	36	Karimi, T.	68	Mousavi, S.M.	5.94	Hashemi, M.	0.489
Saen, R.F.	36	Jafari, A.	61	Tavakkoli-Moghaddam, R.	3.92	Shirouyezadeh, H.	0.489
Mohammadi, A.	33	Sajadi, S.M	61	Jafari, A.	2.83	Mousavi, S.M.	0.487
Rashidi, M.	30	Rashidi, M.	59	Shirouyehzad, H.	2.74	Lotfi, F.H	0.486
Karimi, T.	24	Azarpour, E.	49	Lotfi, F.M.	2.72	Sajadi, S.M.	0.485
Ghorbani, M.	24	Saen, R.F.	48	Mohammadi, A.	2.69	Tavana, M.	0.483
Salehi, H.	22	Salehi, H.	43	Tavana, M.	2.67	Jafari, A.	0.480
Moradi, M	22	Khalifeh, Z.	38	Hashemi, M.	2.60	Sadeghi, S.	0.480

Shirouyezadeh, H.	**21**	**Bozorgi, H.R.**	**37**	**Saen, R.F.**	**2.59**	**Tavakkoli-Moghaddam, R.**	**0.480**

Considering the closeness degree indicator, Akbar Mohammadi allocated the highest closeness degree for himself indicating that the author has been able to collaborate with different persons in the network easily and closely.

Collaboration network of Azad University with different universities and scientific institutions in the field of Humanities and Social Sciences

In order to draw the Azad University network with universities and other institutions, The co-occurrence of the names of the institutions and universities were used in the address of the articles.

Accordingly, at first, given that the names of universities in the articles had been written in different forms, we first harmonized the names we made the and then used the part of Co-occurrence in the BibExcel software to map the co-authorship network and categorize the institutions and finally entered the outputs derived from the software that were in form of net into the NetDraw software. The Azad University collaboration network with other universities and institutions with the density of 0.123 is a loose collaboration network and indicates that although all universities link the Azad University but the universities in the network have no many links themselves and the institutes and universities are far apart. Density is defined as the number of direct relationships between agents in a network and has the highest contribution among all possible relationships in the network (Nooy, Mrvr, Batagelj, 2005). Network density is equal to 1 and the closer this number to 1, the

better the network density and the better the relationships between network actors and on the contrary the closer this number to zero, the weaker the links between actors and the looser and weaker the network due to limited relationship.

Table 4: Correlation indicators of collaboration network of Azad University with other universities

Avg. Degree	Density	Avg. Distance
4.667	**0.123**	**3.966**

The network degree is 4.667 indicating that Azad University averagely has relationship with approximately 5 other Institutes and universities in production of scientific output in the field of humanities and social sciences. The average geodesic distance in this network is almost 4 that represent the network diameter. In fact, it suggests that at least four steps must be taken to move from one side of network to the other side of network.

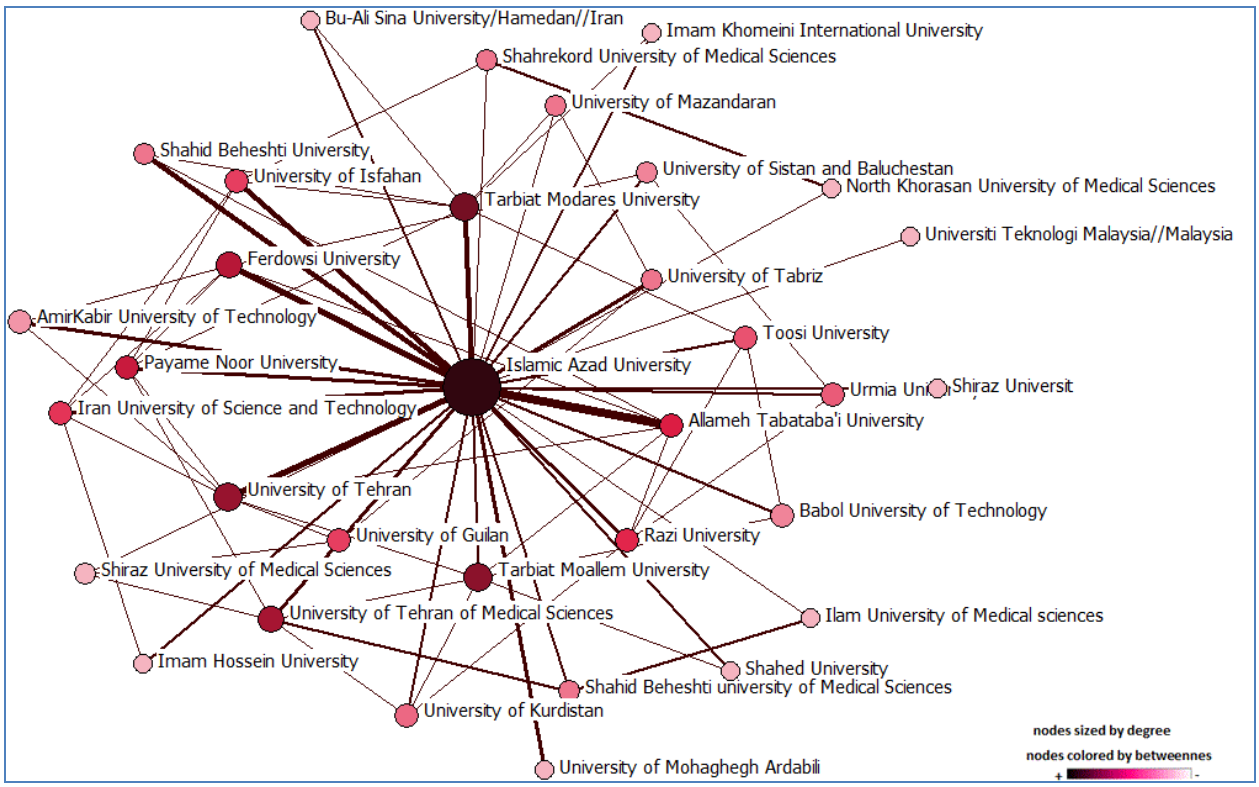

Figure 2: Collaboration network of Azad University with other universities and institutions

As observed in collaboration network, Tehran University, Allameh Tabatabaei University, Tarbiat Modares, Tarbiat Moalem, Ferdowsi University and also Isfahan University are the main partners of Azad University in this field. Tehran University with 291 documents is the most important partner of Azad University in the production of scientific output in the field of humanities and social sciences (Table 5). The university is also located in the first place based on the degree centrality indicators and it suggests the important role and status of the university in production, direction and guidance of Azad University Humanities and Social Sciences.

Table 5: Five universities affecting the collaboration networks based on the number of production and the centrality indicators

Record	score	degree	score	Normalized Betweenness	Score	Normalized Closeness	S
Tehran university	291	Tehran university	74	Tarbiat Modares University	1.422	Tarbiat Moallem University	5
Payam Noor university	158	Mashhad Ferdowsi University	57	Tarbiat Moallem University	1.380	Tehran university of medical science	5
Tarbiat Modares University	117	Tarbiat Modares University	56	Tehran university	0.941	Tehran university	5
Isfahan University	97	Payam Noor university	44	Tehran university of medical science	0.759	Tarbiat Modares University	5
Allameh Tabatabai University	83	Isfahan University	41	Mashhad Ferdowsi University	0.728	Payam Noor university	5

Tarbiat Modarres University with appropriate betweenness position compared to other universities and with the positions within the collaboration network of Azad University in the field of humanities and social sciences has the highest ability to connect with other couples or nodes. One node with high betweenness centrality is like a bridge that connects different parts of a network and if the node is removed from the network, all connections in the network will be affected (Lu & Zhang, 2013). In other words, this indicator suggests that by being placed in the communication bridge between other nodes, the institute has been able to guide the information flow between different nodes in the network and the network loses its cohesion by removing this node. In terms of the closeness centrality indicator, Tarbiat Moallem University with the closeness degree of 55 degrees indicates that

In the process of forming the scientific flow of Humanities and Social Sciences, Azad University has been able to collaborate and interact with other universities in the network closely and easily. High closeness centrality means to what extent a node is connected to the other nodes in the network (Sadeghi and Osareh, 2012).

Collaboration network of Islamic Azad University with different countries

Malaysia and America with 261 and 117 records, respectively, are the important partners of Islamic Azad University in the field of humanities and social sciences. Then, Britain, India and Turkey have the highest collaboration with Azad University. As it is also evident in the collaboration network, with the links between Iran and these countries are relatively stronger and thicker.

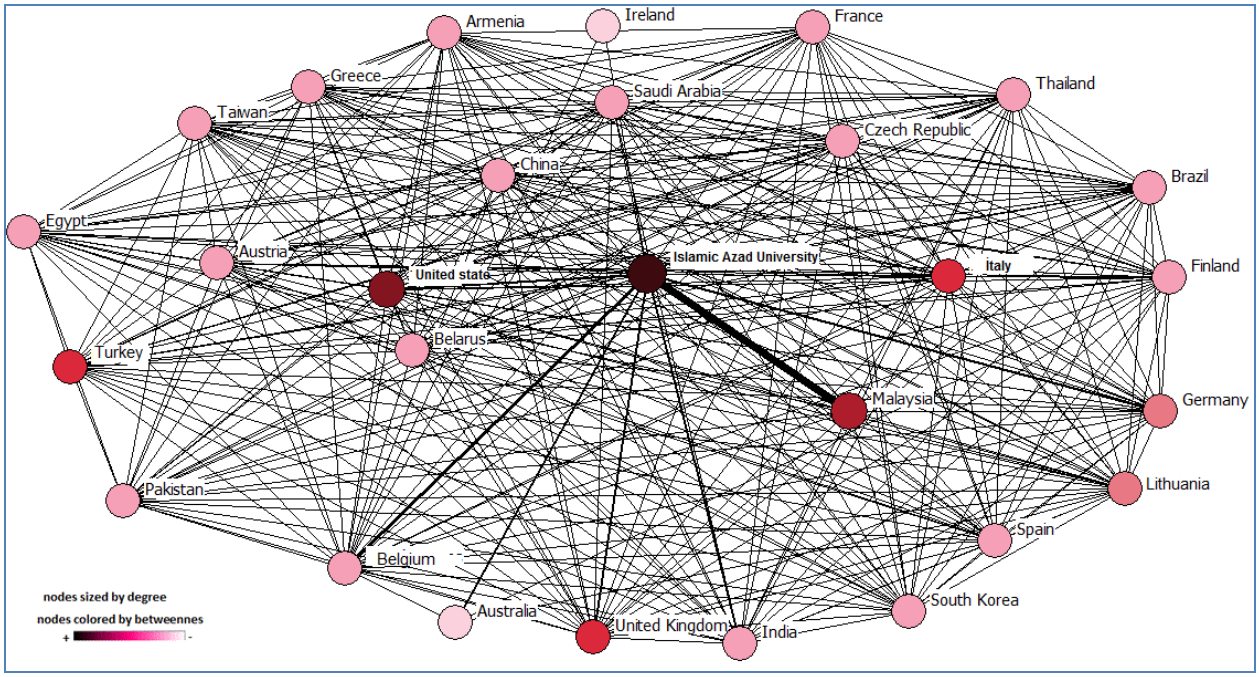

Figure 3: Collaboration network of Islamic Azad University with other countries

The cohesion indicators of collaboration network of Azad University with other countries in the field of Humanities and Social Sciences are presented in Table 1.

The average network degree show 24.48, indicats that the university averagely has collaborated with approximately 25 other countries in the production of its scientific outputs in this field. The average geodesic distance in this network is 1.58, which indicates how much the network diameter is. It indicates that 1,380 steps should be taken to go from one side of network to the other side. In other words, almost one and a half steps should be taken to go from one side to the other side of networks and accordingly the nodes within the network pass a short way to make the collaboration in this field. Network density is 0.247, which indicates that the little connections and links has been established between different countries in collaboration network and a number of countries have good collaboration in forming the scientific outputs of Azad University in this field.

Table 6: Cohesion indicators of collaboration network of Azad University with other countries

Avg. Degree	Density	Avg. Distance
24.48	**0.247**	**1.57**

In terms of degree centrality indicator, Malaysia has had the highest interaction of Azad University with other universities in other countries in the network. Also, the university with a score of 3.974 in the closeness centrality indicator has been able to collaborate with other countries within the network easily and closely.

Table 7: Partner countries of Islamic Azad University based on different indicators

Record	sco	degree	sco	Normali	sco	Normal	Sc

	re		re	zed Betweenness	re	ized Closeness	ore
Malaysia	**261**	**Malaysia**	**394**	**United State**	**4.053**	**Malaysia**	**3.974**
United State	**115**	**United State**	**384**	**Malaysia**	**2.078**	**United Kingdom**	**3.970**
United kingdom	**37**	**United kingdom**	**190**	**United Kingdom**	**1.319**	**United State**	**3.966**
India	**36**	**India**	**174**	**Italy**	**1.054**	**Italy**	**3.966**
Turkey	**31**	**Germany**	**196**	**Turkey**	**0.779**	**India**	**3.957**

In terms of betweenness centrality indicator, America with the score of 4.053 has the highest betweenness among the partner countries of Azad University. In fact, this country with high betweenness in the network makes the interactions between Azad University and other countries within the network possible and plays the central role in transfering of information flow between actors in the network.

Discussion and conclusion

The collaboration Network of researchers in the field of Humanities and Social Sciences of Azad University with the density of 0.004 indicates that is extremely loose and the researchers have not been able to establish many links between each other and the highest links have been established between the number of authors

and the average degree of network with 3.22 shows that the authors have been collaborated with at least 3.22 others on average in the development of their scientific outputs. The average distance of nodes in the collaboration network of authors is 7.68 indicating that the authors are so far away from each other for collaboration in the network. Masoud Hashemi, Saeed Sadeghi and Akbar Mohammadi are the important and influential authors in collaboration network of researchers at the individual level in terms of the different indicators of network analysis.

The Azad University collaboration network with other universities and institutions with the density of 0.123 is a loose collaboration network and indicates that although all universities link the Azad University but the universities in the network have no many links themselves and the institutes and universities are far apart. In fact, the density is defined as the number of direct relationships between agents in a network and has the highest contribution among all possible relationships in the network. Azad University averagely has relationship with approximately 5 other Institutes and universities in production of scientific output in the field of humanities and social sciences. The average geodesic distance in this network is almost 4 that represent the network diameter. In fact, it suggests that at least four steps must be taken to move from one side of network to the other side of network indicating a relatively large distance between the actors in the network. Tehran University, Allameh Tabatabaei University, Tarbiat Modares, Tarbiat Moalem, Ferdowsi University and also Isfahan University are the main partners of Azad University in the field of humanities and social sciences based on the different indicators of network analysis.

Islamic Azad University has averagely collaborated with approximately 25 other countries in the production of its scientific outputs in this field. The average

geodesic distance in this network is 1.58, which indicates how much the network diameter is. It indicates that 1,380 steps should be taken to go from one side of network to the other side. In other words, almost one and a half steps should be taken to go from one side to the other side of networks and accordingly the nodes within the network pass a short way to make the collaboration in this field. However, the little connections and links has been established between different countries in collaboration network and a number of countries have good collaboration in forming the scientific outputs of Azad University in this field. Malaysia, America and Britain are the important partners of Islamic Azad University based on the different indicators of network analysis.

References

Amin Pour, F., Heidari, M. (2009). Comparing the research output of Isfahan University of Medical Sciences. Health Information Management, 6 (1): 35-42.

Rasolabadi, M., khezri, A., Heidari, A., (2012). Scientific output status of Kurdistan University of Medical Sciences based on scientometric indicators by the end of 2011. Scientific Journal of Kurdistan University of Medical Sciences. Pp. 1-14.

Fahimnia, F., Jafari, F., (2009). The use of periodicals in scientific outputs of the faculty members of Humanities colleges of Shiraz University during the years 1998 to 2007. The message of library,

Mobasheri, M., Moradi, MT., Rafiei, F., Sharifi, A., (2012). Scientific Output of Shahrekord University of Medical Sciences in the database by the end of 2011, based on scientometric indicators. Journal of Shahrekord University of Medical Sciences, 14 (6), 115-123.

Soheili, F., Osareh, F., (2013). Density and size of social network in co-authorship network of information science journals. Journal of Information Processing and Management. Coming soon.

Rodríguez, Chinchilla; -González, Z., Zacca; Quesada, G; -Anegón, B. (2015). Latin American scientific output in Public Health: combined analysis using bibliometric, socioeconomic and health indicators.*Scientometrics*, *102*(1), 609-628.

Kutlača, D., Babić, D., Živković, L., & Štrbac, D. (2015). Analysis of quantitative and qualitative indicators of SEE countries scientific output.*Scientometrics*, *102*(1), 247-265.

Noyons, E. (2001). Bibliometric mapping of science in a science policy context. Scientometrics, 50(1), 83–98.

Rafols, I., Porter, A. L., & Leydesdorff, L. (2010). Science overlay maps: A new tool for research policy and library management. *Journal of the American Society for information Science and Technology*, *61*(9), 1871-1887.

Wilson, J. (2011). *Knowledge, networks and nations: Global scientific collaboration in the 21st century*. United Kingdom: The Royal Society.

Hudson J. Trends in multi-authored papers in economics". Journal of Economics Perspectives 1996; 10, 153–8.

Nooy, W.; Wrvar, A.; Batagelj, V. Exploratory social network analysis. Cambridge: Cambridge University Press, 2005

Zupic I, Čater T. Bibliometric Methods in Management and Organization. Organizational Research Methods 2014; 1094428114562629.