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## Co-authorship Network of Authors of Articles Published in Scientific Journals of Persian Literature

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### Abstract

The present study analyses the status of researchers in the field of Persian Literature with a scientometric approach based on the articles of Persian journals in the field of Persian Literature and tries to determine the importance and influence of each of the authors and research institutions in the field of Iranian academic Persian Literature, provided the possibility of evaluating the previous scientific policies of the country in this field. In this research, first, the trend of the rise and fall of the number of articles and co-authorship patterns over time has been investigated and researchers with the largest number of articles have been identified. In the following, after the formation of the co-authorship network, the relationships and importance of authors in this field have been investigated. Observations indicate that the number of articles has grown greatly since the 2000. According to the present research, despite the increase in the number of three-person articles, the collaboration of two authors in writing articles is still considered the most common pattern of co-authorship. According to the results of this study, the scientific centre of Tarbiat Modares University and Institute for Humanities and Cultural Studies and the scientific centre of the

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University of Isfahan are the most influential research centres in terms of publishing scientific articles in the field of Persian literature in Iran.

**Keywords:** *Article co-authorship networks, scientific-research articles on Persian literature, co-authorship of Persian literature articles.*

### ***Extended Abstract***

#### **1. Introduction**

Scientific communication, which is possible through various methods, is considered one of the important bases of the social institution of science, and scientific progress is not possible without it (Riahi, 1995: p. 11). Scientific journals have a special place among the channels of scientific communication due to the speed of publication, periodicity, and quantitative and qualitative diversity, becoming a place to evaluate the scientific ability of researchers and scientists, as well as a symbolic role in the scientific expression of associations and scientific and research institutions (ibid: pp. 17-19). "Philosophical Transactions of the Royal Society" is considered to be the first scientific journal published in the world, which was published in 1665 (Mack, 2015: p. 1); However, the structure of articles and features of magazines have changed a lot over the years.

The history of the publication of scientific journals in Iran goes back to the year 1863 and the publication of the "Scientific Journal of the Government of Iran" (Hosseini Pakdehi, 1996: p. 31). The first literary publication of Iran is called "Bahar" by the initiative of Yussef Etesami (Dehbashi and Zahed, 2007), the first issue of which was published in 1910. In the period after 1965, the increase in the general level of literacy and the improvement of the economic situation was accompanied by an increase in the demand for scientific journals and their growth. Despite the ups and downs caused by political, social and economic factors, this process has continued until today (Zare, 1999: pp. 51 and 52). The digitalization of the processes and the reduction of the problems of paper publishing of magazines in recent years have also solved many problems of publishing specialized publications (Amini and Ghafari, 2016: p. 125).

Collaboration in writing scientific articles is one of the manifestations of scientific communication in scientific journals, which

is called co-authorship (Harirchi et al., 2007: p. 13). Researchers can share material and spiritual resources and use each other's experiences and facilities using co-authorship. Also, scientific collaborations allow researchers to conduct interdisciplinary research by combining the capabilities of different scientific fields and specialities and influencing each other's work (Soheili and Osareh, 2014: p. 352). However, some have distinguished between intra-organizational co-authorship, extra-organizational co-authorship and co-authorship in large research projects (Glänzel and Schubert, 2004: p. 258).

Co-authorship was first noticed in the social sciences, and then it spread to other fields as well (Hariri and Nikzad, 2011: p. 826). Collaboration in writing scientific articles has become common in recent years, both globally and among Iranian researchers (Didgah and Erfanmanesh, 2009: p. 86).

Based on co-authorship relationships, co-authorship networks of authors are formed. These networks are the "starting point for the analysis of co-authorship patterns in information science and epistemology" (Soheili and Osareh, 2014: p. 352) and are used to measure the level of cooperation between individuals, organizations, and different countries (Hariri and Nikzad, 2011: p. 826). These networks can be analysed by common methods in social network analysis and by using graph mathematical models. In Iran (ibid: p. 827) and especially in the field of classical humanities, little research has been done in the field of co-authorship. A more detailed examination of co-authorship networks can reveal the structure of the academic research and also the degree of influence of different people and organizations. Furthermore, it can help the policymakers in the country in evaluating previous decisions and making better and more accurate policy decisions; Therefore, deeper and more comprehensive research in this field seems necessary.

### **Research Question(s)**

What are the structure and attributes of the co-authorship network of authors in the field of Persian Literature?

Which researchers and scientific institutes are the most influential ones in the field?

### **2. Literature Review**

Among the types of networks investigated in bibliography and scientometrics, the investigation of scientific citation networks has got a long history; But until a few decades ago, less attention was paid to co-authored networks. In the mid-90s. And especially in 1960. (Glänzel

and Schubert, 2004: p. 257) Some researchers pointed out the possible importance of these networks, but practical research about these networks was not carried out until around 2000 and the emergence of online electronic bibliographies (Newman, 2004: p. 5200).

Since then, much research has been done in foreign scientific circles on co-authored networks. Newman (2004) reviewed the co-authorship networks of the MEDLINE Database, the Physics E-print Archive at Cornell University, and the databases of the Journal of Mathematical Reviews. He reported the average number of articles per author as a nearly similar value. Since the investigated datasets covered different periods, he concluded that the average number of articles by an author in each year is different in different fields, and he attributed this observation to the difference in the amount of co-authorship in different fields. Like some previous research, Newman has observed that the number of articles by each author follows a heavy-tail statistical distribution; This means that a small number of authors have written a large number of articles. But unlike many other social networks, these networks do not follow a power distribution.

Henriksen (2016) has concluded by examining the co-authorship relationships of more than 4.5 million articles registered on the Web of Science database from 56 different research fields of social sciences in a period of 34 years that the number of authors of each article has increased in recent years. He considered the reward system based on the number of articles common in academic systems, enabling research on a larger scale, increasing the mobility of researchers, developing communication and information technologies, and increasing the number of researchers, especially doctoral students, as the reasons for this. Henriksen believes that what used to be known as an informal collaboration between researchers is now considered formal collaboration. Specifically, he believes today's supervisors expect their students to be recognized as co-authors; While in the past, they were only acknowledged at the end of articles for similar contributions.

Henriksen believes that different methodologies lead to different patterns of co-authorship. In laboratory and scientific fields (such as psychiatry and developmental psychology), researchers collaborate in team projects and different tasks are assigned to different people; But in the fields where the construction of single theories and concepts are more common and are usually defined as the subgroup of humanities, there is less communication. Also, researchers who use quantitative research methods are more likely to be co-authors. The previous observations of Newman (2004) also indicated the difference in the

number of authors of each article between different scientific fields. According to his observations, most mathematical papers - as a theoretical discipline - had only one author; While four-fifths of biomedical articles - as a practical field - have been the result of research collaboration.

Glänzel and Schubert (2004) believe that research productivity increases with research co-authorship until the number of authors reaches a certain threshold, and then productivity decreases as the number of authors increases. They believe that this threshold is one of the special characteristics of each discipline. They also believe that co-authorship increases the number of citations an article receives and the number of citations an article receives. Furthermore, they have also investigated some characteristics of international co-authorship.

There has been less related research in Iran. By preparing a questionnaire, Harirchi and others (2007) have investigated some characteristics of the co-authorship relations of Iranian researchers who have had international co-authorship in the fields of physics, chemistry, and biology. They believe that international cooperation in Iran is much less than in other countries, and most international cooperation belongs to Iranians abroad. Also, many researchers have introduced their co-authors as spiritual collaborators (and not collaborators in the implementation of the research project).

Roshni and others (2013) have investigated co-authorship networks in the field of technology policy and management. It is noteworthy that the field was still very young at that time.

Farhangi et al. (2018) have reviewed 1931 articles related to mystical research that are indexed in the ISC database with scientometric criteria. It seems that by manually extracting citations among these articles, in addition to co-authorship relationships, they have also used scientific metrics such as the H-index to check the quality of the articles. Part of the reviewed articles in their research is common with the present work; However, the limited scope of their research, as well as the incomplete reference base of ISC, make it difficult to compare the results.

Rezaeenour et al. (2014) have investigated information technology co-authoring networks. Almost half of the co-authorship relationships of this network have been student-supervisor relationships. Also, most of the co-authors in this field have been intra-university. They have used the graph reduction technique to convert the connections between the authors to the scientific domains' connections.

Asadi and Saghafi (2012) have investigated co-authorship in the field of engineering. According to their observations, the most common pattern of co-authorship was articles with two authors.

Other articles such as Zangishe et al. (2015), Sattarzadeh et al. (2016) and Ziaei (2020) have investigated the co-authorship networks of Iranian researchers in single or multiple specific domains.

Researches such as the articles of Davrpanah (2008), Hassanzadeh et al. (2008), Didgah and Erfanmanesh (2009), Hariri and Nikzad (2011) and Erfanmanesh et al. (2017) investigate international aspects of co-authorship of Iranian researchers. Their results cannot be compared to the results of the present research, because it is not possible to generalize them to the articles of a specific field, especially in a field where the majority of the articles are published in Persian journals.

Some other articles, such as Soheili and Osareh (2014), Geraei and Basirian Jahromi (2013), Alizadeh and Janalizadeh Choobbasti (2015), and Erfanmanesh and Morovati Ardakani (2016), have investigated co-authorship networks in one or more specific journals. The results of this research cannot provide a comprehensive representation of the co-authorship networks of a scientific field and cannot be compared with the results of the present work.

Articles such as the writings of Asadi and others (2013), Salehi and others (2015) and Asadi and Ferouni Shamili (2016) have also investigated the co-authorship networks of researchers of one or more universities or specific research institutions. The findings of Asadi and Ferouni Shamili (2016) indicate that the amount of scientific production in humanities research institutes has a direct relationship with domestic collaborations and an inverse relationship with international collaborations.

Other articles have also been conducted in the field of scientometrics of literature. Ahmadi et al. (2013), Reza Gholi Famian (2014) and Naderi et al. (2021), respectively, have investigated the themes of articles in the fields of comparative literature, linguistics and a journal of Arabic language and literature.

Davarpanah (2007) in addition to a case study of a journal, has examined some challenges of scientometric analysis in Iranian humanities. He believes that the humanities are traditionally book-centred and that any type of article-based citation analysis is likely to be based on at most 30% of cited sources. He also believes that common scientific citation indices such as the Impact Factor (IF) are not suitable for measuring the quality of articles in this field; Because the research in humanities usually relies on old sources. Furthermore, he has also

pointed to the more individualistic nature of the humanities. Research several years later by Jafari and Goltaji (2009) shows a change in the behaviour of humanities researchers in Iran and more citations to articles (Jafari and Goltaji, 2009: p. 115).

### **3. Methodology**

To investigate the co-authorship network, the articles published in Persian-language scientific journals in the field of Persian literature were examined. After removing journals related to the fields of linguistics, translation, foreign languages, and philosophy from among the 68 Persian-language journals listed under the "Humanities" group and the "Language and Literature" subgroup in the "Scientific Journals Portal" of the Ministry of Science, Research, and Technology, 46 journals remained. By adding to the list the special issues of "Nameh Farhangestan" and the old magazines of the faculties of literature and humanities, whose main alternative publications were in the aforementioned list, the length of the list reached 61.

In order to collect data, it was first tried to use the information available on the journals' own websites; But these websites were very incomplete and did not have bibliographic information of many articles. Therefore, the articles' information was collected automatically from "Noor Specialized Magazines (Noormags)". Due to technical limitations, the collected information only included the publication's specifications, the article's title, and the authors' names. In cases where Noormags did not have some journal issues or did not index the journal, "Iran Journals Database (Magiran)", "Comprehensive Humanities Portal", "Scientific Information Database (SID) of Academic Center for Education, Culture and Research" and "Islamic World Science Citation Center (ISC)" as well as the websites of the publications themselves were referred to.

Before data analysis, the collected data had to be cleaned. The names of the authors were recorded in different ways by different sources. Due to the specific requirements of the problem, it was not possible to use common automated and regular methods of data cleaning. To solve the problem, a number of heuristic automatic transformations and some semi-automated methods were used to ensure the correctness of the attribution of the articles to the authors, at least about the most important authors.

In this research, some common methods in scientometrics, social network analysis, big data analysis, and graph theory were used to

analyze articles in the field of Persian literature and the co-authorship network of their authors.

First, the number of articles of each author was extracted and the authors with the most articles were identified. The number of authors' articles was modelled with the statistical distribution of Lutka's law, and according to the suggestion of Potter (1981), the appropriateness of the proposed statistical distribution was checked with the Kolmogorov-Smirnov test. Some other statistical calculations were also done, especially regarding the changes in the number of articles and co-authorship patterns over time.

To investigate the co-authorship network, a weighted graph of co-authorship relationships between authors was formed. In this graph, each node represents an author and the existence of an edge between two authors means their co-authorship in the same article. The number of shared articles between two people determined the weight of the edge between them.

NetworkX (Hagberg et al., 2008) and Gephy (Bastian et al., 2009) tools were used to investigate the graphs. OpenOrd algorithm (Martin et al., 2011) was used to arrange the nodes. Louvain method (Blondel et al., 2008) was also used for graph clustering.

### **Results**

The co-authorship network of the authors of authoritative Persian-language scientific journals in the field of Persian literature is in many ways similar to the co-authorship networks of similar age. The analyses show the characteristics of a scientific field with an old tradition of essay writing, which, like other global research fields, has turned to co-authorship, although perhaps a little later.

Essay writing in Persian literature has had an upward trend despite the ups and downs caused by political, economic and social events. Various scientific policies of the Ministry of Science, Research and Technology, along with factors such as the increase in public literacy, the growth of higher education in the country and the development of new communication technologies, have brought about the growth of the number of articles and also the increase of co-authorship. Two-person co-authorship has been the most common pattern of writing articles in the last decade; This pattern is expected to give way to three-person co-authorship in the next few years. Co-authorship relationships with more than five people have been rare in this field.

The analysis of the organizational affiliations of authors with the largest number of published articles, along with the analysis of the



network of co-authors and its centrality measures, indicates that although researchers from different universities of the country are present among the most active and influential authors in this field, the scientific centre of Tarbiat Modares University and Institute for Humanities and Cultural Studies and the scientific centre of the University of Isfahan are the most effective centres of academic literature in Iran.

The educational groups of some universities have managed to form a kind of scientific hub by cooperating with each other. The scientific centre of the University of Isfahan University centred on "Hossein Aghahosseini", "Eshagh Toghiani", "Ali Asghar Mirbagheri-Fard", "Mehdi Nourian", etc., the scientific centre of Ferdowsi University of Mashhad centred on "Mohammad Jafar Yahaghi", "Abolghasem Ghavam" and "Mahdokht Pourkhaleghi", the scientific centre of the Bahonar University of Kerman centred on "Mohammed Reza Sarfi", "Mohammad Sadegh Basiri" and "Ahmad Amiri Khorasani", and the scientific centre of Payame Noor University centred on "Fateme Kopa", "Mostafa Gorji" and "Ali Mohammad Poshtdar" are some of the big scientific centres formed in the academic space of Persian literature. It seems that famous universities such as University of Tehran and Allameh Tabatabai University, despite having professors such as "Ali Mohammad Moazeni", currently do not have a central position in the academic Persian literature of Iran.

But the most important of these scientific centres is the scientific centre, consisting of the researchers of Tarbiat Modares University and the Institute for Humanities and Cultural Studies. "Hossein Ali Ghobadi", as a researcher from Tarbiat Modares University and the head of the Institute for Humanities and Cultural Studies, is at the head of a scientific centre with the presence of researchers such as "Nasser Nikoobakht", "GholamHossein GholamHosseinZadeh", "Taghi Pournamdarian", "Saeed Bozorg Bigdeli", etc. and using the capacities of both research centres is at the heart of Iranian academic literature. The extensive cooperation of these two research centres (Asadi and Feroni Shamili, 2016: p. 78), the extensive external connections of the professors of these two centres and especially the Institute for Humanities and Cultural Studies with other research centres, the employment of many old graduates of Tarbiat Modares University as members The scientific faculty of prestigious universities across Iran and the focus on the research and higher education are possible reasons for the success of this scientific hub.

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