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Providing an integrated model for evaluation of staff management and managers in project-based research organizations with a 540 degree feedback

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ABSTRACT

The overall goal of this study is to evaluate the performance of departments, professional groups and staff management in project-based research organizations based on the management and organizational indices in order to improve the efficiency and quality of providing service in these places. In this regard, a main hypothesis and eleven subsidiary hypotheses are provided based on the indices of performance evaluation from individual and organizational perspectives. The eleven indices are as follows: planning, organizing, leading and guiding, supervision and control, decision-making, interaction and communication, personal and managerial competencies, accountability, entrepreneurship, reporting, and efficiency. The statistical population of this research consists of 200 researchers and managers in research centers and 100 subjects are selected as the samples through a stratified random sampling method. The researcher-made questionnaire with 50 questions is the data collection tool, and Cronbach's alpha is obtained equal to 0.86 after investigating the validity in order to evaluate the reliability. Kolmogorov-Smirnov test is utilized to identify the data distribution; and the obtained data is analyzed through descriptive and inferential statistics (one-group t test). The final results of research indicate that these eleven indices evaluate the managers and staff management in research organizations from the perspective of managers in staff-research centers. The case study is done in a research staff organization; and ranking 12 managers is done with this approach.

KEYWORDS: Performance management, performance evaluation, efficiency, performance improvement, 540-degree feedback

1- INTRODUCTION

In the past two decades, the organizational performance management has become one of the interesting topics, and this interest both in research and application fields has led to the creation of vast innovations [1]. The performance evaluation is one of the major issues affected by a wide range of disciplines and experts and new reports and articles have been written about it. Furthermore, the application market has also grown in this field [2]. Despite the existence of numerous models and frameworks in this regard, the researchers' some conceptual models have had the greatest influence on shaping this particular field [3]. Any research organization should consider the continuous improvement in its performance, thus it should have the appropriate performance system for tracking the exact position and receiving the feedback to identify the gaps which need to be improved [4]. The proposed model in this study is based on the identification of indices to assess the management and managers' performance on staff-research organizations and it plays an important role in evaluating the performance of research organizations.

2- RESEARCH OF LITERATURE

Since the past 15 years, the performance evaluation has engaged numerous academic opinions in different, so that the second half of 1990s has been identified as the culmination of these activities. The estimates indicate that 3615 articles were published in the field of performance evaluation from 1994 and 1996. Furthermore, the statistics indicate that a book was published about this subject only in America every two weeks in 1996 [5]. This is also true in research organizations and most of the state organizations and agencies are seeking to show a good performance for their research centers according to the necessity for high investment and the increasing importance of research and development for future competitiveness, despite the fact that the performance evaluation of these centers and measuring their contribution in the success of relevant organization or community are very difficult [6].

In an article entitled "The multidimensional organizational performance evaluation using a combination of AHP and BSC approaches", Bentes et al evaluated three operational units of an organization with regard to the balanced scorecards. They introduced a nine-step algorithm in this regard and defined the appropriate indices for each of the criteria in order to evaluate the performance [7].

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In a research entitled "The integrated approach of BSC-TOPSIS for evaluating the top management faculties at Universities of Tehran Province with a strategic approach", Mehregan and Nayeri evaluated the performance in management faculties and compare them by balanced scorecard [8].

In an article entitled "The use of Fuzzy network analysis process for balanced scorecard", Yüksel et al determined the performance of a business based on a balanced scorecard integrated model with fuzzy network analysis process based on the perspectives and strategies. They have declared that the proposed model is able to evaluate the business performance from the perspective of a strategy and through the past results, and current and ongoing indices [9]. Utilizing a combined model of TOPSIS and fuzzy BSC, Manian et al evaluated the performance of IT department in Gas Company [10].

Hoseinpour et al have found that the balanced scorecard (BSC) model can be a basis for evaluating the performance of local defense research centers. Therefore, these canters should utilize this method according to the local and environmental conditions, scope, and their goals and strategies. In their model, the performance of research centers of defense is evaluated with respect to their goals and strategies in four dimensions of finance, customer and market, internal processes, and employees' learning and growth [11].

Prowse et al took efforts to compare different methods of performance evaluation and measurement and extract the executive problems and challenges of evaluation process for each method. They emphasized on the restriction of theoretical development in performance evaluation and discussed about the psychological attitude of evaluation analyses as well as the more critical evaluations [12].

In a research for evaluating the features of evaluation systems and performance management in public organizations, Sole extracted and introduced the factors affecting the improvement of performance in public sector. Furthermore, this study includes a review and analysis of performance aspects and the use of performance evaluation indices as well as the factors which affect the implementation of performance management process [13].

In a research with the aim at evaluating the performance in research organizations of India, Banwet et al have concluded that the performance evaluation for research and development organizations should be done based on the quantitative and qualitative outputs (quantitative and qualitative indices), and if these two types of indices are considered together, it will lead to the more realistic and comprehensive results of organizations and thus the more appropriate opportunities will be created for managers to identify the criteria of research and development organizations in order to evaluate the efficiency and separate the inefficient from efficient organizations [14].

In a research for investigating the effectiveness of financial and non-financial indices in performance evaluation of organizations, Hassab et al have compared these two types of indices and concluded that the results of evaluation based on these factors are more real when the compensation of employees' service is on the basis of financial and non-financial factors of performance, and since these factors are less changed, this type of evaluation will lead to the higher encouragement of employees and thus their job security [15].

In a research entitled "The performance measurement of research and development using the balanced scorecard (BSC) approach", Bigliardi et al have designed a model for performance evaluation in research and development organizations of Italy and considered the balanced scorecard model proper for performance evaluation of research and development by investigating different models and thus developed the BSC model and defined the perspectives for performance evaluation [16].

In a research entitled "A model for performance evaluation of research and development by selecting the balanced scorecard model for evaluating the performance of research units, Lazzarotti et al have introduced 5 perspectives as follows: 1- Financial perspective; 2- customer perspective; 3- innovation and learning perspectives; 4- internal business perspective, and 5- perspective of partnerships and research network. Afterwards, they have explained their model in a research company, which is active in mechanical and aerospace areas, by introducing 48 research and development indices, and proved that the proposed model and indices can meet the performance evaluation in research and development units [17].

2-1- Traditional and new approaches to evaluation (360-degree feedback and 540-degree feedback)

The traditional evaluations based on the stakeholder and mainly superior's opinion are unable to meet the diverse today's needs of business because the nature of today's businesses is based on the customer and extensive internal and external communications and this makes essential to pay attention to all beneficiaries and their views. 10 major factors, which undermine the traditional evaluations, are as follows: The lack of specified performance criterion/ inefficiency of scoring tools (83%), poor working relationship with the boss (79%), the superior's lack of knowledge about the way of actual performance (75%), the lack of continuous performance feedback (67%), being too negative/ guesswork (63%), perceived political studies (54%), the ineffective communication with reward system (50%), the lack of focus on improvement management (42%), the superior's lack of motivation/ability in scoring the skills (33%), and the weakness of structure/stability of study process (judgment) (29%). The conducted studies in this field indicate the increasing tendency of European organizations to new approach according to its advantages compared to the classical approach [18].

The 360-degree feedback refers to the systematic collection [process] of data associated with the performance [and competencies] in individuals or group from a number of their stakeholders and providing the feedback to them. In this method, the various stakeholders' information is utilized for evaluation and a more realistic assessment of individual skills, capabilities and performance is provided. The results of evaluating this method should be in fact considered as the results which are accepted by various people and this acceptance is done easier with lower opposition by evaluator.

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Since the past few years, numerous organizations have gone beyond the intra-organizational evaluation system and evaluated the staff performance more accurately from the perspective of those outside the organization such as the external customers, suppliers and stakeholders. This process has led to a new form of 90, 180 and 360-degree feedback (evaluations) which is often called the 540-degree feedback as shown in Figure (1). Oxford Dictionary defines the 540-degree feedback as follows: It implements a wider scope than the 360-degree feedback [19]. In other definition, the 540-degree feedback is an approach which involves the external sources (including the external customers, suppliers and business stakeholders) in the evaluation process [20]. The important thing is that the detailed evaluation of individual performance needs the intra and extra-organizational feedback [21]. The 540-degree feedback creates the outer layer of 360-degree feedback and includes those who comment on the individual performance and evaluate his performance from the outside of organization [11]. A large number of organizations utilize the evaluation by domestic and external customers as the sources of evaluation information [22].



Fig.1. Basic 540-degree model

Armstrong argues that the scope of feedback can be extended to include other stakeholders namely the external customers, clients or suppliers. A self-evaluation process can also be used to compare the same criteria [23]. Ketan and Alwan have utilized the multi-resource 540-degree evaluation system in their study to facilitate the staff learning and training needs, and compared the result with post training by identifying the pre-training needs [24].

The 540-degree feedback is selected as the base model according to the research literature, and the proposed model is presented on this basis.

Figure 2 shows the process of implementing the 540-degree feedback. The people, who are supposed to be evaluated, are first identified and then an evaluation team is considered for each organizational unit. Afterwards, the questionnaire is distributed and evaluation performed. Then, scoring is done for each manager based on a table, and eventually ranking the managers is done and the results analyzed.

Khoshnevis et al., 2016



Fig.2. Process of 540-degree feedback-Mark(1996)

2-2- Proposed model:

Figure 3 represents the proposed model for evaluating the managers and staff management in research organizations. The Chief Executive Officer or CEO is the direct authority in this model. The employees, working under the supervision of management, are the subordinates. The self-assessment questionnaire is responded by each manager. The internal customers and stakeholders include the service receivers from that management, and ultimately the external customers are those outside the set who interact with target management and take the advantage of its service.



Fig.3. Proposed model for evaluating the managers and management

2-3- Identifying the evaluation indices for staff management in research organizations

The library studies are first conducted to identify the performance evaluation indices, and these indices are extracted from previous papers and studies and then the experts' opinions are added to these indices as a form of initial questionnaire. In this regard, some of the indices are added, removed, or modified, and an initial questionnaire designed for investigating the content validity.

3- RESEARCH METHODOLOGY

Since this study has the theoretical and practical type, it needs the library and field studies. Numerous articles, books and theses are studied in this regard. The results are studied by experts for investigating the validity of model at each stage of model. Therefore, the questionnaires are designed and distributed among them and their validity and reliability investigated in this area. The interviews are conducted with experts for better data collection. According to these issues, this study has descriptive-research method and is applied according to its case study is target research organization. The statistical population consists of staff managers and employees in target research organizations and centers.

This research has the stratified random sampling type. Therefore, several individuals are selected from each mentioned group in statistical population in terms of availability to respond to the questionnaire. Table 1 shows the statistical sample.

Table 1. Determination of statistical sample				
Statistical population	sample size percentage of total samp			
Managers	13	%13		
Offices and the same-level	13	%13		
management				
Subordinates	50	%50		
The board of directors	2	%2		
External stakeholders	22	%22		
Total	100	%100		

3-1- Investigating the validity and reliability of questionnaire

The content validity is utilized in this study. Therefore, the content validity questionnaire is designed in a way that its questions are not vague and ambiguous. Afterwards, the prepared questionnaire is provided for university experts and reviewed and modified by receiving their ideas and suggestions. The Likert scale (1= very low to 5 = very high) is utilized to score the questionnaire. After finalization, the content questionnaire is given to 16 experts familiar with the performance evaluation issues for receiving their judgment and comment. From this number, 14 questionnaires are responded and given to the researcher. The validity of questionnaire is evaluated by experts and three questions are removed based on the Carcass index according to the cut-off point of 0.6. Furthermore, Cronbach's alpha is applied to assess the reliability of questionnaire, and 100 out of 120 questionnaires distributed among the statistical population are returned. Based on SPSS software, Cronbach's alpha coefficient is obtained equal to 0.86 which has high and appropriate reliability.

Most of the statistical tests such as the parametric tests are based on the normal distribution of data, and they are applied according to the assumption that the data distribution is normal in a population or among the samples selected from the target. Therefore, the analyst needs to know the type of distributing those variables before statistical analyses of variables. Kolmogorov-Smirnov test can be utilized in this regard [25].

3-2- Kolmogorov-Smirnov test

According to the null hypothesis in Kolmogorov-Smirnov test, the data follows a normal distribution; and based on the alternative hypothesis, the data does not follow a normal distribution. As shown in Table 2, the level of probability (P-value) in all research variables is higher than the error level of 0.05 in this test. According to the P-value and not rejected null hypothesis, the data distribution is considered in accordance with the normal distribution, and thus the parametric tests compatible with normal distribution should be utilized to test the hypotheses or respond to research questions.

 H_0 and H_1 are utilized to test the normal distribution of data. The H_0 is based on the normal data distribution and is tested at the error level of 5%. Therefore, if the test statistic is obtained greater than or equal to 0.05, then there is no reason for rejecting the null hypothesis based on the normal data. In other words, the data distribution will be normal. The statistical hypotheses are set to test the normality as follows:

- H₀: Data distribution for each variable is normal.
- H₁: Data distribution for each variable is not normal.

Distribution of observations follows a normal distribution			H ₀ : (^{/2} =0)		
Distribution of observations don't follows a normal distribution			$_{\rm H_1:(} \rho \neq_{0)}$		
Variable	Number of samples	Test statistic	Sig value	Test Result	
Planning	100	0.752	0.052	Normal Distribution	
Organizing	100	0.695	0.719	Normal Distribution	
Leading and Guiding	100	0.603	0.860	Normal Distribution	

Table 2. Data distribution

Khoshnevis et al., 2016

Supervision and Control	100	0.853	0.461	Normal Distribution
Decision-making	100	0.892	0.404	Normal Distribution
Interaction and Communication	100	0.795	0.129	Normal Distribution
Personal and managerial Competencies	100	0.732	0.404	Normal Distribution
Accountability	100	0.770	0.658	Normal Distribution
Entrepreneurship	100	0.685	0.586	Normal Distribution
Reporting	100	0.791	0.435	Normal Distribution
Efficiency	100	0.857	0.158	Normal Distribution

According to the statistical z value for Kolmogorov-Smirnov test and the obtained significance level, it is found that the mean scores of variables are normal, and thus the t-test is utilized.

3-3- Hypothesis Test

One-sample t-test (compared to a constant value) is utilized to investigate the indices of performance evaluation. The value of 3 is considered in this test (Test Value). According to the five-point Likert scale, the values below 3 indicate the inappropriate variable and those above 3 show the appropriate variable. As noted, the value 3 is selected as the middle of range (t normal) and the average status of variable. The null and alternative hypotheses for this test are as follows:

Null hypothesis: The variable has inappropriate status in sample population. (H₀: $\mu \leq 3$)

Alternative hypothesis: The variable has appropriate status in sample population. (H₁: μ > 3)

Hypothesis test

Main hypotheses:

Considering that similar hypotheses, a hypothesis is provided and other indices are investigated in the table.

First hypothesis: The planning index is appropriate as the performance evaluation index in staff management of research organization.

 H_0 : The planning index is inappropriate as the performance evaluation index in staff management of research organization.

H₁: The planning index is appropriate as the performance evaluation index in staff management of research organization.

According to the mean test of a population (one-sample t), the proposed hypothesis is investigated for population mean at the error level of α . Given the defined level (value 3), we can determine the value of target variable and decide whether that variable in studied phenomenon is considered effective or not?

The result of this test consists of two outputs. First, (Table 3) provides the descriptive statistics for hypothesis test. The calculated values indicate the number of data, mean, standard deviation and standard mean error, respectively. The results of testing the descriptive statistics indicate that the sample mean value of 4 for target variable (first dimension) is higher than the constant value (3), but this should be verified through the inferential statistics (hypothesis test or confidence interval). Like the first index, the hypothesis test is presented for all indices, and the results are presented in the table3.

Variable	Ν	Mean	Std. Deviation	Std. Error Mean	
Planning	100	4.000	0.54267	0.06892	
Organizing	100	3.730	0.1047	0.13976	
Leading and Guiding	100	3.7417	0.44439	0.05644	
Supervision and Control	100	3.6134	0.47415	0.06022	
Decision-making	100	3.7534	0.32993	0.04190	
Interaction and Communication	100	3.8617	0.25315	0.1135	
Personal and managerial Competencies	100	4.0434	0.34125	0.00452	
Accountability	100	3.8456	0.41294	0.0258	
Entrepreneurship	100	3.4582	0.38569	0.07452	
Reporting	100	4.2514	0.45129	0.03365	
Efficiency	100	3.4512	0.54183	0.1123	

Table3- one-sample t test statistics results

The second output is as the table (4) for inferential statistics and it provides the test results. According to the Table 4 and the statistic value (t = 17.02) with degree of freedom equal to 99 and significance level of 0.000 (Sig =0.000 <0.05), the significance level for first hypothesis is less than 0.05 at the confidence interval of %95, thus the H₀ is rejected and it can be concluded than the planning index is appropriate as the performance evaluation index in expert committee of target research organization. Other results are presented in the following table.

	Test Value = 3					
Variable	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Planning	17.02	99	.000	0.88387	0.7461	1.0217
Organizing	17.147	99	.008	0.25115	0.0492	0.4531
Leading and Guiding	12.635	99	.004	0.4871	0.3245	0.7682
Supervision and Control	17.147	99	.000	0.96774	0.8549	1.0806
Decision-making	13.437	99	.000	0.80914	0.6887	0.9296
Interaction and Communication	13.27	99	.000	0.7534	0.2209	1.0533
Personal and managerial Competencies	13.437	99	.000	0.70214	0.6325	0.9346
Accountability	13.437	99	.000	0.79564	0.5864	0.8965
Entrepreneurship	11.523	99	.000	0.7452	0.5523	0.9523
Reporting	12.8	99	.000	0.6623	0.3845	1.0452
Efficiency	10.256	99	.000	0.7569	0.5236	0.9862

Table 4- one-sample t test hypothesis results

4. Conclusion

There are several ways for full assessment of managers and management in research organizations. 540-degree feedback model is one of the most comprehensive models which consider various aspects of evaluation and it plays the important role in evaluating the organizations especially the research ones with regard to the extra-organizational stakeholders. The 540-degree evaluation is an interactive model which cannot be implemented without all members' cooperation in the organization. The 540 degree feedback is an appropriate way in the field of developing the quality of leadership and development management. This process is a full cycle which provides a summarized feedback of everyone (managers, subordinates and stakeholders, internal colleagues, and external stakeholders) on various aspects of their leadership and management styles and performance. This study provides eleven indices for evaluating the staff management in research organizations including planning, organizing, leading and guiding, supervision and control, decision-making, interaction and communication, personal and management of research organization on this basis.

REFERENCES

- [1]Hersey, P. & Blanchard, K. & Johnson, D. (2012), "Management of organizational Behavior(10 th Edition)", Prentice Hall
- [2]Marr, B. & Neely, A. (2003), "Measuring E-business performance", Twelfth Annual Conference of the Production and Operations Management Society, Orlando FI.
- [3]Marr, B. & Schiuma, G. (2003), "Business performance Measurement: past, present and Future", Management Decision 8/41, pp 68-87.
- [4]Almasi, Hassan (October 1995), "A new approach to human resources: From performance evaluation to performance management", Tadbir Journal, No. 56.
- [5]Folan, P., Browne, J., "A review of performance measurement: Towards performance management", Computers in Industry, Vol. 56, pp. 663-680, 2005.
- [6]Loch, C. H., Tapper, U. A. S., "Implementing a strategy-driven performance measurement system for an applied research group", Journal of product Innovation Manage, Vol. 65, pp. 879-886, 2006.
- [7]Bentes, Alexandre Veronese & et al, (2012). "Multidimensional assessment of organizational performance: Integrating BSC and AHP". Journal of Business Research, 65, 1790–1799.
- [8]Mehregan, M.R; Dehghan-Nayeri, M. (2009). "The integrated approach of BSC-TOPSIS for evaluating the top management faculties at Universities of Tehran Province with a strategic approach", Journal of Industrial Management, 153-168.
- [9]Yüksel, i. & da Hdeviren, M. (2010)." Using the fuzzy analytic network process (ANP) for Balanced Scorecard (BSC): A case study for a manufacturing". Systems with Applications, 37, 1270–1278.
- [10] Manian, A. et al (2011). "Performance evaluating of IT department using a modified fuzzy TOPSIS and BSC methodology". Journal of Management Research, 3(2), 1-18.
- [11] Hopkins, B and Markham, J. (2003), "E-HR: Using Intranets to Improve the Effectiveness of Your People". Gower Publishing.

- [12]Prowse ,P and Prowse , J ,(2009)"The Dilema of performance Appraisal", Journal of measuring Business Excellence, Vol 13, Iss 4,pp 69-77
- [13]Sole, F, (2009), "A management Model and Factors Driving performance in public organization", Measuring Business Excellence, Vol 13, Iss 4, pp 3-11
- [14]Banwet, J. D. K. and Deshmukh, S. G. (2008); "Evaluating Performance of National R&D Organizations Using Integrated DEA-AHP Technique"; International Journal of Productivity and Performance Management, Vol. 57, Iss. 5, pp. 370-388.
- [15] Hassab, E., Hassan, R., Amal, A. and Said, E. M. (2010); "Nonfinancial Performance Measures and Earnings Management"; Advances in Management Accounting, Vol.18, pp. 55-79
- [16]Barbara Bigliardi and Alberto Ivo Dormio (2010), "A balanced scorecard approach for R&D: evidence from a case study ", Facilities, Vol. 28 No. 5/6, 2010, pp. 278-289
- [17] Lazzarotti , Valentina . Manzini , Raffaella, Mari , Luca (2011) , "A model for R&D performance measurement", Int. J. Production Economics 134 (2011), pp 212–223
- [18]McCarthy ,Alma M. Garavan, Thomas N (2001)," 360° feedback process: performance, improvement and employee career development", Journal of European Industrial Training, Vol. 25, pp.5 32
- [19] Heery, E and Noon, M. (2004), "A Dictionary of Human Resource Management", Oxford University Press, New York,4th Edition, pp 127.
- [20]Bailey, D. (2002), "360 feedback", Bulletiny Tua Company the Gee Training Hand Book.
- [21] Richardson, L. (1996), "Sales Coaching Making the Great Leap from Sales Management to Sales Coach", Mc.Graw . Hill, Printed by R. R. Donnelly.
- [22]Yakovak, M. A. (1996), "Paying for Satisfaction". HR Focus 73, No. 60.
- [23]Armstrong, Michael (2006), "Performance management (Key strategies and practical guide)", translated by Sadi Safari and Amir Vahabian, Iranian student book agency (ISBA) of Tehran, First edition, Tehran.
- [24]Ketan, H. S., Alwan. L, (2009),"Computer Aided Training Need Analysis Performance Improvement Measurement System", Btech Journal. Vol. 27, No.1.
- [25]Tofigh, Ali-Asghar; Soltani, Roya (2013)"Research method on a set of necessary concepts, methods and tools", published by the Industrial Research & Training Center of Iran, First edition, Tehran.