Norms of Science and Scientific Products in Higher Education Institutions; (A Case of a Higher Education Institute in Iran)

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Abstract

The main purpose of this research was to study the impact of administration in higher education in terms of administrators' faithfulness to scientific norms. These were Universalism, Organized Skepticism Disinterestedness, and Commonality, which analyzed in the context of scientific production in higher education in Iran. This study employed a quantitative method of non-experimental explanatory cross-sectional research. A normative commitment questionnaire developed for collecting data relating to administrators' faithfulness to scientific norms. University reports were used as main resources to measure scientific productivity at Ferdowsi University of Mashhad (FUM). Subjects that participated in this research were the president, vice-presidents, dean of faculties, and members of chairs of academic departments at FUM. They selected from the following academic fields; veterinary-agriculture, basic sciences, technical and engineering. All participants had held their positions in higher education administration for at least two years. Results showed a positive and significant correlation between administrators' faithfulness to these norms of science and levels of productivity of the university. Moreover, results showed significant differences between departments in terms of administrators' faithfulness to scientific norms.

Keywords: norms of science, scientific products, higher education normative Structure, university administrators**.**

Introduction

Science and technology are critical areas of contemporary life. The history of science reveals that it has a profound effect on peoples' lives in terms of how it affects structures of human relationships, groups, institutions, and jobs.

Progress in the field of science and technology provides excellent opportunities for development in such a way that it can also be considered as a criterion for determining whether a society is developed or underdeveloped. It can be said that development is achieved when the substructures of science and technology exist in all the fields, including those of human capital, knowledge, skills, production, and capacity for innovation (Noruzichakeli & Nourmohammadi, 2007). Science development and scientific activities also demand favorable conditions.

This suggests that universities need to provide suitable services in terms of quality and quantity to reform research conditions. Such an approach not only simplifies access to this purpose, but it can also direct efforts by institutions to activities in terms of research capacity to increase the production of knowledge and information about institutional matters.

(1) It can be said that research is essential to improve productivity and special attention is needed to maximize an institution's research potential
(2) The development will lead strengthening higher education institutions.

Considering the vital role of research in meeting the targets mentioned above, the role of higher education administrators becomes highly significant. It also becomes necessary to refine the administration of higher education institutions. Iranian university administrators may have some contradictions in their roles, which may compromise the development of effective policy and organization. So, the question arises as to how can administrators take into consideration the norms of science within the context of the contradictions that are inherent in Iran, particularly at the Ferdowsi University of Mashhad. Furthermore, the following question needs to be presented to determine whether or not there is a significant relationship between administrators' faithfulness to science norms and the rate of scientific production at FUM.

1. Is there a direct relationship between administrators' faithfulness to norms of science and the rate of production in a department?
2. Is there a significant difference between administrators' faithfulness to science norms according to scientific rank?
3. Is there a significant difference between education departments in terms of faithfulness to science norms?

Growth of Science Productivity in Higher Education Systems

Nowadays most countries have shown an interest in the development of higher education institutions to increase productivity in the economic sector, to create jobs and as part of more widespread aim to raise living standards(Sameti, Emadzadeh, & Bakhtiari, 2003)**.** Investment in infrastructure is a prerequisite for growth and development. Investment in higher education, especially in human resources, is a major indicator of development. Such investment provides an effective environment in which science and technology are able to expand and new scientific fields and rules are explored and in which an economy can prosper(Woodhall, 1994). Among different components of a higher education institution, human resources plays a major role in directing a university toward its mission and keeping it in tune with the constantly shifting demands of society (Arasteh, 2002).

In fact, staff members of academic institutions are key to its development; therefore, it is essential that faculty members are central to efforts to improve the scientific ranking of a university. It is expected that in addition to teaching, research and acting as consultants that they also become engaged in personal and professional development. This relies on them participating in activities such as membership of scientific societies, attending professional meetings, studying available resources, updating information and conducting research reviews(TaghipoorZahir, 1996). Meeting these requirements demands an appropriate environment and opportunities by administrators. Research by Huse (1980)has asserted that attracting and keeping good researchers is the most important challenge faced by universities. It is the researchers themselves that are active in producing research on behalf of the institution, it is therefore necessary that they are provided with appropriate conditions to be effective members of a faculty(Saki, 2002). One way to support professional development for employees at higher education institutions is the establishment of strong bonds with other national and international scientific institutions by strengthening collaborative networks. This serves to facilitate professional development of faculty members, increases scientific production and stimulates diversity in production. Bringing the norms and standards of higher education institutions to reach global standards constitutes the first step in this direction.

Research by considered planning for faculty members of higher education centers in developing countries in terms of access to study opportunities and participation in collaborative projects as very important aspects of the professional development of faculty members as well as development of the institution as a whole, the study was based on the effect of cooperation of northern and southern countries in strengthening higher education in the field of agriculture. Poespodarsono & Guritno (1989) considered international cooperation and exchange services with foreign institutions and determined that this constituted an important element in developing human resources as well as in raising academic standards. An analysis was done on the process of evolution of the agriculture school of Brawijayan Indonesia University.

The study of articles regarding research institutes in New Zealand indexed in SCI (science citation index) by Goldfinch, Dale, & DeRouen (2003)showed that articles produced in collaboration with other authors were more often invoked than articles written by a single author. This means that there is a direct and significant relationship between scientific collaboration and the ratio of invoking articles on quality ratings of scientific articles. Mohseni (1993)indicates that efficiency will increase if researchers are encouraged to communicate with each other. If daily communication increases among researchers on different courses in a research unit their efficiency will increase. Knorr et al., (1976)in a research that covered six countries; Austria, Belgium, Finland, Hungary, Poland and Sweden findings determined that good leadership in academic institutions and science organizations leads to better morale, which serves to improve the efficiency of an organization Research has also demonstrated that interrelated elements of production such as management skills and work environment are important in industrial laboratories (Farkas, 1979). However, application of these factors is more important at university institutions than it is in industry.

Studies by Cole & Cole (1967) and Hagstrom (1975) showed that variables such as encouragement and availability of appropriate resources in terms of money, time, social networks of friends and colleagues and easy access to information all impact on science productivity in higher education. Another study by Guttman (1997) considered variables such as sex, financial resources, morale, order and regularity, administrative, executive affairs and consulting with colleagues and showed that institutional characteristics and properties have more effect on the rate of production of scientific information than do individual characteristics of an institution's faculty members.

In addition to technical material, technology, production processes and human elements, which have been discussed above, have been determined as necessary elements for a productive system of higher education, the field in which an education system operates should also be taken in to consideration. Each specific academic field is the result of an historical process and is represented by the institution both internally and externally. The activities of an institution provide a framework for debate within an academic field that can work to either strengthen or weaken research opportunities. However, an institution is a part of an academic field that is based on rules, principles and regulations and with the help of these rules and principles parts of the institution can work more effectively to achieve its common purpose. In other words, this factor is considered as a facilitator of the activities of the two above noted issues. These rules and principles are referred to by Merton, RobertK. as a set of values and norms, consisting of a set of suggestions, forbidden, preferences and justifications that become significant for scientists so they form a scientific conscience(Glover & Strawbridge, 2004). Merton(1973)presents four kinds of institutional necessities that determine norms of science and that are considered as the terms of ethos for science and research. Accordingly, application of concepts such as cultural framework, normative structure and scientific morale provide a set of values for science projects that has a moral framework. Several studies have noted that among institutions, external factors and individual factors are the most effective issues affecting research productivity. In addition, according to Merton's view, the existence of a strong normative structure in a university system can serve as a good director of this set of factors for improving science in different societies.

Normative Structure in a University System

Merton(1973) assumes that the cultural structure of scientific communities is based on a scientific ethos and believes that this kind of ethos is based on two sets of norms, social and cognitive (technical).

And that the main elements of social norms in a scientific context are universalism, commonality, disinterestedness and organized skepticism.

A) Universalism:

This norm is based on the principle that a claim is accepted or rejected according to related research from previously proven observations and other knowledge associated with in the field rather than personal or social characteristics associated with the person who has provided the research. The strength of this norm is that it relies on democratic principles and competent leadership(Mohseni, 1993).

B) Commonality:

This norm is based on the necessity that scientific findings are the product of social cooperation and are considered as a kind of common social heritage. Briefly this refers to common ownership of information and scientific findings. Hiding research findings would be in breach of this norm and would result in suppressing the effectiveness of this norm(Ghazi Tabatabayi & Vadad hir, 2001).

C) Disinterestedness:

This is a norm that describes the principles guiding scientific activity. It determines that scientific research be conducted with neutrality. According to this norm, research should be set apart from 'personal, motives and incentives, financial or otherwise, for the sake of truth and the advancement of knowledge.'(Anderson, 2000).

D) Organized Skepticism

This norm determines that judgment should be withheld unless it is supported by evidence and that a conclusion has no scientific validity until it has been proven by tests(Anderson, 2000). In other words, judgment should be made according to logical and empirical criteria in an appropriate cognitive framework of related research, even those that are raised by other valid institutions (Glover & Strawbridge, 2004).

Findings of other research shows that acceptance of this cultural structure (research culture) and concentrating on it is possible by society acceptance process. As Swazey & Anderson(1996)concluded that scientists' normative and worthy orientation is formed during the process of academic research and scientists fortify this normative system during regular procedures. However, contrary to that claim, other publications have shown that the working environment in an institution, defined by conditions such as group structure, conditions of each department and students' skills are more expressions of anti-norms of science Anderson(2000),Anderson & Louis(1994),Ghazi Tabatabayi &Vadad hir(2001).The working environment in an institution has a considerable effect on normative trends; the trend to adhere to science norms is generally stronger among students than it is among faculty members. Atkinson & Gilleland,(2007)identified four dimensions that strongly support a normative structure in a research environment: respect for the structure of authority, respect for the boundaries of an institution, professionalism and a strong sense of virtue. Political power can be added as a fifth dimension, it represents an element that can threaten the normative structure. In this paper the term political power is used to describe the power structure within an organization and more specifically the powers of members of an institution in terms of weak and strong points in an organizational structure and how leading members relate to these points. Longitudinal studies (1989-1996), Pratt, Margaritis, & Coy(1999) in Waikato University of New Zealandon "Developing the Research Culture among Academic Member in University " showed that a research culture is established by managerial decision making and according to considerations of relationships among changes in ideas, attitudes and values, and changes in the institutional culture of a university to facilitate scientific and research efficiency in institutions.

Further to consideration of other research on structures that underpin research culture, it seems that little attention has been paid to identify elements that serve to strengthen the research culture of academic institutions. On that basis, this study was done to establish the effect of managers' faithfulness to science norms in relation to productivity in a university institution.

Conceptual Framework

Cannavò (1997) provides a model in which morals based on cognitive paradigms such as religion, economics, epistemology and institutions are considered in professional terms.

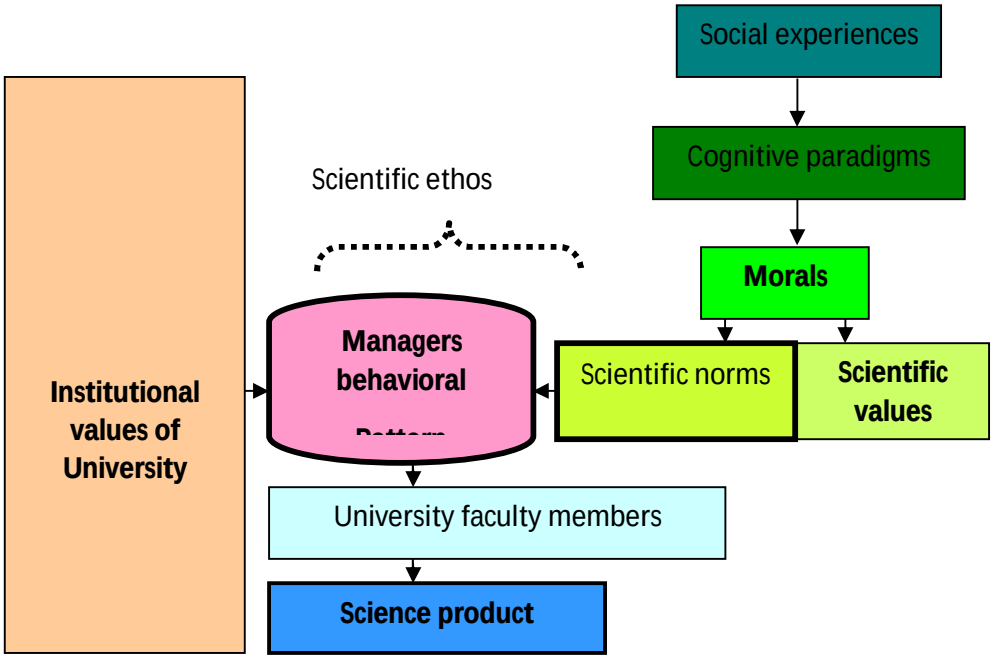

Figure (1) Process of formation and fortification of trends towards norms of science and its appearance managers' behavior patterns

As figure (1) demonstrates the initial origin of a scientific ethos (a normative orientation to science) is related people's experiences within a scientific community. According to the other research Anderson & Louis (1994);Austin(1994);Swazey & Anderson(1996)orientation towards norms occurs with acceptance of these norms by the society; where people are encouraged to communicate with each other at different levels and when they institutionalize behavioral patterns and values related to science and scientific norms(right side): university researchers and administrators are the most effective elements of this process of accepting norms. In addition, as you can see from the other side (left side) of the figure, administrative and institutional values tend to change administrators and members' behavioral patterns to safeguard their interests. Any conflict in these two forces forms a behavioral pattern that may be followed by administrators. Likewise, an administrator's behavior sets a direction and determines guidelines for academic units in an institution. There is no doubt that such a procedure impacts on the functioning of its members as well as on their level of productivity on behalf of the institution

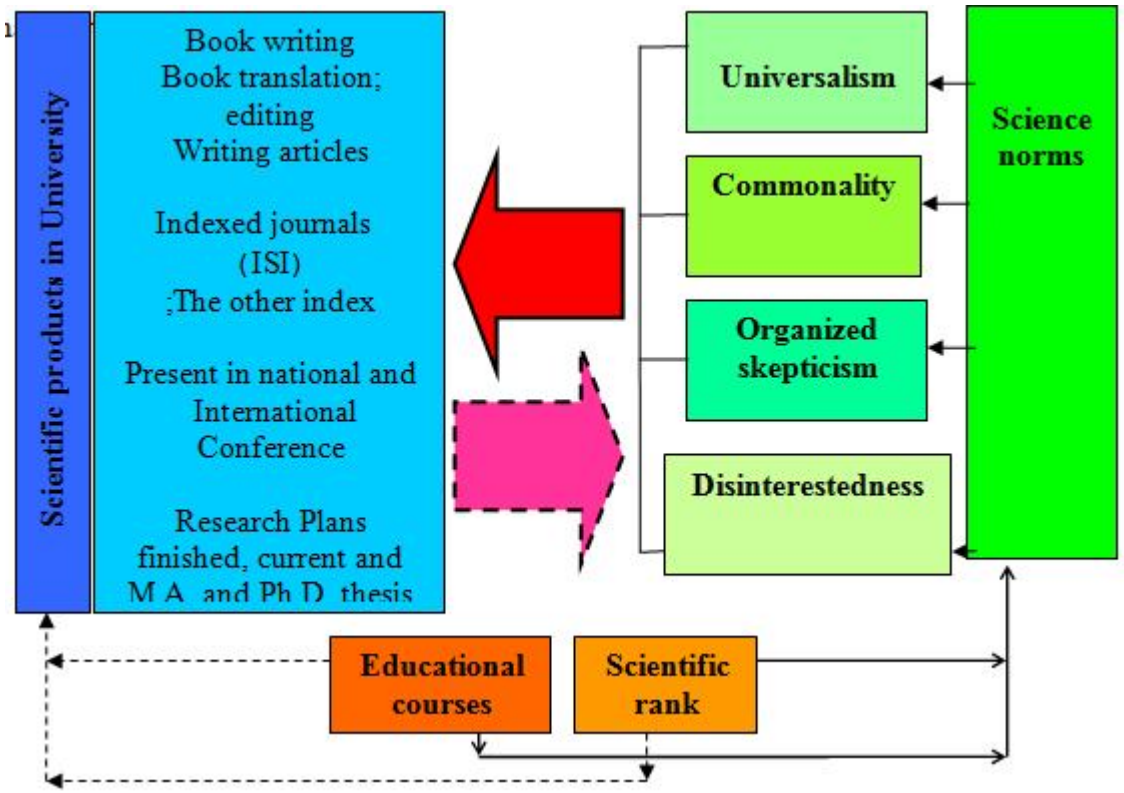

Figure (2) Conceptual framework normative commitment and science productivity

According to figure (2) mutual action between two subjects: norms of science involving components and organized skepticism and scientific products have been emphasized at the university level. In fact, researchers that rely on the existence of theoretical and research findings only tend to concentrate on the relationship between administrators' faithfulness to science norms and scientific productivity at the university(red flash indicates this relationship and refers to questions 1and 2). In addition, other factors such as scientific rank and educational courses, which seem effective in the process of fortification of acceptance and faithfulness to science norms by administrators and the rate of scientific productivity in a university, have also been considered (the orange squares refer to questions 3 and4 of this research).

Procedure (Method)

The methodology applied in this study was quantitative, non-experimental, explanatory and cross-sectional (Shabani Varaki, 2006). The aim of this study was to determine the relationship between administrators' faithfulness to science norms and science productivity relative to factors such as purpose and time; two variables were considered, those of faithfulness and scientific productivity.

Ratio and distance scales were measured, thus assuming a normal distribution and Pearson Correlation was used for data analysis in questions 1and2.

When variables were measured on at least an ordinal scale, to test the unit, two independent groups of continuous distribution obtained from U man Whitney were used (Sarmad & Bazargan, 2001). Due to the low volume group ride facilities; sequential analysis of nominal scale was used.
In the fourth question, groups were compared according scores of faithfulness to science norms in order of rank so the Kruskal-Wallis test was used(Sarmad & Bazargan, 2001).

Participants in the study gave informed consent and they were familiarized with the purpose of the research before being given the questionnaires. Data was collected from subjects within in a fixed timeframe and lastly their function was expressed.

In order to collect the required data on the norms of science, a questionnaire was developed based on the four main components of Merton's theoretical model (universalism, commonality, organized skepticism and disinterestedness), as shown on the right side of figure 2
Below are a few sample questions:

Universalism:

I believe that the scientific validity of the developed countries, underdeveloped countries have achieved more credibility
Commonality:
I tried everything in the process of scientific activities - research, I've learned to move my colleagues organized skepticism:
Let the people to express facts without any restrictions
Disinterestedness:
The best rewards of fame is that I get to do research
72 Questions were organized in the Likert scale on a continuum from' completely agree to completely disagree'. The annual academic reports for academic years 2006-2007 and 2007-2008 were used as main sources for data about the scientific productivity of FUM. Some other data on scientific activities of the institution were collected from faculty members directly by the researchers. Each of these scientific works was graded according to the university's academic promotion act. These cases are referred to in the figure on the left.

Table 1: scientific works grades by the university academic promotion act

works	Current and MA- Ph.D thesis	Finished Research plans	Present in the International-national conference		Indexed journal ISI	other indexed journal	book Editing	book Translation	book Writing
			Full text	abstract					
grades	2	5	2	1	5	4	2	12	20

Types of work are shown in Table 1.It should be noted that a high score is considered in all cases in promotion regulation. To more accurately compare levels of scientific productivity for each department, calculations were made for the ratio between scientific productivity and the number of faculties for each department.

Validity and Reliability

To determine the construct validity of the normative commitment questionnaire by relying on factorial analysis method with varimax turn and four components under the title of elements and considering an Eigen value of (1) was determined as the cut-off point, four main elements have been achieved for each subset of questions.
Table (2) shows the factorial load of a subset of questions. Reliability coefficient of normative commitment questionnaire was achieved as a result of Coronbach's Alpha calculation equal to 0.84.

Table 2 factorial load of subset of questions

UNIVERSALISM							
question	Factorial load	question	Factorial load	question	Factorial load	question	Factorial load
1	.361	7	397.	31	934.	22	703.
42	.669	8	760.	14	817.	32	505.
3	.823	59	465.	18	619.	24	874 .
44	.714	10	929.	19	943.	52	646.
55	.806	39	983.	20	865.		
66	.881	12	673.	21	800.		
COMMONAITY							
15	.845	29	697.	35	418.	41	714.
16	.945	70	429.	36	460.	42	469.
17	.973	13	492 .	37	726.	43	619.
26	.759	23	649.	38	410.	4	923.
72	.531	33	357.	11	408.		
28	.720	34	779.	40	574.		
ORGANIZED SKEPTICISM							
45	614.	49	739.	53	856.	57	564.
46	544.	50	882.	54	521.	58	781.
47	390.	51	766.	55	535.	9	564.
48	798.	25	490.	65	718.		
DISINTERSTEDNESS							
60	462.	64	851.	68	861.	27	849
61	676.	56	673.	69	862.		
62	842.	6	829.	30	803.		
63	891.	67	899.	71	849.		
				71			

Subject and sampling method of common features of effective management in research organizations. According to the Iranian Research Organization's report of development of technology of Iran, poor management constitutes one of the biggest problems(Arasteh, 2002).So, in this study considers directors as a population. The subjects (n==105) in this research included the president, vice-presidents, deans of faculties and the chair of academic departments at Ferdowsi University of Mashhad in the academic fields of humanities, agriculture-veterinary, basic sciences, technical and engineering. All selected participants had held their administration positions for at least two years. Percentages of participants from each department were as follows; (41.3%) from humanities, 26.3% from agriculture-veterinary, 17.5% for basic sciences and 15% from technical engineering. Percentages of participants of various ranks were as follows; assistant professor (72.2%), lecturer (1.3%), associate professor (20%) and professor (7.5%).Complete coverage was used instead of sampling.

Table 3: Department chairs (Academic Year: 2007-2008)

departments	F	PF
Humanities	34	42.5
Basic science	15	18.75
Technical engineering	10	12.5
Agriculture-veterinary	21	26.25
Total	80	100

The administrators' faithfulness to norms of science on scientific productivity of faculty members was measured at intervals and ratios respectively. Thus assuming normal distribution, Pearson's(r) correlation coefficient was used to analyze data. The administrators' faithfulness to the norms of science was measured on a scale based on academic ranking and departments were considered at ordinal and nominal levels, so were nonparametric Mann Whitney U and Chi- Square tests were used to analyze data.

Results

Table 4: Pearson Correlation for two variables of faithfulness and scientific products in 2005- 2006

	Ratio of scientific products in University
Faithfulness to norms of science	
Pearson Correlation	*.389 ** *
Sig.(2-tailed)	*.000*
N	*80*

** Correlation is significant at 0.5 levels (2-tailed).

As table (4) shows, there is a significant relationship between administrators' faithfulness to science norms and the rate of scientific productivity at FUM. According to this table the increase of administrators' commitment to science norms caused improvement in the condition of scientific productivity.

Table 5 Pearson's Correlation in two variables of managers' faithfulness and their scientific productivity

	Managers scientific products
Faithfulness to norms of science	
Correlation Pearson.(2-tailed)	*.015*
N	*.898*
	80

According to table (5) there is no direct and significant relationship between administrators' faithfulness to science norms and rates of scientific productivity. Furthermore, administrators' normative commitment rate doesn't necessarily cause an increase or decrease in the institution's rate of productivity.

Table 6 showing comparisons of averages of managers' faithfulness to norms of science according to scientific rank.

Scientific rank	**N**	**Mean Rank**	**Rank**
Faithfulness to norms of science			
Teacher – Assistant professor	58	40.53	*235.50*
Associate professor- Professor	22	40.43	*880.50*
Total	80		

Table7: U man Whitney

	Faithfulness to norms of science
U man Whitney	*636.500*
Wilcoxon W	*889.500*
Z	*-0.16*
Sig.	*.897*

This data indicates that there was no significant difference between averages of grades of faithfulness to science norms in different scientific ranks. In the other words, there is no significant difference between administrator's faithfulness to science norms according to scientific rank. The results from U man Whitney test are shown on Tables 6 and 7.

Table 8 comparison of rank averages of different educational departments according to faithfulness to science norms.

	Faithfulness to norms of science
Chi- square	**16.266**
df	**3**
Sig mpAsy	**.01**

Table 9 Shows comparisons of different educational departments according to faithfulness to science norms

Educational Departments	N	Subset for alpha = .o5	
		1	2
Humanities	34	358.6471	
Basic science	10	376.70000	376.70000
Technical engineering	15	382.8667	382.8667
Agriculture–Veterinary	21		395.5714
Sig.		.88	.351

Considering the information from Kruskal-Wallis, Tables 8 and9, it can be concluded that the department of agriculture-veterinary had the highest average and humanities had the lowest in terms of faithfulness to science norms in comparison with other groups.

Table 10 Shows comparisons of different educational departments according to faithfulness to science norms..

Educational departments		**N**	**Mean Rank**
Faithfulness to norms of science			
.	Humanities	34	*28.96*
	Basic science	15	*45.73*
	Technical engineering	10	*43.95*
	Agriculture–Veterinary	21	*53.81*
	Total	80	*40.50*

Data shown in Table (10) shows that managers' faithfulness to science norms among the agriculture-veterinary group had a significant difference in comparison with other groups. This uniqueness could be because it is a very different academic field from others in the study.

Conclusion

In the context of a nation's development in terms of knowledge and associated economic benefits of participation in global academic collaboration, this study was done to enable determination of rank and quality of universities. The ranking criteria applied by international universities and research institutions such as Times Higher Education Supplement (THES) ranking, national research center of Spain, Shanghai Jiao Tong University (SJIU), and ranking criteria if Organization of Islamic Conference (OIC) shows that about 80% of weight depends on qualitative and quantitative rates of scientific productivity.

According to reports on Iran's share in the global production of knowledge, it is observed that in spite of development during recent years, Iran ranks very low in comparison with other countries. Two alternatives for filling and/or lowering the existing gap in Iran's social-economic development programs are:

Supporting scientific centers and increasing scientific interaction. Establishing scientific poles among powerful courses in scientific groups (Sameti et al., 2003).

The suggested model to improve knowledge requires fortification of a threefold bed as a substructure of technical elements (software and hardware facilities, network and communication facilities and publication systems), laws and regulations (supportive and encouraging laws, international laws, supportive and protective laws) and social and cultural foundations(Hasanzadeh, 2008).
The provision of conditions in the field of regulations and technical elements and provision of a sufficient budget is essential for implementation of many policies by governmental authorities and policy makers in the field of research and technology**.**

However, the role of administrators in academic institutions should not be overlooked, especially in terms of their providing appropriate cultural and social conditions.

The first step towards strengthening the research capacity of an institution is through development of a good democratic culture. Research culture refers to a set of norms that are considered as necessities and an order to direct scientific activities and the most accessible instruments for progressing in an academic field (Huff, 2003).The research in this study was based on Merton's theoretical model, which maintains that establishing and developing scientific institutions needs an appropriate cultural and social environment. And scientific development is facilitated in those communities that operate under the above -mentioned premise (Janalizadeh Chubbasti, 1999).So, this research was done on the basis of findings from different studies in the field, the role of education managers in achieving the main goal of an academic institution, that of development and productivity in the field.

Results of this research have identified a significant relation between administrators' faithfulness to the norms of science and an institutions' productivity. Hence, it seems that a commitment to these principals by managers leads to development within a scientific research community until its foundation becomes a constant in that community. It simplifies the process of fulfilling the goals of high principles, competent leadership, standardization based on exact scientific criteria, cooperation and free communication, holding respect for researchers, determining exact and scientific evaluative bases away from opinionative, political and group prejudice, flexibility, scientific modesty, open mindedness, critical thought and creativity and attention to scientific methodology. There are constraints to achievement of these goals that stem from inside the scientific institution as well as from outside it. This finding is consistent with results of studies by Prattetal.(1999), Knorr et al.(1976)both researches that mention that good leadership in a scientific organization with the right management decisions and by considering relationships among changes in ideas, attitudes and values and changes in the culture of an institution can promote efficiency of the organization's performance**.**

This research also found that there was no difference in people's faithfulness to science norms in relation to their passing higher scientific degrees. The educational system did not demonstrate any serious attempt to develop its professional scientific moral development of its associated scientists and academics after they entered the system. Therefore, they have not demonstrated any attempt at professional development.

The research result of Anderson(2000), Anderson & Louis(1994), Austin(1994), Ghazi Tabatabayi & Vadad hir (2001) show that university elements are more expressive of anti-norms of science.
It is this way that lack of laws such as copyright and serious punishment for those who *commit* plagiarism, forging and alteration and political power that noted on Atkinson & Gilleland (2007) research as a fifth dimension of normative structure that can be threatening factors to adherence to the norms of science.

Researchers such as Jones (2007) and Kalichman & Friedman(1992) have emphasized the necessity for providing a moral charter and to establish research morals in education to improve knowledge and people's view towards moral behavior in that research. A charter to include planning, executing and analyzing research as well as to facilitate registration and publications would reflect the university's commitment to the observance of morality in publishing research in the highest level of management.

On the contrary, research findings show that there is no significant relation between administrators' faithfulness to science norms and their scientific productivity. It means that in addition to elements such as faithfulness to science norms there are other interfering factors influencing people's cooperation in science productivity. In fact, in parallel with fortification and spreading a research culture in a university system it should not be forgotten that university members having characteristics and skills such as scientific ability, domination on sources of information in a field of research, ability in scientific writing and skill at making selections for new research (Ghaemitalab, & Mirhoseini, 2006) can increase people's collaboration in scientific activity. So it is recommended that educational research workshops be held to improve people's abilities in the field of research. In addition, lack of enough time(Arasteh, 2002; Cohen & March, 1986) due to downgrading cooperative administration at universities allows administrators to spend more of their time for trivial executive affairs so they are becoming distanced from the process of research.

Comparison of different educational departments, according to faithfulness to science norms shows that there are significant differences between them, so it may be the result of the different nature of the various courses. Humanities groups, which place the most emphasis on subjective and abstract concepts, had lower levels of achievement than other groups.

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