Devising an instrument to assess human resources productivity in an Iranian context

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ABSTRACT: There are various factors affecting human resources productivity. Moreover, it is a necessity to identify the most important and efficient ones. Therefore, there should be an appropriate instrument to determine the factors in the most comprehensive way. Accordingly, this study has employed Factor Analysis to devise a locally-based instrument to assess human resources productivity in Guilan University of Medical sciences. To achieve the mentioned goal, two stages have been taken during the fall of 2009. One was qualitative and the other was cross-sectional. In the former step 45 expert managers were included as the sample of the research to determine productivity factors and in the latter 321 staff members of scientific society, training and human resources departments of Guilan University were selected to establish the productivity variables. To enclose, One questionnaire with 5 headings and 42 questions has been obtained as follows: Organizational culture with 18 questions / Environmental conditions with 7 questions / Motivation factors with 10 questions / Empowerment with 4 questions / Method of leadership with 3 questions. The invented device, regarding to it reliability, validity, relevance and indigenousness in assessing of human resource productivity, could be useful for all the universities of medical science. Using of this device could improve the effectiveness of educational activities which are performed for the faculty members and experts of education.

INTRODUCTION

Productivity issues have attracted increasing interest amongst researchers during the last decade (Sahay, 2005, Parasuaman, 2002) in today's world; one of the main issues that assure consistency for organization is productivity. Implementing culture of productivity will lead organizations to make the best use of human and material resources and in doing so, competencies and potentials of organization will flourish. (Soltani, 2007). Manpower is the most important factor to improve productivity (Abtahi and kazemi, 1999). Efficient manpower is the main factor to obtain organizational goals and keep succeeding with consistency. (Eastaugh, 2002). Human factors may waste or make the most use of resources (Soltani, 2007). Also manpower could be considered the most valuable asset and resource for organizations. Organizations that located manpower on top of their list of agenda as prime importance factor succeeded to a desirable level (Abdolahi and Navehebrahim; 1999). Identifying influenced factors in order to upgrade manpower productivity is the main objective of many researchers. Moreover, almost all researchers believe that promoting manpower productivity may not result from only one special cause (or case), but a combination of factors should be considered (Taheri, 2007).

Present statistics indicates medical schools and organizations as well as medical training centers unlike industrial and commercial organizations have scarcely considered suitable methods to increase productivity among staff in Iran not to mention the models devised in industrial and commercial areas are not suitable for medical and health sectors (Jordan, 1994). Furthermore, because of some differences in cultural, social and economic circumstances, studies conducted in other countries are not feasible and proper to achieve suitable models for Iranian organizations either. (Dehghan Nayeri et al, 2006). Reports specify that manpower productivity indexes in Iran are lower than the other countries of Middle East together with the countries in the east of Asia.(Taheri, 2007). Therefore, proposing a strategy that could result in improving manpower productivity, systematic methods are required for measurement and evaluation (Soltani, 2007). One of the main factors for manpower productivity evaluation and assessment is to employ

suitable tools (Sarmad and bazargan and hejazi, 1997). Additionally, the tools are expected to be reliable and valid (Tabibi, Maleki, Delgoshaee, 2009).

According to what has been mentioned, this study concerns devising an instrument by which manpower productivity may be assessed. In other words, present study has employed exploratory and confirmatory factor analyses, considered as suitable methods for measuring instrument validity and reliability, to assess the reliability and validity of the researchers' composed questionnaire. It is worth mentioning that in the composed questionnaire almost all characteristics of research situation such as cultural, social and local aspects are expected to be involved. The researchers hope that all the results achieved in this study will provide sufficient local and native tools for Iranian researchers to facilitate their tasks in assessing human resources productivity.

Review of the related literature:

Alvani and Ahmadi (2001) tried to devise an instrument in assessing manpower productivity by establishing an expert panel from which the proposed comments were regarded as a basis to set up the content validity of the instrument.

Gigans and Oerman(2001), Gibons,Adaam and Padden (2002) , Zimeren andWestfall (1998) made an effort to achieve the reliability of their self-developed instrument through a group of experts.

Amini, Vanaki and Emamzadehghasemi (2005) made use of a group of specialists and experts to obtain the reliability and validity of an assessment instrument for nursing management practical learning. That is to say, the researchers achieved the face and content validity of the devised instrument by experts' confirmation and the reliability of the mentioned instrument was accomplished by internal reliability.

Song, Joo, and Chermack (2009) made an attempt to accomplish a validation study for learning organization questionnaire in Korean context.

To recapitulate, it is necessary to mention that there are lots of studies conducted on instrument devising in Iran and other countries, but these studies do not concentrate on devising an instrument assessment for human resources productivity in Universities and Higher education departments of Iran. Moreover, in the present study, confirmatory and exploratory factor analyses were employed to achieve the reliability of the devised instrument**.**

MATERIAL AND METHODS

Descriptive, analytical and cross-sectional studies were carried out during three months of September, October and November of 2009 in two stages (cross-sectional and qualitative). At quality stage, 45 experts in manpower productivity were included in the research sample population to determine manpower productivity dimensions. Data collection instruments at qualitative stage were interview and questionnaire. Issues that appear through research include empowerment of staff, method of leadership, organizational support, clarifying and documenting services, staff intention and motivation, Likert scale was used (Andaleeb,2004), completely agree (5), agree (4), no comment (3), disagree 2) and completely disagree (1). After determining the score for each component, the results were fed into SPSS software. Then the agreement extent for each component among experts was calculated. Next, the components on which 70% of experts had common agreement, chosen to be beneficial for manpower productivity. At last, the rest of the components as well as newly-proposed issues were negotiated again among those experts in order to lead to a total agreement.

At cross-sectional stage, the research samples were consisted of education department employees and faculty members of medical sciences university's such as dentistry, health care, nursing, midwifery, medical laboratories and international school of medical sciences in Guilan. Data collection mechanism at this stage was a questionnaire consisted of two sections. Section one comprises 8 questions regarding personal information such as sex, age, marital status, employment status, work experience, level of education, management experience and scientific group membership. Section two contains 42 questions on the subject of manpower productivity variables. As before for each question, Likert scale has been used for scoring as follows: 5 indicates very much, 4 indicates a lot, 3 indicates average, 2 indicates little and 1 indicates very little. The validity of manpower assessment instrument has been performed by library research and item analysis. Furthermore, the content validity has been obtained by an expert panel of manpower productivity. To put it into a simple language, the 12 specialists' comments were considered as a basis to modify some parts of the questionnaire. To determine construct validity, to identify the most effective components on manpower productivity and to recognize the loading level of each component on the main components, exploratory factor analysis with Varimax rotation method has been accomplished. Additionally, Kaiser_ Mayer_ Olkin (KMO) has been used for volume sufficiency (Dixon, 2001). To attain the data suitability, Bartlet test was employed.

To assess the reliability of the questionnaire, a test retest technique was carried out.

To verify internal consistency, Alpha Cronbach method has been used. The questionnaire distribution of cross-sectional stage was done during September November. After explaining necessary information about the research objective of the questionnaires to

347 people, 321 out of those completed the questionnaire accordingly.

RESULTS
A- QUALITATIVE RESULTS

1) After revising related studies conducted both in Iran and overseas, a primary model for manpower productivity was designed by the researchers. This model has been consisted of six components (factors) such as staff empowerment, method of leadership, organizational support, clarifying giving service, employees' tendency and motivation and validity of decisions.

2) The proposed primary model was given to the experts in order to obtain their comments and views (N = 45). The approved factors were rated as follows:

- Staff empowerment = 100 %
- leadership method = 100 %
- Organizational support = 91.1 %
- Clarifying giving servicing = 82.2 %
- Employees' tendency and motivation = 97.7 %
- Creditability of decisions = 86.7 %

3) At the previous stage some of the experts believed other factors like organizational culture, environmental condition, organizational structure, innovation and creativity also to be discussed in order to upgrade manpower productivity efficiency .Therefore, the following issues also went through rating process by experts and the following compromised results revealed as:

- Organizational culture = 91.1 %
- Organizational structure = 86.7 %
- Innovation and creativity = 73. 3 %
- Environmental condition = 71. 1 %

4) At the end of the given stages, 10 components were confirmed by the experts.

B- CROSS SECTIONAL RESULTS

The model devised from the mentioned stages(the qualitative stage) and the researchers' proposed questionnaire consisting of 8 questions in relation to personal and demographic characteristics and 42 questions in connection to efficient manpower productivity variables(the variables were selected based on the literature review) were submitted to 347 . Out of those 347 persons from scientific and training group members, medical university experts of human resources, dentistry , nursing , health care , medical laboratories and international unit, 321 persons completed and returned these questionnaires. After analysis, the following results in two sections obtained.

1) PERSONAL AND DEMOGRAPHIC CHARACTRISTICS RESULTS

1-1) **AGE**: 58. 6 % of the sample population was between 40 – 49 years of age. Minimum age was 28 years, maximum was 68 years and average age found to be 43. 87 ± 7.10 years.

1-2) **Sex**: 62. 9 % (202 persons) of the sample population was male and 37. 1 % (119 persons) was female.

1-3) **marital status**: 88. 2 % (283 persons) was married and 11. 8 % (38 persons) was single.

1-4) **Employment status**: 58. 9 % (189 persons) was official and the rest were non-official employees

1-5) **Work experiences:** 11.8 % (38 persons) had less than five years of experience, 20.6 % (66 persons) had 5 – 10 years of experience, 48. 6 % (156 persons) had 11– 20 years of experience and   19% (61 persons) had more than 20 years of work experiences.

1-6) **Level of education**: 35. 8 % (115 persons) were experts and at PhD level, 22. 1 % (71 persons) was educated up to post-PhD degree, 19 % (61 persons) had B. Sc. degree, 15. 3 % (44 persons) was educated up to M. Sc. degree, 2. 5 % (8 persons) was general physicians (GP), 3. 7 % (12 persons) had above-diploma degree and 1. 6 % (5 persons) had diploma.

1-7) **scientific group member**s: 62 % (199 persons) was the faculty members and 38 % was not.

1-8) **Managerial work experiences**: 49. 2 % (158 persons) who carried out related researches had management experiences and the rest didn't.

2) EXPLORATORY FACTOR ANALYSIS RESULTS

Reliability of this questionnaire calculated by test-retest method was 0.98 and internal consistency was 0.89 using Alpha Cronbach method. Content validity conducted by expert panel. KMO method was employed in order to assess sample population volume, the logical result achieved was 0.96 in which it was found that the result was 0.8 more than the ideal value (Dixon, 2001). The suitability of data was also carried out by using Bartlet test (Bartlett, 1954) which indicated the suitability at the $p = 0.000$ level. As it can be seen, this suitability disclosed recognizable relations between those variables subjected to factor analysis.

In exploratory analysis the 5 main issues with 42 questions were identified and they are as follows in the order of importance:

1. Organizational culture with 18 questions; 29.26 % variance and Eigen value of 21. 62

2. Environmental conditions with 7 questions, 12. 96 variance and 2. 63 Eigen value.

3. Motivation factors with 10 variable, 12. 84 % variance and 1. 58 Eigen value

4) Empowerment with 4 variables, 7. 47 % Variance and 1.34 Eigen value.

5) Leadership method with 5 questions, 5.05% variance and 1.21 variance.

It is necessary to mention that these 5 issues with 67. 60 % variance could explain manpower productivity changes (Tables 1).

Table 1. Identifying 5 main issues using exploratory factor analysis

ROW	MAIN TOPICS	VARIABLES (QUESTIONS)	VARIANCE (%)	SPECIAL(ADDED) VALUE
1	ORGANIZATIONAL CULTURE	18	29.265 %	21.622
2	ENVIROMENTAL CONDITIONS	7	12.961 %	2.634
3	MOTIVATION FACTORS	10	12.849 %	1.584
4	EMPOWERMENT	4	7.47 %	1.341
5	LEADERSHIP METHOD	3	5.05 %	1.211
6	TOTAL	42	67.595 %	28.392

   To achieve the purpose of identifying the loading degree of each component based on their main components, exploratory Factor analysis with Varimax rotation (Table 2)

Table 2. Main issues matrix after Varimax rotary with loading level from all variables (Questions)

ROW	VARIABLES	ORGANIZATIONAL CULTURE	ENVIROMENTAL CONDITIONS	MOTIVATION FACTORS	EMPOWER MENT	LEADERSHIP METHOD
32	Supporting new ideas by managers	0.823				
29	Financial and spiritual support for new ideas	0.807				
٣١	Allocating budget for innovation	0.795				
38	Award and recognition for doing difficult tasks	0.790				
28	Suitable working environment	0.765				
33	Benchmarking-using innovation & creatability of other organizations	0.760				
37	Supporting staff by managers at difficult situations	0.758				
39	Promotion of capable staff for other positions	0.758				
30	Innovation by staff	0.735				
34	Creativity training courses for staff	0.720				
36	Delegation by managers	0.710				
40	Permission of decision making by staff from managers	0.702				
27	Using updated technology and technical knowledge	0.701				
26	Safety and health care in working environment	0.687				
24	Promoting staff to higher positions	0.637				

	(Capable staff)				
35	Documenting clear job descriptions	0.635			
25	Having employee relation manual and code of conduct	0.327			
16	Award and recognition of staff in group gathering	0.582			
12	Human resources forecasting in relation to different tasks		0.680		
13	Equipment and tools forecasting in relation to different tasks		0.657		
8	Exact definition of responsibilities and authorities		0.636		
7	Systematic activities		0.611		
5	Having related knowledge to carry out tasks(job)		0.598		
11	Suitable equipment and facilities for customer arrival		0.553		
1	Knowledge and education in correspondence with related job		0.451		
21	Time boundaries to do particular tasks			0.694	
18	Written or verbal warnings on basis of customer complaints			0.692	
20	Title register and names			0.691	
14	Recommendation and complaint box			0.670	
17	Customer evaluation appraisal for staff			0.647	
15	Job holder participation in decision making			0.538	
19	Clarifying different kind of services to people			0.504	
22	Resolving staff complaints by management			0.502	
23	Departments inspection and providing reports			0.450	
10	Maintenance and commissioning of internet site and answer call system			0.437	
4	Holding courses and seminars				0.781
3	Holding training courses for managers				0.721
2	Holding training courses				0.690

	for staff					
6	Establishing quality improvement committee				0.443	
42	Exact staff response to rules and regulation					0.698
41	Exact manager response to rules and regulation					0.619
9	Emphasis on carrying out work instructions and procedures accordingly					0.474

3) CONFIRMATORY FACTOR ANALYSIS

In order to confirm and fit obtained issues in exploratory factor analysis and the loaded variables described under each issue (fig. 1), LISREL 8.80 was used (Schumacher, 2004).
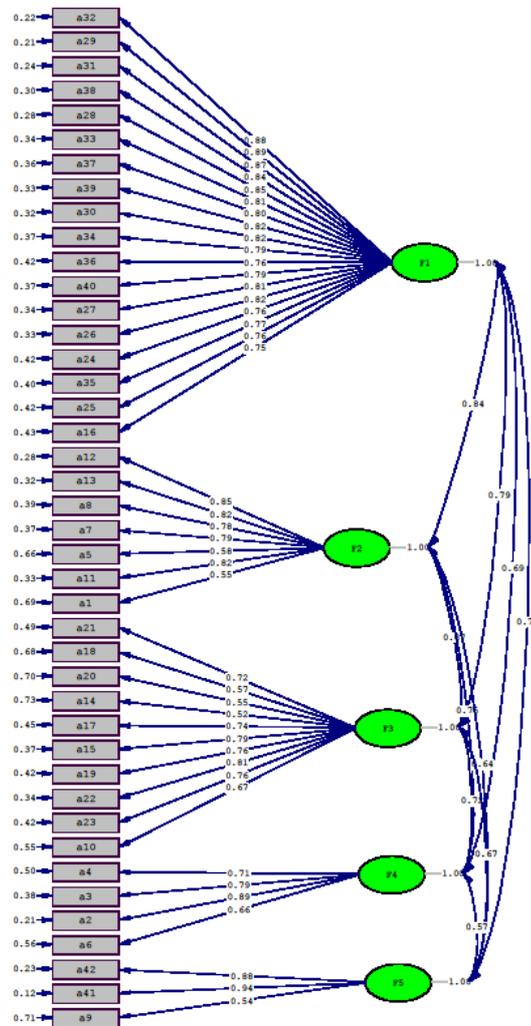

Figure 1. "Index model in confirmatory factor analysis and loaded variable"

Fit-index

1 – Root mean square error of approximation is equal to 0.090 and because this figure is less than 0.1, then we can consider this is an acceptable result for model used in factor analysis. In other words, degree of variables loaded under every issue is higher than 0.5, therefore the model is approved accordingly (Norris, 2005).

2- Comparative fitting index was equal to %0.97 and because this is higher than 0. 9, therefore, this indicates suitable index factor analysis model in comparison with similar models (Norris, 2005).

3. Standardized root mean residuals (SRMR) was equal to 0.039

4. Adjust goodness fit index (AGFI) was equal 0.075

5. Goodness of fit index (GFI) was equal to 0.90

6. Normed fit index was (NFI) was equal to 0.96

7. Relative fit index (RFI) was equal to 0.96

DISCUSSION AND CONCLUSIONS

The present study concerns devising an assessment instrument for manpower productivity. One of the most important steps for this purpose is validity and reliability. As far as it is considered, one of the most common methods for finding validity is gaining ideas from a group of experts (Gibbons, 2002). Accordingly in this research, the content validity was carried out by the help of management and productivity specialists.

Construct validity was confirmed using exploratory and confirmatory factor analysis.

Even though all components and questions of the questionnaire were the experts' comments and previous researchers' views, but factor analysis has been employed for the following reasons:

1. regarding the fact that questionnaires are affected by cultural and social features

2. determining the different important factors in composing questionnaires content

3. simplifying the extracted factors

Studies that carried out by kline indicated that factor analysis is often suitable for defining content layout (Kline, 1986). Comparing factor analysis results in qualitative research stage proved that 10 components confirmed by experts as the most efficient ones for manpower productivity. In contrast, in exploratory and confirmatory factor analysis 5 components including organizational culture with 18 questions, motivation factors with 10 questions, empowerment with 4 questions and leadership method with 3 questions listed as the most resourceful ones. It is also needed to state that 5 issues were eliminated because of having a factor load of less than 0.5 or overlapping with other factors. Correspondingly, Organizational culture was identified as the prime importance to upgrade manpower productivity. Similarly, schermerhorn studies specified that organizational culture may influence the whole

grounds of organization (1999). Also in exploratory factor analysis, the following variables (questions) such as enthusiastically accepting new ideas and keenly supporting those who proposed the ideas, supplying financial and non-financial support for staff creativity and innovation and at last allocating budget for the creativity advised from sub-divisions of organizational culture were regarded respectively as the most important factors to promote manpower productivity. In conjunction to this matter, Robbins believed 7 issues are the main criteria for organizational culture. He also believes creativity and innovation are the most central entities for organizational culture (Robbins, 1998). Alvani and Ahmadi carried out research with the title of total productivity management model and considering qualitative result, they came up with 8 issues including motivation factors, leadership method, and competitiveness, physical and spiritual status, on the job and off the job training. These 8 issues considered being main issues and other 47 issues called organizational sub-groups (Alvani&Ahmadi, 2001).Some of the issues that carried out in both researches could be visualized like leadership method and motivation factor. Also in total productivity management model, researches by revising different models and using personal management experiences, may seem like some important issues were not mentioned, like cultural values, training and environment.

In this study, research environments were medical universities, training and medical training contents, research society included scientific group, trainers and manpower. This research carried out at 2 stages considering cultural values, social and training.

One of the important actions in tool making process is to obtain creditability of tools.

Burns says that reliability with ratio of one indicates a complete reliability and zero ratios shows that there is no reliability. Also he says that 0.7 ratio reliability is a suitable tool (Burns and Groves, 2003).

This research made use of test re-test reliability of tools at a high level of 0.98 what is more the designed instrument in this study could also be used for the development of manpower productivity in medical sciences universities, medical training centers and governmental hospital all over the country.

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