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Factors related to the international research collaboration in the health area: A qualitative study

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Abstract:

BACKGROUND: International research collaboration (IRC) is known as one of the important indicators of productivity, efficiency, and validity of universities in the world. In other words, IRC is necessary for the scientific trade-off between researchers in international scientific societies. The study aimed to address the experiences of an academic researcher about factors related to IRC.

MATERIALS AND METHODS: The present study was conducted using a qualitative approach and conventional content analysis method. The participants consisted of 19 experienced faculty members and researchers from Isfahan University of Medical Sciences, who were selected based on the purposive and snowball sampling techniques. Data were collected through semi-structured interviews and were analyzed using the content analysis technique. Guba and Lincoln's evaluative criteria, including credibility, confirmability, dependability, and transferability, were applied to evaluate the trustworthiness of the study.

RESULTS: According to the research findings, factors of "personal skills," "personality," "professional position," and "scientific activities" under the category of personal factors; "rules and regulations" and "equipment and facilities" under the organizational factors; and "domestic policies" and "foreign policies" were identified under the government factors category.

CONCLUSION: Research collaborations are influenced by individual, intra-academic, and extra-academic factors; thus, research policymakers can help further to enhance the quantity and quality of scientific output and promote the university's placing in international rankings through providing conditions that enable international interactions.

Keywords:

International research collaboration, international scientific collaboration, Isfahan University of Medical Sciences, researcher, scientific production

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Introduction

Scientific collaboration is a social phenomenon that has become important since 1960[1] with the development of universities and putting attention toward the importance of higher education.[2] This phenomenon consists of interaction between two or more researchers in scientific societies to satisfy specific duties and achieve a common goal.[3] In other words, scientific collaboration is the result of a phenomenon called "professionalization of science"[4] to bring together several scientists from different fields of study.[2]

The scientific collaboration includes people from different nationalities as well as people with similar nationalities living in different countries or those working in the same field of study.[5] Therefore, the geographical and political borders have faded due to huge daily improvements in information and communication technologies,[6] and international scientific collaboration has gradually become the main topic in research-related international policy.[7]

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Nowadays, international scientific collaboration has expended through collaborative research, scientific conferences, and international journals,[8] and many countries internationalize their scientific communication to increase their international research collaboration (IRC).[9] Since IRC can contribute to generating innovative solutions for increasing globalized problems[10] and improve the competitiveness of individual scientific research,[7] it is seen as one of the important tools to build research capacity and create learning opportunities for researchers that governments and international organizations allocate them significant properties to promote international research activities.[11]

Despite the importance of IRC and related factors, there few studies have been done on the factors affecting IRC improvement, and some studies have reported activities and obstacles for international scientific collaboration. According to Hara *et al*., personal compatibility, work connections, motivation, and social-technical infrastructures affect collaboration among scientists.[12] Systematic insights into the social and intellectual processes of academic collaborative writing are the keys to successful international collaboration.[13] Tabatabaee also presented few approaches, including a macro approach (policy orientation), mid-range approach (international approach to higher education), and micro approach (universities executive actions) for enhancing international cooperation in higher education systems.[6] Furthermore, according to Riahi *et al*., political variables that are the most important cultural variables are the least influential obstacles for international academic collaboration.[14] Heidari-Abdi showed that international scientific cooperation is the most important tool for the development of international collaboration.[15] Mohseni and Bozeman *et al*. also presented a model to improve the level of international scientific collaboration.[1,16] Recently, Wagner *et al*. showed that the novelty in the research articles published based on international collaboration is significant.[17]

This literature highlights the crucial role of IRC as an indicator of the productivity, efficiency, and validity of universities in the world, which can improve the abilities and performance of scientists. Nevertheless, this raises the questions of "how some researchers have more IRC than other people" or "which set of factors could contribute to improving IRC?" Therefore, the present study aimed to address the academic researchers' experiences about factors related to IRC. This enables us to provide universities with the requirements for the development of international scientific and research relationships while identifying the relevant factors and obstacles.

Materials and Methods

This study was performed using qualitative approach and conventional content analysis method. Since this problem includes hidden aspects for researchers and policymakers, a qualitative approach is much more efficient in discovering the hidden aspects compared to a quantitative approach. Qualitative content analysis is a research technique used to interpret text data through a systematic classification process of coding and identifying themes.[18] The interviewees were mainly faculty members and researchers from Isfahan University of Medical Sciences, who had valuable experiences in international collaboration

Table 1: The Characteristics of the interviewees

Participant	Faculty	Job	Experience (years)
1	School of Management and Medical Information Sciences	Faculty member and manager	17
2	School of Advanced Medical Technology	Faculty member	17
3	School of Nursing and Midwifery	Faculty member	19
4	School of Medicine	Faculty member	16
5	School of Pharmacy and Pharmaceutical Sciences	Faculty member and manager	28
6	School of Pharmacy and Pharmaceutical Sciences	Faculty member and chief editor	22
7	School of Rehabilitation Sciences	Faculty member and president	18
8	School of Dentistry	Faculty member and president	19
9	School of Nutrition and Food Sciences	Faculty member and chair man	22
10	School of Medicine	Faculty member	14
11	School of Dentistry	Faculty member and chair man	19
12	School of Dentistry	Faculty member and chief editor	18
13	School of Advanced Medical Technology	Faculty member and chair man	15
14	School of Medicine	Faculty member and chief editor	27
15	School of Pharmacy and Pharmaceutical Sciences	Faculty member and chief editor	17
16	School of Medicine	Faculty member and president	19
17	School of Health	Faculty member	10
18	School of Medicine	Faculty member and chair man	25
19	School of Management and Medical Information Sciences	Faculty member and manager	18

and cooperative activities [Table 1]. The purposive sampling and snowball approaches were applied to identify the study participants from November 2017 to September 2018. The inclusion criteria were expertise in international collaboration publications and willingness to contribute to the study. The exclusion criteria were participants' unwillingness to continue cooperation in the study.

The semi-structured interviews were used for the data collection, all of which conducted by the first author based on an interview guide designed by the research team. Before performing the primary interviews, one pilot interview was performed by the supervisory team to adjust the accuracy of the questions. The interview started with an open question to improve communication and build trust between the interviewer and interviewee. An example of such a question is: "Could you please explain what factors did you experience that contribute to increased international collaboration?" Furthermore, to clarify the concept of participants' responses, they were asked to provide suitable examples of their own experiences. Interviews continued until the data saturation. Finally, 19 interviews lasted between 30 and 90 min were conducted for this study and were recorded using a voice recorder with the interviewees' consent.

The qualitative content analysis method was used for the data analysis, which involves different steps. First, each interview was recorded, and every single word or every single sentence was transcribed. The transcripts were typed and stored on a computer. Second, transcripts were reviewed several times to reach a full understanding of the texts and comprehend the general sense of the interviews. Third, the data were divided into meaning units (codes) in the format of words, sentences, or paragraphs. Then, the meaning units were reviewed several times until the appropriate codes were identified. In the last step, subcategories were summarized and merged. Finally, the main categories were specified. Data were coded using the MAXQDA-10 software program developed by the VERBI software group.

The four trustworthiness criteria of credibility, confirmability, dependability, and transferability suggested by Lincoln and Guba were used for assessing the quality of the current qualitative study.[19] Credibility was ensured with the researcher's prolonged engagement in the research subject and continuous interaction with the participants. It facilitated attracting the participants' trust and achieving a better understanding of their experiences. Furthermore, re-interviewing some of the participants about the collected data was effective in evaluating the data credibility. For ensuring the confirmability of the research, parts of the text of the interviews, along with the codes and categories extracted for evaluation, were provided to three people outside the research and familiar with the qualitative research method. The dependability of the research was ensured through the implementation of interviews as soon as possible, accurate recording of all stages of the research, and providing a similar situation for the participants. Moreover, to increase the transferability of the findings, we have tried to a diverse variety of participants in terms of research experience, working background, and education program. Finally, the extracted codes and classes were observed by three experts to ensure the accuracy of the procedure.

This study was approved by Isfahan University of Medical Sciences according to the ethics committee reference number IR.MUI.REC.1396.3.296. Before conducting interviews, the participants were provided with the necessary information, assured of anonymity, the way of recording interviews, data confidentiality, and the rights to withdraw from the study at any desired time, and then, their written informed consent was obtained for participation in the study as well as using the audio recorder. In addition to complying with privacy principles, a numeric code was also assigned to each participant, and the data were reported in a way that individuals could not be identified.

Results

Nineteen interviewees participated in the present study, whose personal characteristics such as faculty, job, and experience are described in Table 1. The findings were classified into three main categories, including personal, organizational, and governmental factors [Table 2].

Personal factors

The personal factors were determined as the most crucial factor affecting IRC according to the participants' experiences. According to interviewees, personal factors include four categories of personal skills, personality, professional position, and scientific activities, which are discussed as follows:

Personal skills

It was demonstrated that the main differentiating factor between researchers is their skills, which lead to an increase in IRC activities. According to the participants' experiences, personal skills include the ability to speak and write in English, academic writing skills, use of electronic communication tools, and practical international communication skills. These points were addressed by interviewee No. 17:

"Some people are working well, but they are not good at presenting their work in English. This causes them to be less cooperative because they do not have an acceptable level of English speaking and writing skills. When you want to

Table 2: Factors related to the international research collaboration

Codes	Subcategory	Categories
English speaking and writing	Personal skills	Personal factors
Academic writing		
Use of electronic communication tools		
Predominate international communication skill		
Being interested in IRC	Personality	
Being responsible		
Being collaborative		
Being self- confident		
Managers of international communication	Professional position	
Reviewers, chief editors and members of editorial board of international journals		
Participating in scientific conferences	Scientific activities	
Membership of scientific associations		
Education in well-ranked universities abroad		
Participate in academic social network		
Having a personal web page		
Having defined research of interest		
Agreements between universities	rules and regulations	Organizational factors
Providing sabbatical or visiting fellow		
Providing facilities related to common research		
Encouraging researchers for collaborative works		
Promoting university's international ranking		
Writing theses or publication in English		
Access to merit databases	Equipment and facilities	
Appropriate media infrastructure		
Credit card for international payments		
Creating an online research repository		
Build international universities	Domestic policies	Government factors
Increasing the number of international students		
Considering the experiences of successful countries		
Correcting declarative regulations		
Use of merited and experienced managers		
Scientific bans	Foreign policies	
Friendly relationships with other country		

IRC=International research collaboration

collaborate with another scientist, it is required to be good enough at English."

"I think the internet and social media indirectly help IRC. For example, you will be able to find research centers, researchers of interest, and their contact information to call or E-mail them. These are very effective." (interviewee No. 3).

Personality

Personality and social characteristics were other factors affecting communication in a scientific society. Personality was described as being interested in IRC, being responsible, being well self-confident, and being collaborative. Supporting this statement, stated that:

"Personality is a significant factor. Personal characteristics should be suitable for good communication, and this means being collaborative and being brave and ready for teamwork." (Interview No. 6.

"If you add someone in your paper as a gift or a ghost author, first, it is not ethical, and second, these people won't accept this offer because they are famous enough, and they care about the research being ethical." (interviewee No. 7).

Professional position

It was shown that the professional position provides researchers with valuable international opportunities. In other words, responsibilities related to the job position provide researchers with opportunities to increase IRC. Job positions consist of two main categories: (1) international communication managers and their staff members linked to the university and (2) reviewers, chief editors, and editorial boards of international journals. These categories contribute to findings and contact researchers of interest.

"When I was abroad, I had more scientific communication or collaboration than when I was in Iran, in particular, when I was working as an international communication manager. This position helped me to be in contact with many scientific people, and it gave me the chance to improve my connections." (interviewee No. 5).

"Chief Editor and reviewers for international journals helped me to improve collaboration because those people have many experiences, and they can find each other and work together easily." (Interview No. 9).

Scientific activities

According to the participants' experiences, IRC is a scientific goal that requires targeted actions and activities that are associated with collaboration, scientific communication, and contact with local and international scientists. These factors allowed us to gain a better understanding of the researcher's area of interest using methods and tools for the distribution of knowledge. Scientific activities include participation in scientific conferences, membership in scientific associations, graduating from well-ranked universities abroad,

participation in academic-social networks, having a personal web page, and research of interest (research map).

"I spoke at a conference in Abu Dhabi branch of New York University related to NCD degausses. I received some collaborative offers that later helped me to complete my three projects." (interviewee No. 17).

"An international communication can start in many ways; for example, I was a Ph. D. student at the University of Alberta and thus professors and I were classmates yet colleagues at the same university. Well, I believe that if you have been abroad in a scientific society for a while, then, of course, you all are colleagues and you will publish some common papers." (interviewee No. 15).

"I think, for us to be seen, we need to be active in academic-social networks." (interviewee No. 6).

Organizational factors

Organizational Factors include two categories of "cross-departmental rules and regulations" and "equipment and facilities."

Rules and regulations

Rules and regulations can affect IRC at international levels. Cross-departmental rules and regulations include an agreement between universities, sabbatical or visiting fellows, facilities for collaborative researches, awards for collaborative publications, writing theses or dissertations in English, and improvement of university's international ranking.

"Face to face communication is significant. Some of these communications are known as visiting fellows, and this means you can go and work there. Also, a 3-or 6-month period sabbatical facilitates better international communication for researchers." (interviewee No. 1).

"I believed that the university's ranking is more important than other factors for IRC improvement. Because the more famous the university is, the more likely it is for scientists to be more attracted to work there." (interviewee No. 19).

"Universities should encourage their scientists to have results and improved output such as higher publication with better quality. It is worth mentioning that encouragement is not only to say "good job," it has to be also financially supported by universities." (interviewee No. 2).

Equipment and facilities

IRC improvement depends on the equipment and facilities for more convenient scientific communication. Access to online research repositories and informal database for statistics and reports, video conference recordings, unlimited access to online databases, and a credit card for international payment are among these facilities. Some of the opinions and experiences of participants in this regard are as follows:

"The university has to provide sufficient infrastructure and facilities for researchers. With this, faculty members can properly do their researches without being concerned about the resources required for their research." (interviewee No. 19).

"One of the main concerns is to not have a Master Card for online registration or payment for publications and similar stuff. It was unbelievable for other people when I said I could not book the hotel or pay for registration." (interviewee No. 9).

Government factors

Domestic policies

The most important domestic policies of countries, which can improve IRC, include building international universities, an increase in the number of international students, taking advantages of experiences of successful countries, modifying the declarative regulations, and use of merited and well-experienced managers. These data were collected based on the interviewees' opinions, as described below:

"We do not have enough collaboration because we are not good managers to build international collaboration. Honestly, our communication should be better than what we already have. It seems we should improve our management to be more practical and make stronger communications." (interviewee No. 11).

"More communication with other countries will help us to take advantage of their experience and facilities to overcome our obstacles." (interviewee No. 1).

Foreign policies

Interdictions or international sanctions were observed to be one of the crucial foreign policies affecting IRC. Interdictions and international sanctions are a consequence of the challenges or battles between governments, resulting in a negative impact on IRC. Interviewee No. 19 addressed a statement supporting this fact as follows:

"In my opinion, international sanctions can result in changing other people's opinions about us. For example, we might have had a work offer from one country, but it won't occur because that country won't take that risk of working with us due to heavy penalties and consequences of working with us."

Another foreign policy factor is friendly international relations. Friendly international relations are known to be paramount to success in scientific society and the relationship improvement between countries. Friendly international relations have advantages such as facilitating the visa process, improving international communications, and facilitating the fund transfer and

traveling and safety improvement. Interviewee No. 4 addressed this fact as follows:

"We need a modification on governmental regulation to improve international communication, and this means that when I want to go abroad, I will be able to get a visa easily. I should not feel upset and humiliated and give up. Therefore, improving international communication is very important."

Discussion

The present study aimed to address the academic researcher's experiences about factors affecting IRC promotion. This article contributes to getting a better understanding of the factors that increase IRC between researchers. The findings were categorized into three main categories, including personal, organizational, and governmental factors. One of the main results is that personal skills affect IRC significantly. Similar to our findings, personal skills such as English speaking and writing, academic writing, use of electronic communication tools, and practical international communication skills are considered among the crucial factors affecting IRC.[8,13,20-22] The aforementioned skills contribute to finding scientists, contact relevant scientific researchers of interest, and exposing scientific works. Furthermore, the personality traits of the researcher, including being interested in IRC, being committed to responsibilities, and being collaborative, can have a promising effect on IRC.[1,7,12,23] Besides, another personality factor found in the current study was self-confidence that was not investigated in previous studies. To the best of our knowledge, researchers should be committed to following professional ethics and must be respectful to other researchers' beliefs during collaborative researches. Unanimous decisions should not be made in collaborative research without the agreement of all group members because their collaboration is necessary for the success of the research project. Four careers play crucial roles in the IRC success, including international communication managers, journal reviewers, journal chief editors, and editorial board members.[24-26] These professional positions not only contribute to introducing researchers with the same area of interest to each other but also provide researchers with a wide range of possibilities to promote international networking. As argued by different authors, scientific activities including participation in scientific conferences, membership in scientific professional associations, participation in workshops and training programs held in high-ranking universities, participation in academic-social network sites, has a personal web page, has clearly stated, and specific interest in a field of research could improve IRC,[27-29] leading to promote advantages in scientific activities by providing researchers with the most recent relevant findings from around the world, allowing long-range contacts between researchers, and creating a good understanding of an area of study.

It is a well-documented fact that cross-departmental rules and regulations can play a significant role in accelerating or decelerating IRC.[6] Examples of an accelerating effect include the agreement between universities, providing sabbatical or visiting fellows, providing facilities related to common research, encouraging researchers to participate in collaborative works, and improving the university's international ranking.[6,11,24,30-33]

Besides the aforementioned component of cross-departmental rules and regulations, findings also indicate that publishing the dissertation in English is another factor in accelerating IRC for non-English-speaking researchers. Furthermore, IRC is not possible without adequate government supports. There are some regulations that result in the IRC deceleration in Iran. For instance, the higher profit of a self-authorship compared to co-authorship, ascending order profit for authors and co-authors, and unfair allocation of profit between the first author and co-authors all reduce the desire for co-authorship among researchers. Therefore, the modification of these declarative regulations is required to promote IRC in countries similar to Iran. Facilities and equipment are other components of organizational factors that include access to merit databases, an appropriate media infrastructure, and a credit card for international payments.[5,12,14,24,34] These factors can facilitate information needs, communication improvement, as well as the support of international communication expenses. It is also worth mentioning that without novel information technology and financial support, the real success of international collaborative research is not guaranteed.

The government factors consist of two parts: domestic policies and foreign policies. Several domestic policies including building international universities, increasing the number of international students, considering the experiences of successful countries, amending regulations, and using merited and experienced managers are needed to maximize the benefits of international communication between international organizations.[14,35-37] Foreign policies consist of two categories: scientific interdictions and friendly relationship. Currently, IRC is decreasing due to increased challenges because of international interdictions and sanctions.[24,14,38] On the other hand, friendly relations with other countries facilitate international communication in cases such as issuing visas for international conferences and fund transfer for international researchers. Therefore, a friendly international relation is needed to improve IRC. This article has some limitations, generally the following

two points. First, the scope of this study is the Isfahan University of Medical Sciences, and this result may not be generalizable to the broader population. Besides, subsequent and affecting factors of this article require further research.

Conclusion

One of the most significant steps in the way of achieving scientific development is to expand scientific interactions and carry out joint research projects at an international level. The findings of the present study indicated that IRCs are affected by various indicators such as individual, intra-university, and extra-university factors. Based on the importance of international scientific interactions in the quantitative and qualitative promotion of research activities, research managers and policymakers can utilize the findings of the present study to expand the basis which is required for international scientific cooperation for both faculty members and higher-education students alike and consequently improve the quality of their scientific products and make possible the promotion of the university's position in international rankings. Managers can also expand the scope of IRCs by reviewing research rules, creating research services, supporting sabbatical leave, observation training courses, and attending international conferences. Furthermore, future research can also compare the impact of scientific collaborations with various countries and scientific institutions on improving the quality of research activities in addition to assessing the cost-effectiveness of such international interactions.

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Conflicts of interest

There are no conflicts of interest.

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