

DESIGNING OF A PERFORMANCE ASSESSMENT MODEL OF STUDENT RESEARCH CENTERS

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ABSTRACT: The aim of this study was to develop a model for assessing the performance of student Research Centers in Isfahan Province. In this regard, for the evaluation and analysis of the data, six indicators were put forward for the measurement and analysis of performance, which for these indicators in proportion to the purpose of the research centers, 47 markers were defined. The present study is an applied research study and conducted with the research approach in the field of Research Centers' performance in Isfahan Province during the academic year of 2013-14. Also with respect to the quantitative parameters used in research, the used model is the type of operational research one and carried out based on the data from the survey. Moreover, with regard to the adopted research methodology (descriptive research), the method of data collection was to survey the comments of Research center authorities. The statistical population of this study consisted of 21 research centers running in the province which all 21 centers were included in the sample of this research. The analysis method is based on the concepts of analytical hierarchy method which is a graphical illustration of the real complex problem. The general purpose of the problem is on the top and values and options are located on the lower levels. The findings of the indicators, which in a way demonstrates the set markers based on the articles of the association of research centers, opinions of elites and authorities of the research centers at the disposal of research center managers showed that the weight of each indicator in measuring the performance is as follows: Indicators related to festivals and competitions (CR: 0.003, 0.229), dissemination of the research culture (CR:0.003, 0.218), human resources (CR: 0.003, 0.096), Research center management (CR: 0.003, 0.096), development of Research Center (CR: 0.003, 0.147), Educational space, information, and administration (CR: 0.003, 0.146). Also, a certain weight is set for markers of each indicator for performance assessment in accordance with the priorities of the indicator. The results of the research led to the formulation of the proposed model of performance, based on the measurement criteria and markers derived from the research centers objectives.

Keywords: research center, indicator, marker, performance measurement, analytical hierarch.

INTRODUCTION

Providing conditions and facilities for the development of creativity, knowledge, and capabilities of the students in relation to their talents and interests is one of the main purposes of the education and training. The realization of this goal with regard to variety of interests and different capabilities of the students and their vast number in the country requires access to a suitable capacities of the resources and facilities; but the existing limitations mostly affect and challenge the main plans based on the vast talents and individual differences of the students, so that in practice, the approach of the plan turns into public coverage of the students. Therefore, planners, managers, and executives in education programs, in interaction with students, encountered some of their needs that could not be provided. Thus, providing the opportunity for the talented and interested individuals who are eager in deepening and exploring the spirit of their leanings seems imperative. Establishment of student research centers has been considered as one of the strategies to meet the above objectives (ASTED, 2002). The student research centers are established for the comprehensive development of the students; the necessity of student research centers has been turned into a natural fact and everybody agrees on that. However, in designing and execution of the teachings, the performance measurement or comprehensive assessment of these centers is of utmost importance and based on the results of these assessments, the complementary and directional trainings could be designed. It is noteworthy that establishing research centers involves huge investment and spending time on active service personnel. Thus, knowing the level of performance is very important for senior managers in the organization. The present research first identifies and prioritizes the influential criteria over performance of student research centers and then focuses on the performance assessment. To achieve these goals, first through using survey, an opinion poll was conducted about the activities of these centers. Then, using the result of the first stage, and library studies, the collection of effective indexes in increasing efficiency of research centers were identified and listed. In the next step, using the methods and techniques of collective decision-making and taking opinions of the experts, a collection of indicators were identified and derived that the majority of the people have agreed upon them. In order to weighing and prioritizing and determining the degree of importance of each indicator, all indicators were weighted and prioritized with designing matrix of comparative pairing and analytical hierarchy process. The presented indicators and performance assessment model will be applicable in the education centers and affiliated units.

STATEMENT OF THE PROBLEM

As one of the purposes of the education and training is providing the condition for the growth and expansion of the talents and capabilities of the students, it must put the principle of continuous improvement on its top priority. This principle realizes when its background is provided by the performance assessment. This important issue could be realized by receiving necessary feedback from internal and external environment and analysis of weak and strong points and opportunities and organizational threats and establishing and running a performance assessment system. Therefore, in Research centers, there is a need for advanced systems of performance assessment that with the help of creating new prospects, development and

design of insights and inspirations, could lead to innovation and evolution and ensures the activity and growth of the students by inspiring the personnel. Thus, ever-increasing attention to the performance assessment has turned into necessities of these centers. In fact, performance assessment is a realistic approach to work and life and is a criterion that could improve the existing conditions continuously (Shahriyari, 2005). Education and training is one of the educational and institutional organizations that plays a role with shaping the intellectual capital as the main pillar of the community. If education of any community is at the heart of all social problems, attention to research systems and determining their efficiency (with the same logic), would have an important place in the development and improvement of society. Regarding that and also the evolutionary and changeable condition of the today's world, attention to the performance of the educational and research organizations in its fundamental level and in the education and training is undeniable. These educational and research organizations have been established based on the needs of society and the overhead documentation and were named as student research centers. On the other hand, in line of execution of the laws of the research center article of associations and article 11: Deputy of theoretical and practical education and training of each province should supervise over the well performance of the research center activities. This deputy should carry a scientific and precise assessment of the activities of each research center based on the criteria that is announced every year by the office of theoretical and pre-university education and training and present this assessment to the planning council of the province (No. 420/28 dated 03.02.2003), and according to article 13 of the article of the association of the student research centers (No. 420/28 dated 03.02.2003) make necessary preparations for the strict implementation of the above-mentioned requests. The performance assessment is considered as a key factor in identifying weaknesses and threats, strengths and opportunities for the improvement in the processes. Hence, according to the mentioned article of association, in case of properly implementation of assessment methods, the student research centers as a part of the educational system can engage in training professional and efficient human resources. In this regard, the present research problem is the assessment of the operations of the student research centers which is done as a case study in Isfahan Province. Although this research is a descriptive one and its data were collected using scientific texts, documents, relevant by-laws, and opinions of educational and research centers authorities, it is more concerned on inferring the desirable performance operation than just extraction of relevant concepts, but relationships between variables. In other words, in spite of the attention of the plan to the analysis of the data and qualitative and quantitative information and access to the scientific findings about its subject, the main and pivotal problem is to evaluate the performance assessment in such a way that: help the managers of the research centers to prioritize activities and measures, judge and evaluate the activities and measures of the research centers, identify variables and parameters affecting the performance of the research in the research centers, and establish a special administrative system by which implement the performance assessment and has the feasibility in the other research centers despite its "case research" type.

Literature Review

Any organization, to obtain long-term success, is trying to achieve organizational fit. By definition, organizational fitness is the organization's

ability for survival and adaptation in the changing business environment. Means of achieving organizational fit are as follows: natural evolution, meaningful change and continuous assessment (Beer, 2003). To this effect, the organization must have a clear concept of the performance, a concept that is offered by the highest management authority (Voelpel et al, 2004). Opinions and comments of educational management experts such as Abtahi & Torabian (2011), Neely,(2000), Ting (2011), Cunningham and Cordeiro (2003), Kleiner (2005), Huyett and Viguerie (2005), Adel (2008), Aghapour (2002), Avkiran (2001) and Tabarsa (1998) suggest that educational institutions are different in nature from other organizations, so the assessment performance educational/ research systems always attracted the attention of authorities. The literature on the performance assessment shows that for its realization, it is necessary that to consider the type of the view to the organization. Assessment of the performance of educational/ research institutions is carried out with three specific approaches, including tactics, strategies, and abilities. In tactics approach, educational organization focuses on promoting students to a higher level. In the strategic approach, they focus on a series of weaknesses in educational organizations. In this approach, the emphasis is on the regular evaluation and monitoring. These two approaches can improve organizational performance in a short-term or medium-term. The third approach was introduced by Adel (2000). This approach enhances the ability of educational institutions and in the long-run will lead to effectiveness. Kleiner (2005) mentions that performance assessment is a complex issue that requires the use of a natural and vivid approach to the teaching / research organizations. Considering educational/research institutions as a viable organization provides the possibility of expansion of a range of self-assessment strategies, monitoring the progress and data collection and the necessary information needed for the continuous assessment. Educational organizations as natural systems, show such features as adaptation, growth with an emphasis on participation, interdependence of minor systems, attention to the individuality and uniqueness. Such organizations are sensitive to the environmental and internal changes and feel themselves responsible. In these organizations, managers appear in the role of facilitators that try to establish organizational commitment and realization of the common mission of members of the organization (Bossert, 1993). With regard to social evolution and changes, the assessment of organizational processes is necessary. That is why, the assessment of the organizational performance has always attracted the view of management and organization authorities (Hides et al., 2010). The basic assumption of performance assessment is that the organizational effectiveness and efficiency can be increased. The purpose of performance assessment is the transformation of the processes, structure, and how to do organizational activities to finally change the organizational culture and the organizational and management functions be realized in a more effective manner (Hyun, 2010). On one hand, because of the importance and role of the research in all aspects of the development of the country, promotion of research culture among students and teachers and application of research findings, identification of researchers, directing the research activities and creating research inspirations and actualization of research capabilities have been prioritized. On the other hand, providing conditions and opportunities to grow and nurture creativity and promote the knowledge and ability of the students in proportion to their aptitudes and interests, is one of the fundamental goals of education.

RESEARCH METHODS

$$\sum_{A=1}^7 W_A + \sum_{B=1}^7 W_B + \sum_{C=1}^8 W_C + \sum_{D=1}^8 W_D + \sum_{E=1}^9 W_E + \sum_{F=1}^8 W_F = 1$$

$$0/229+0/218+0/096+0/164+0/147+0/146=1$$

Table 2. Degree of preference parameters associated with festivals and competitions, dissemination of research, human resources, management of research center, development of research center, teaching space, information and administration

Row	Abbreviation	Assessment area	Local priority	Inconsistency rate
1	W _A	Relative priority of set of assessment indicators related to the festival	0.229	
2	W _B	Relative priority of set of assessment indicators related to the dissemination of research culture	0.218	
3	W _C	Relative priority of set of assessment indicators related to the human resources	0.096	
4	W _D	Relative priority of set of assessment indicators related to the management of Research center	0.164	0.003
5	W _E	Relative priority of set of assessment indicators related to the development of the research center	0.147	
6	W _F	Relative priority of set of assessment indicators related to the education space, information, and administration	0.146	

Third, fourth and fifth steps: obtaining the degree of preference for each of the parameters of first step by paired comparisons and comparisons of inconsistency rate in Table 3 as:
 $\sum W_A = 0.166 + 0.150 + 0.150 + 0.132 + 0.185 + 0.166 + 0.101 = 1$
 $\sum W_B = 0.181 + 0.016 + 0.215 + 0.202 + 0.048 + 0.71 + 0.207 = 1$

According to this model, to determine the indicators of performance assessment, the four communities were used as follows:

- A. Research officials in education and training
 - B. Research managers
 - C. Experts in research and evaluation at the University and Education and Training administration
 - D. Article of Association and ministerial documents in the field of performance assessment of research centers
- Indicators of performance assessment in the field of research centers with regard to purposes and tasks of research centers are divided into four factors and each factor has been divided into some indicators that are as follows:
- Capacity building (production and dissemination of knowledge) (factor)
 - Festivals and Events (indicator)(A)
 - Dissemination of Research culture (indicator)(B)
 - Human resources (factor)
 - Human resources (admission of students, the combination of teachers and coaches) (indicator)(C)
 - The objectives, organization and management status(factor)
 - Research center management (indicator)(D)
 - Research Development Program (indicator)(E)
 - Teaching and research facilities (factor)
 - Educational space, information and administration of the research center (indicator)(F)

This study with research approach was carried out in Research centers of Isfahan Province during the academic year 2013-14. As the used criteria in this research were quantitative, the model was a kind of operational research, based on data collected by survey. Moreover, with regard to the kind of adopted research method (descriptive research), the method for collecting data was survey of opinions of Research Centers authorities. Because this study has a descriptive purpose, the main objective is as follows: Presentation of a suitable model for assessment of the performance of the student research centers.

Secondary objectives

- 1- Determining the optimal model for performance assessment
- 2- Determining the indicators of performance assessment of Research Centers

Research Questions

- 1- How is the optimal model of performance assessment for Research Centers?
- (2) How are indicators of performance assessment preferred to each other?

ANALYSIS OF DATA

In the process of hierarchical analysis of the items, any level is compared to the related item in the higher level as a pair and their weight are calculated and named local priority. Then, by combining the local priorities, the overall priority is obtained. Local priority is obtained from paired comparative matrix and is the overall priority of final rank of each research center. For each of the six areas of performance, which include indicators related to festivals and competitions, dissemination of research, human resources, management of research center, development of research center, teaching space, and information and administration, paired comparative matrix was formed (see Appendix) and the degree of preference or the local priority of indicators was determined as a group decision-making by 5 persons directly responsible for these centers. So that:

$$\sum W_C = 0.059 + 0.171 + 0.086 + 0.084 + 0.111 + 0.158 + 0.197 = 1$$

$$\sum W_D = 0.94 + 0.108 + 0.097 + 0.102 + 0.130 + 0.075 + 0.277 = 1$$

$$\sum W_E = 0.199 + 0.144 + 0.133 + 0.133 + 0.158 + 0.100 + 0.064 = 1$$

$$\sum W_F = 0.042 + 0.139 + 0.128 + 0.129 + 0.179 + 0.113 + 0.164 = 1$$

Table 3: degree of preference Indicators, related to festivals and competitions, dissemination of research culture, human resources, management of research centers, development of research center, education space, information, administration

1- Festivals and competitions	Degree of priority	2- Dissemination of research culture	Degree of priority	3- Human resources	Degree of priority	4- Management of the research center	Degree of priority	5- Development of research center	Degree of priority	6- education space, information and administration	Degree of priority
Student experience	0.166	Publication of scientific journals in the research center (Electronic version)	0.181	Available regulations and criteria of admitting students in research centers	0.059	Participation of the principal of the research center in meetings of research center council	0.094	Number of seminars and conferences in the research centers in collaboration of other organizations	0.199	Educational and administrative space to separate cases (including rooms, etc.)	0.042
Research center principals' experience	0.150	Establishing scientific clubs in the research center	0.076	Moral and material support of gifted students in research	0.171	Annual program of activities, services and professional education	0.108	The available documents for the development of educational and research activities of the research centers	0.144	Appropriateness of domestic and foreign scientific journals with needs of students of research centers	0.139
Number of festivals and competitions held by the research center	0.150	Registered invention or domestication of a registered idea or process	0.215	Arrangement of teachers and trainers of the research center regarding their certificate	0.086	Available educational, research and disciplinary notices and by-law	0.097	minutes related to the developments of laboratories and material resources	0.133	Number of domestic and foreign journals that are subscribed to research centers	0.128
Present teams in the festivals and competitions proportional to the share of the research center	0.132	Published articles in prestigious scientific journals	0.202	Arrangement of teachers and trainers of the research center regarding their working background	0.084	Academic certificate of the principal of the research center	0.102	Existence of achievements and awards of students of the research centers	0.113	Existence of E-library in the research center website	0.129
Participation in international, national, and provincial festivals	0.185	Introducing activities to new students	0.048	Arrangement of teachers and trainers of the research center regarding their expertise	0.111	Research background of the principal of the research center	0.130	The amount of hour/person of research center	0.158	Existence of library in the research center	0.179
Acquiring rank in international, national and provincial festivals	0.116	Holding general and special courses in affiliated schools of the research center	0.71	The proportion of teachers and trainers to the students regarding their course	0.158	Having a prepared program for spending credits	0.075	Available documents and standards for qualifying designs and ideas of the research center	0.100	Access to the high speed Internet and information databases in research centers	0.113
The type of the teams present in the competitions and festivals	0.101	Producing the works and achievements of research center	0.207	Documents related to development of expertise human resources (training and education of needed human resources)	0.197	Taking financial resources from outside and issued credits	0.277	Number of accomplished visit from research center	0.064	CD bank in the research center	0.164
				Having supervisor in the field of Physics, Chemistry, and Biology	0.130	Sending wanted reports to the province	0.117	Availability of educational and research calendar in the research center (workshops and classes schedule)	0.058	Existence of suitable workshops and laboratories to separate cases	0.107
								Availability of record and ID of research center	0.050		
Inconsistency rate	0.002	Inconsistency rate	0.009	Inconsistency rate	0.005	Inconsistency rate	0.005	Inconsistency rate	0.003	Inconsistency rate	0.01

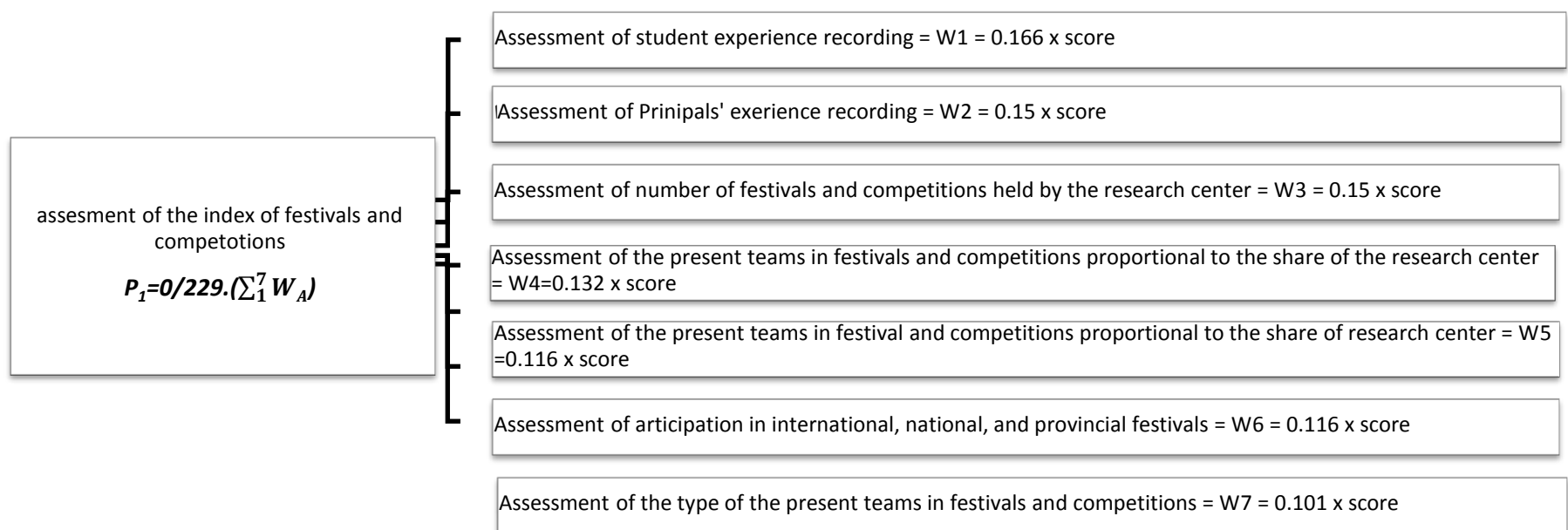


Figure 1: The assessment model Evaluation of festival and competitions indicator and related remarks

The score in the above model is the grade that research center receives at that marker. This score is multiplied in a fixed value (degree of indicator preference, see Table 3) , then sum of these assessments is multiplied to a fixed amount (0.299), which is the degree of preference of this index (see Table 2), and finally delivers the total score of the assessment index of festivals and competitions.

PRACTICAL SUGGESTIONS

To improve and increase the performance of research centers, the mechanism of experience recording for students and principals must be

provided and this issue needs awareness and holding courses of research methodology.

To increase the capacity of research center performances, the attention must be paid to the issue of dissemination of knowledge and publishing scientific articles by students, which requires growth and development of students and their familiarity with principles of academic writing and publishing methods.

To enhance the performance in the field of publication and its development, Research Centers must provide a suitable mechanism in the virtual space for preparing and publishing journals including, monthly, quarterly, periodical, and library.

To increase the quality of laboratory activities and accentuating the performance in these fields, having experts in the fields of physics / chemistry / biology is necessary. Therefore, the authorities in charge of human resources and management of research centers must pay particular attention to this issue.

To supply the facilities and opportunities of activities in research centers it is vital that the principals of research centers do any attempts for attracting financial resources and supports in order to have a sound trend in research activities.

In order to attract students in the Research Centers, it is necessary to prepare frameworks and instructions regarding the macro management of research centers which includes opportunities that facilitates services to talented students in research.

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