

Obstacles to undertaking research and their effect on research output: a survey of faculty members' views at Shiraz University of Medical Sciences

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عوائق إجراء البحوث وتأثيراتها على نتائجها: مسح لآراء العاملين في كلية العلوم الطبية في جامعة Shiraz
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الخلاصة: إن تحسين جودة البحوث تقتضي فهم عوائق إجراء البحوث. وتهدف هذه الدراسة إلى (1) التعرف على عوائق البحوث كما يراها العاملون في كلية العلوم الطبية في Shiraz؛ (2) الفروق بين آرائهم بحسب الجنس والمتغيرات المهنية، (3) تأثير العوائق على أنشطة البحوث. وقد أخذ الباحثون في الحسبان ستة أنماط من العوائق هي المالية، وذات الصلة بالمرافق، والعوائق المهنية، والإدارية - التنظيمية، والعلمية، والشخصية. وتألقت عينة الدراسة من 240 مشاركاً تم انتقاؤهم من 550 من العاملين في الكلية. وجمع الباحثون المعطيات بواسطة استبيان يملأ ذاتياً، ووجدوا أن معدل الاستجابة 91٪، وأن جميع الأنماط الستة من العقبات ينظر إليها معظم المستجيبين للدراسة على أنها تؤثر على أنشطة البحوث؛ إلا أن 90٪ منهم قد حددوا العوائق المالية. وكان هناك فروق واضحة بسبب اختلاف الجنس والدرجة العلمية ومجال الدراسة، وتحمل مسؤوليات تنفيذية، دون أن يشمل ذلك فترة الخدمة في العمل. ورغم وجود هذه العوائق المتعددة أمام إجراء البحوث فإن المستجيبين للدراسة لم يعتقدوا بأن نتائج البحوث قد تأثرت.

ABSTRACT To improve the quality of research, it is necessary to understand the obstacles to undertaking research. This study aimed to identify: i) internal obstacles to research as considered by faculty members at Shiraz University of Medical Sciences; ii) differences between their viewpoints by gender and professional variables; and iii) the effect of these obstacles on research activity. Six types of obstacle were considered: financial, facility-related, occupational, managerial-organizational, scientific and personal. The study sample consisted of 240 participants selected from all 550 faculty members of the University. Data were collected by self-administered questionnaire; the response rate was 91%. All 6 types of obstacle were considered to affect research activities by most of the respondents, with 90% identifying financial obstacles. There were significant differences by gender, scientific rank, field of study, and holding executive responsibilities but not for durations of work experience. Despite these numerous obstacles to conducting research, respondents did not think their research output was affected.

Obstacles à la conduite d'une recherche et leur effet sur le résultat de la recherche : enquête sur les points de vue des membres du corps enseignant de l'Université des Sciences médicales de Chiraz

RÉSUMÉ Pour améliorer la qualité de la recherche, il est nécessaire de comprendre les obstacles à la conduite d'un tel travail. La présente étude visait à identifier : i) des obstacles internes à la recherche du point de vue des membres du corps enseignant de l'Université des Sciences médicales de Chiraz ; ii) des différences entre leurs points de vue en fonction des sexes et des variables professionnelles ; et iii) l'effet de ces obstacles sur l'activité de recherche. Six types d'obstacles ont été étudiés : les obstacles d'ordre financier, professionnel, gestionnaire ou organisationnel, scientifique et personnel et en relation avec l'établissement. L'échantillon de l'étude comptait 240 participants qui avaient été sélectionnés parmi les 550 membres du corps enseignant de l'Université. Les données ont été recueillies par auto-questionnaire ; le taux de réponse était de 91 %. La plupart des répondants considéraient que les six types d'obstacles influaient sur les activités de recherche, et 90 % avaient identifié les obstacles financiers. Les différences entre les hommes et les femmes, le grade scientifique, les domaines d'études et le fait d'avoir des responsabilités de direction étaient significatives, contrairement aux années d'expérience professionnelle. En dépit de ces nombreux obstacles à la conduite d'un travail de recherche, les répondants ne pensaient pas que les résultats de recherche étaient affectés.

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Introduction

Research is one of the main foundations of sustainable development, and the long-term development of research policies without a comprehensive research system is simply not possible [1–3]. Research is so important that indices such as the national investment in research, the number of researchers referred to the total population and the number of published papers are considered criteria in judging a country's progress [3].

The number of publications from the Islamic Republic of Iran has grown from just 736 in 1996 to 13 238 in 2008 [4]; however, the country's participation in global knowledge production has not been satisfactory in terms of published papers. Furthermore, in 2005 the average participation of the Islamic Republic of Iran in knowledge production was only about 0.2%, although this country is home to about 1.0% of the world's population [5]. This implies that to reach the world average in research and knowledge production, the Islamic Republic of Iran should consider strategies to increase its output, such as recruiting skilled human resources, enhancing scientific culture and infrastructure, preparing suitable research tools, and investing in targeted research fields. Lack of financing and resource distribution are key barriers to researchers in all developing countries. The research budget in a typical developed country falls somewhere between 3% and 5% of the GNP [6], whereas in the Islamic Republic of Iran it ranges from 0.2% to 0.4% of the GNP [7,8]. Official bureaucracy, the quantitative orientation of research evaluation, and biases in judging research projects are other obstacles to carrying out research [3].

Lack of interaction and a common language between researchers and scientific policy-makers is another challenge in research, which can undermine the efficient application of research results [9–11]. Majumdar investigated the causes of the inapplicability of medical

research in Asian countries [12]; one of the main causes identified was the incongruity between research and the actual needs of these communities.

The greatest barriers to involvement in research in medical schools according to Siemens appear to be time, availability of research mentors, formal teaching of research methodology and the perception that the student would not receive appropriate acknowledgement for work put towards a research project [13].

Uncovering obstacles to research is an important first step towards improving the quality of research. Therefore the research we report here was designed to identify internal obstacles to research activities at a large medical university in the Islamic Republic of Iran in 6 fields: financial, facility, occupational, managerial–organizational, scientific and personal. This paper attempts to answer 3 major questions:

- What are the main inter-organizational obstacles to research activities as seen by faculty members?
- Do the viewpoints faculty members about obstacles affect the quantity of their research?
- Are there differences in the viewpoints of faculty members associated with gender, scientific rank, field of study, executive responsibilities and duration of work experience?

Methods

Study sample

This study was a descriptive cross-sectional survey conducted in 2008. The study population was the 550 faculty members of the 8 schools and 15 research centres of Shiraz University of Medical Sciences. The study sample consisted of 227 participants selected from the 550 faculty members by stratified random sampling. We had to select all of the academic staff of some faculties as they had only few such

staff (for example the school of health services management); as a result the final sample increased from 227 to 240 participants.

Data collection

Data were collected by a self-completed, anonymous questionnaire in Farsi devised by the authors. The instrument consisted of 46 closed-ended items, demographic and occupational items, and 3 open-ended items. The responses to the closed-ended questionnaire items were chosen from a 4-point Likert-like scale where 4 = agree, 3 = agree somewhat, 2 = disagree somewhat and 1 = disagree.

The respondents were asked about 6 types of inter-organizational obstacles to research activities: financial, facility-related, professional, scientific, personal and managerial–organizational.

Internal and external validity of the questionnaire were confirmed by review of the relevant scientific literature and review by 15 faculty members from the different schools and centres. The Cronbach alpha coefficient for reliability of the questionnaire was 92.8% based on a pilot study with faculty members.

Questionnaires were distributed to all 240 participants by one of the researchers who explained the purpose of the study to them.

Analysis

The analysis of the data was intended to answer 3 basic questions about the influence of obstacles to research on faculty members' research activity. To test the first question, the single-sample *t*-test was used. The second question assessed the effect of faculty members' viewpoints on the quantity of their research activities and there was more than 1 dependent variable (number of papers and research projects). As the variables may have interacted, MANOVA (multivariate analysis of variance) with Wilks' index was therefore used. Independent-sample *t*-tests, one-way ANOVA and the Tukey test were used for the third question.

SPSS, version 15 was used for data analysis.

Results

Of the 240 questionnaires distributed, 218 were returned fully answered (response rate 91%).

The demographic characteristics of the sample are shown in Table 1. Just over half were male (53.3%), the greatest proportion were assistant professors (44.1%); 5.6% were professors. The majority were in the medical or paramedical field (72.4%) and the greatest proportion were in the faculty of medicine (37.4%) followed by nursing/midwifery (13.2%). Just under half had executive responsibilities (46.3%) and 40.2% had less than 10 years' work experience while 39.3% had 11–20 years.

With regard to the main inter-organizational obstacles to research activities, all 6 types of obstacles were reported (financial, facility-related, professional, scientific, personal, managerial–organizational) ($P < 0.01$). Table 2 shows the average percentage agreement scores for each question. The highest average agreement score was found for the financial domain and the lowest for scientific factors.

To elucidate whether faculty members' viewpoints about obstacles affected the quantity of their research, agreement rates were analysed with Wilk's lambda index. The results showed that in the faculty members' views financial obstacles had a significant effect on their research output ($P < 0.03$) while facility, professional, scientific, personal and managerial–organizational obstacles had no influence ($P > 0.05$) (Table 3).

The analysis of third question sought association between faculty members' viewpoint and their gender, scientific rank, field of study, executive responsibilities, and work-experience. There were significant differences by sex, scientific rank, faculty, field of study

Table 1 Demographic characteristics of faculty members of Shiraz University of Medical Sciences who completed the questionnaire

Characteristic	% (n = 240)
Sex	
Male	53.3
Female	46.7
Scientific rank	
Lecturer	32.2
Assistant professor	44.1
Associate professor	18.1
Professor	5.6
Field of study	
Surgeon	15.0
Non-surgeon physician	16.3
Medical basic sciences	34.4
Paramedical	16.7
Non-medical fields	17.6
Faculty	
Medicine	37.4
Dentistry	9.7
Pharmacy	7.0
Nursing and midwifery	13.2
Rehabilitation	4.4
Paramedicine	10.2
Health and management	9.7
Other research centres	8.4
Has executive responsibility^a	
Yes	46.3
No	53.7
Work experience (years)	
< 10	40.2
11–20	39.3
> 21	20.5

^aHave additional managerial responsibilities.

and executive responsibility in faculty members' viewpoints about professional, personal and managerial obstacles ($P < 0.05$) (Table 4). However, there were no significant associations between demographic variables and the responses regarding other obstacles (Table 4). The average agreement scores for perceived obstacles were higher for instructors and assistant professors than for associate and full professors, and these differences were significantly related to professional, personal and managerial–organizational obstacles ($P < 0.01$). There were also significant differences

between faculty members' viewpoints about scientific obstacles and their field of study; respondents from the basic medical sciences fields had the lowest average agreement for scientific obstacles, whereas participants from the medical surgery and nonmedical fields most often agreed that there were scientific obstacles ($P < 0.01$). In addition, faculty members who had more executive responsibilities identified fewer obstacles than other respondents, and this difference was significant for personal obstacles ($P < 0.01$). There were no significant differences between

Table 2 Average agreement for different internal obstacles to research activities according to faculty members of Shiraz University of Medical Sciences

Obstacle	Item	% agreement scores	
		Mean	SD
Financial	Lower funding for research activities than other activities	90.2	14.9
	Allocation of research budget is based on reputation and influence	89.2	15.9
	Insufficient budget for scientific research activities	87.8	15.6
	Unsuitable regulations and mechanisms for research proposal budgeting (extreme bureaucracy)	87.6	15.3
	Lack of independence of university in budget allocation and a dependence on governmental budget	85.6	16.3
	Inappropriate allocation of budget and facilities of the university	84.1	18.9
	University unable to acquire all the available research budget due to inappropriate organization	78.8	18.8
Facility-related	Difficulty and delays in funding procurement process	90.0	13.5
	Lack of skilled and efficient co-researchers	87.3	17.2
	Insufficient access to up-to-date, accurate databases at the university	86.1	14.9
	Lack of research materials	82.1	19.2
	Lack of active research cores in the university	81.0	17.9
	Lack of suitable computer facilities and laboratories for research	77.9	19.9
	Lack of skilled service staff (such as typists, laboratory technicians, etc.)	78.1	20.3
	Inefficiency of university's consultation centres	75.7	19.1
Professional	Insufficient access to scientific references (libraries, scientific database subscriptions, full text articles, documents, etc.)	64.0	22.1
	Involvement in routine executive activities	87.0	16.5
	Heavy load of executive work and insufficient time for research	86.1	16.5
	Lack of proper connection with other research organizations	83.4	17.7
	Personal financial problems of faculty members	83.1	20.8
	Limitations to and difficulties in taking part in professional development opportunities	80.8	20.5
Scientific	Obstacles to attending seminars and conferences abroad	73.4	23.4
	Lack of sufficient knowledge of research methods, statistical tests, questionnaire preparation, etc.	85.6	18.5
	Lack of sufficient skills with computer hardware and software	80.0	19.9
	Lack of sufficient skills in writing scientific papers	79.8	17.8
	Lack of suitable skills for preparing articles for international journals and presentations at congresses	78.9	20.3
	Lack of suitable skills for identifying, describing, analysing, and processing research problems	76.6	17.8
	Lack of suitable skills in searching for international articles and using electronic journals	75.8	20.4
	Lack of suitable skills in using foreign language references in different studies	70.3	23.4
Personal	Self-centred attitude among faculty members and lack of involvement in group activities	87.3	15.5
	Declining scientific involvement	84.0	17.0
	Increasing apathy among faculty members over community's problems	81.9	18.9
	Lack of researchers' commitment to research and scientific trustworthiness	80.4	17.4
	Copying research ideas from other researchers rather than trying to address current problems of society	79.8	18.9
	Lack of individual motivations for research	79.4	21.1
Personal and family problems	78.1	21.8	

Table 2 Average agreement for different internal obstacles to research activities according to faculty members of Shiraz University of Medical Sciences (concluded)

Obstacle	Item	% agreement scores	
		Mean	SD
Managerial and organizational	Lack of effectiveness of university research in improving society's affairs	87.7	15.1
	Unsuitable evaluation of research performance (lack of distinction between original research and fraudulent or repetitive work)	86.9	16.3
	Insufficient cooperation among medical sciences and other sectors of research activities	86.5	14.7
	Redundant work and repetition of similar research at universities because of inappropriate organization and lack of information	84.4	15.7
	Allocation of research budget to problems that have a trivial impact on society	83.4	17.0
	Unfair and unreasonable evaluation of research	83.2	16.9
	Innumeracy of referees and policy-makers who review the research proposals	80.3	18.5
	Lack of information about research resources, facilities and regulations	79.5	17.1
	In effective motivation system	79.4	19.2
	Insufficient support for researchers	75.2	22.1

^aBecause of other managerial responsibilities.
SD = standard deviation.

faculty members' viewpoints and their work experience ($P > 0.05$).

According to the faculty members in the study, research evaluation was sometimes quantitative and aimed at annual promotion.

Discussion

Obstacles

Financial

Our study showed that the large majority of the faculty member clearly identified financial issues and lack of funding as an obstacle to research. This is not surprising as according to other research, financial issues are one of the greatest obstacles to research activities [9,10,14–16]. Majumder also stated that financial and economic obstacles were the most important problems in Asian developing countries [12].

Facility-related

In this area, the difficult and time-consuming processes needed to obtain and prepare materials to obtain funding was the obstacle that participants identified most often. This is in agreement

with Hosseini and Shmsaie [17], who surveyed facility-related obstacles in agricultural research and reported that these obstacles were considerable, and others, who noted lack of research facilities, lack of funding for libraries, out-of-date references, and lack of resources and materials for research activities as important obstacles [12,18,19]. An important consideration here is that in medical sciences, most research is experimental and requires laboratory facilities and materials, medical equipment, and laboratory animals and their maintenance; thus, financial support to obtain and maintain facilities and equipment is imperative.

The vast majority of the respondent also agreed that the lack of skilled co-researchers was an obstacle and Tareff reported that recruiting capable staff and co-researchers who can make efficient use of facilities is more important than procuring facilities [3].

Professional

All respondents clearly indicated that their day-to-day work and /or involvement in executive work curtailed the time they had for research. This concurs

with many researchers who reported that a heavy workload was a significant obstacle to research activities [18,20–22]. Involvement in executive and official activities not only wastes large portions of faculty members' time but can also weaken their motivation for research and replace it with a tendency to do executive tasks [3]. However, our results are in contrast with those of Hosseini and Shamsaie among agriculture scientists who found that professional obstacles were the least important [17]. This discrepancy may reflect differences in the research fields of the respondents (agriculture versus health science fields). Faculty members in medical fields may work in various departments (outpatient, operating room) or in field work and may also work in their private practice so they have virtually no time for research.

Scientific

Although the majority of respondents agreed that there were scientific obstacles to conduct research, the agreement scores were the lowest, lack of adequate knowledge of scientific methods being the scientific obstacle most agreed with. Other researchers have reported that

Table 3 Effect of faculty members' viewpoints about obstacles on their research output (Wilk's lambda index)

Obstacle	Value	F	Hypothesis df	Error df	P-value
Financial	0.944	2.624	4	356	0.03
Facility-related	0.977	1.051	4	356	0.381
Professional	0.964	1.644	4	356	0.16
Scientific	0.976	1.086	4	356	0.36
Personal	0.954	2.108	4	356	0.07
Managerial and organizational	0.990	0.459	4	356	0.76

df = degrees of freedom.

a lack of necessary knowledge about scientific research methods, a lack of information about statistical methods, and the lack of foreign language skills for research were the main scientific obstacles [13,14,23].

In our study only 70.3% agreed that insufficient foreign language skills was an obstacle making it the least important obstacle; however the standard deviation was 23.4% for this item indicating a wide divergence of views.

Personal

The majority of the respondents agreed that personal obstacles existed which concurs with other studies [23–25]. Funk recognized that there is a direct relationship between personal incentives and the amount of research activity undertaken [24].

Among the personal obstacles mentioned, a self-centred attitude was the main obstacle. An earlier survey showed that experts and researchers in developing countries preferred to be more independent in their activities because of the overall atmosphere in the research environment [3]. In contrast, collaboration and teamwork activities have been reported to be essential for research development and productivity, and universities that developed teamwork activities published more research papers than universities that favoured individual activities [26]. A short-answer item in our questionnaire asked faculty members to indicate whether, according to previous experience, they preferred individual research activities or teamwork. Only

10.6% preferred individual work, and we infer from this that if the context is suitable for group activities, researchers will welcome teamwork and interdisciplinary collaboration.

Managerial–organizational

Several studies have surveyed managerial, official and organizational obstacles such as lack of coordination among research organizations [27], inappropriate planning [28], lack of intersectoral collaboration [20], and insufficient implementation of research results [29,30]. Bergquist and Bland stated that managerial factors within organizations, such as providing clear plans and objectives, have a direct effect on research productivity [25].-Moreover, Jens and Try found that organizational factors had a significant effect on research output, and this effect was even greater than that of the time devoted to research [31].

The 3 items most agreed as managerial–organizational obstacles were: the lack of effectiveness of research to solve actual problems in society; the inability of the system to properly evaluate research performance; and the lack of cooperation of between scientific fields in research. Some experts believe that research results are not properly presented to policy-makers, managers and executors [32]. As a result, research results are not used to influence policy and solve society's chief problems. In addition, policy-makers and managers may not take research activities seriously; there is no evidence-based decision-making culture or dynamic

communication between researchers and managers. Consequently, researchers are not provided with guidance for solving society's problems [32]. In other words, the lack of implementation of research results is not only an obstacle, but also a negative consequence of complicated research systems that ultimately leads to barriers which decrease researchers' motivation.

Another managerial–organizational obstacle is the quantity-based approach to research activities and performance evaluation. The system lacks the ability to distinguish between original research and fraudulent or redundant work which affects researchers' motivation to undertake new and pioneering research. Furthermore performance evaluation based simply on quantity of research discourages researchers from undertaking original research. As a result faculty members prefer to work on simple subjects and do repetitive and imitative research and focus on quantity.

Effect of obstacles on the quantity of research

Although the participants noted many factors as significant obstacles, they considered that these obstacles had no effect on their research performance. This could be related to 2 factors. According to faculty members' viewpoints, research evaluation is quantitative and aimed at annual promotion; therefore these obstacles do not impede their research activities. However, such policies may orient researchers toward hazardous and repetitive research activities.

Table 4 Association between faculty members' viewpoints on obstacles to undertaking research and demographic and work-related characteristics

Variable	Obstacles	Type III sum of squares	df	Mean square	F	P-value
Sex	Professional	790.40	1	790.40	6.77	0.010
	Personal	913.88	1	913.88	11.85	0.001
	Managerial & organizational	5.18		5.18	5.18	0.024
Scientific rank	Professional	1266.942	3	422.314	3.679	0.014
	Personal	971.559	3	323.853	4.158	0.008
	Managerial & organizational	713.703	3	237.901	3.071	0.030
Faculty	Facility-related	2986.597	7	426.657	4.461	<0.0001
	Scientific	1972.921	7	281.846	2.161	0.042
	Personal	1302.435	7	186.062	2.394	0.025
	Managerial & organizational	2480.881	7	354.412	5.402	<0.0001
Field of study	Scientific	2841.157	4	710.289	5.907	<0.0001
Executive responsibility	Personal	434.13	1	434.13	5.500	0.021

The second factor is related to personal motivation. Sometimes powerful incentives can overcome external obstacles. An open-ended item in this survey asked faculty members what their starting point for research activity was. More than 50% declared that despite the problems and impediments, patient suffering and an interest in finding answers to new questions were their main motivations for research. However, the widespread perception of obstacles evident in our survey could reduce research quality and incentives in the long term.

Difference between faculty members' viewpoints and socioeconomic characteristics

According our findings, women identified research obstacles more frequently than men and this is in agreement with other research findings [33–35]. However, according to Tajari, there was no significant difference between women and men regarding obstacles to research in social sciences [36]. The discrepancy between Tajari's findings and ours may be related to differences in the male to female ratio in the 2 samples.

Faculty members who had more executive responsibilities identified fewer obstacles than other respondents, However, Tajari reported that there

were no significant differences between respondents with and without executive responsibilities in the frequency of perception of personal obstacles [36]; this difference may reflect differences in the configuration of the 2 populations studied. In Tajari's study, only 25% of the participants had executive responsibilities, whereas in our research, 46.3% held executive positions.

There were no significant differences between faculty members' viewpoints and their work experience, which is consistent with the results of Tajari [36]. However, according to Hosseini and Shamsaie's study of agricultural science researchers, those with more teaching experience identified obstacles less frequently than other respondents [17]. Again, the differences between studies may reflect structural differences in the populations that were surveyed.

We found significant differences between faculty members' viewpoints on scientific obstacles depending on their field of study. Researchers in basic medical science had the lowest score for scientific obstacles, whereas clinicians in surgery and nonsurgical specialties had the highest scores. The reason for this may lie in the nature of basic sciences, which is more research based. In contrast,

surgeons spend more time providing health care and clinical services, and have less time to do research or participate in research development programmes. In addition we found that language problems were mentioned more frequently in nonmedical fields than in medical and basic science fields. The reason for this difference may be the frequent use of English terms in medical teaching and training activities at Shiraz University of Medical Sciences. Our results suggest a need for faculty members to improve their English language capabilities.

Study limitations

It should be noted that our study sample may not have been representative of the entire teaching staff at this university or the faculty at any other universities in the country; as such the findings should be extrapolated with caution.

Conclusion

Our findings show that faculty members in our university consider there are numerous obstacles to conducting research, lack of funding and difficulties in funding procurement being the most important, and significantly more women identified research obstacles than

men. Despite this our faculty members did not think their research output was affected. However, such high reporting of obstacles suggests the system does not favour research and in the long run research quality could decrease. Therefore university management needs to address this and select effective strategies

to encourage more and better quality research.

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