



Localization of the Knowledge Workers' Productivity Questionnaire and Evaluation of the Productivity of Knowledge Workers of the Central Field of Shiraz University of Medical Sciences

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Abstract

Introduction: Human resources impose a vast expense on health organizations. Therefore, improvement of the productivity of human resources is of considerable concern to executive managers of every country.

Methods: In the present study, first, the knowledge workers' productivity assessment questionnaire was localized. Then, the knowledge workers of the central field of Shiraz University of Medical Sciences were investigated regarding productivity and affecting factors thereof.

Results: In this analytic and cross-sectional study, the questionnaire designed by Antikainen et al, was used as the pattern. 300 knowledge workers of the central field of this University were selected through the stratified random sampling in June 2011. Moreover, the data were analyzed through factor analysis, and etc.

Conclusion: Factor analysis led to the identification of eight main components of the knowledge workers' productivity. The reliability of the new version of the questionnaire was confirmed by the Cronbach's alpha coefficient of 0.945. Additionally, in this sample, productivity level of 19.3% of employees was low and 80.7% was favorable. In this regard, attempts must be made in order to improve the productivity.

Keywords: Organization and Administration, Manpower, Productivity, Questionnaire, Factor Analysis, Statistical

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1. Introduction

In general, health and treatment systems are highly dependent on the number, skillfulness, and commitment of their work force. In fact, human resources are known as the basis of the health section in respect of production, presentation, and management of the services [1]. Besides, physical resources and consumable materials, are other major inputs of the health system [2].

Human resources can impose the vastest and, at the same time, the most uncontrollable expenses on health and treatment organizations. Nevertheless, they are the central factor which affect the performance of these organizations. Consequently, one of the major duties of the researchers is determining how human resources can be managed in order to maximize productivity, increase creativity, and control expenses [3].

The human resources' productivity and its deep investigation are among the priorities of every organization. Productivity is defined as a person's feeling of effectiveness, efficiency, and capability in an organization. In other words, it means the optimal utilization of workforce, power, talent, and skills of the human resources [4].

Measurement of productivity is a way for supervising the organization's outputs as well as the personnel's efficiency. In fact, productivity is defined as quantification of products as well as the services which, according to the consumable resources, are produced in a particular period of time. Cohen et al, believe that productivity is beyond an economic measurement and shows how individuals have fulfilled their responsibilities in order to gain customers' satisfaction. In fact, productivity shows the personnel's effectiveness and efficiency [5].

Productivity is one of the major factors of success in all organizations. Moreover, improvement of the productivity can considerably affect most social as well as economic phenomena, such as economic growth and standards of life. Therefore, in order to remain profitable, organizations must continuously improve their productivity. Furthermore, measuring the productivity is a practical and traditional method for productivity management [6], which was traditionally evaluated through measuring the quantity of produced outputs (services or products) and the inputs utilized in the production process [7].

Of course, the traditional measurement of productivity

needs the outputs to be similar and comparable regarding their characteristics and qualities. Inputs utilized should be countable as well. In case the products are highly varied regarding their characteristics and qualities, the comparison will be quite difficult and even impossible. This problem is more obvious in evaluating the services and will be more serious in investigation of the knowledge workers; since they have highly complicated outputs of abstract and incomparable nature [7]. In addition, they do not have fixed duties. They do not have a standard time of production either and their duties are performed differently by various employees [8].

The term “knowledge work”, also known as “white-collar work”, is a rather new term. This term was first used by Drucker. The term referred to the staff who worked with intangible resources. Since then, the researchers defined the knowledge workers as people who used their knowledge in order to produce products or services. However, they did not insist on formal education. In fact, any type of knowledge that could be gained through informal education resources, such as experience, previous acquaintance, personal knowledge, organizational knowledge, and extrinsic knowledge [8]. Therefore, knowledge worker is referred to person who use knowledge in order to perform their duties. Based on this definition, the workers’ duties include planning, learning, research, analysis, organizing, storing, distributing, marketing, decision making, and all the other tasks which need the transfer of information from one form to another in order to produce the final “product” [8].

Researchers have proposed various conceptual models for measuring the knowledge workers’ productivity that the most common of which are going to be discussed.

According to Mundel, if the designed measurement system provides information about the objectives of performing the duties, output, method of counting the outputs, number and type of required resources for producing the outputs, desirable practical plan for the next stage, and method of measurement, the knowledge workers’ productivity can be evaluated. In the same line, Bumbarger showed how to measure the productivity and improve the knowledge workers’ productivity based on the four key factors of the operation function analysis methodology; i.e., demand, inter-organizational focus, creativity, and independence [8].

Furthermore, Smith proposed industrial engineering analysis and techniques for the measurement of knowledge workers’ productivity, including the analysis of work unit, process and method diagram, activity sampling, team time, standard organizational inputs, multiple linear regression analysis, and economic measurements [8]. Moreover, Gordon used “effectiveness” instead of productivity and, at the same time, confirmed their similarity. He argued that different factors, such as quantity, quality, timeline, and the multiple priorities regarding what the knowledge workers do, must be measured and evaluation should not be limited to the work quantity [8].

Drucker also emphasized the Taylorism potential application, including work design and industrial engineering principles, in the measurement of knowledge workers’ productivity. As such, he considered 6 determining factors of the knowledge workers’ productivity, the individuals’ task recognition, autonomy, creativity, continuous teaching and learning, the qualitative nature of productivity, meanwhile considering knowledge workers as assets [8]. At the same time, based on the studies conducted by Antikainen, since productivity is part of an organization’s performance, the productivity stimulants can originate from the factors which affect the performance. Therefore, the primary conditions of a successful knowledge-intensive organization can be the quality of the outputs, time efficiency, time management, knowledge and competency, the general requirements of the organization as well as the staff, appropriate working environment, appropriate cooperation with the customers, capability of useful knowledge conversion, and information progress among the network members [7].

Nevertheless, conceptual models cannot practically measure knowledge workers’ productivity. Subjective productivity measurement (SPM) is an old approach of low application for the measurement of productivity. Irrespective of quantitative information, SPM comes from personnel’s subjective measurement and utilizes questionnaires in order to gather the data [6]. The data of subjective measurement include beliefs, feelings, and attitudes which are hard to be quantified [7].

Such data are usually gathered through questionnaires as well as qualitative or descriptive interviews. Moreover, the data of subjective measurement can be gathered from the staff, administrators, customers, clients, and suppliers [6].

In general, Hersey and Goldsmith model is the most common applied model for the workers’ subjective productivity measurement which is utilized in most researches. The components of this model include ability, job recognition, organizational support, motivation, performance feedback, reliability, and environmental compatibility. It should be noted that this model is a general one and is not specialized for measurement of the knowledge workers’ productivity [9-12]. Nevertheless, Knowledge Work Productivity Assessment (KWPA) is particularly designed for measuring the productivity in knowledge-intensive organizations. KWPA can be used to improve the productivity and also identify the possible obstacles to productivity factors. This method, in fact, is a combination of questionnaires and interviews with a number of employees. The results of the questionnaire provide a general description of different factors related to productivity. Besides, the interviews provide deep information about particular issues [7].

Subjective productivity measurement may not include the quantitative aspects of objective or physical measurement; however, it can be utilized since the staff usually work based on their emotions. Also, according to Clements-croome and

Kaluarachi, SPM is highly advantageous as it can be conducted easily and, at the same time, requires low expenses [6].

Overall, the researchers of the present study came to the conclusion that Antikainen's model (2005) is the only available model for subjective measurement of the knowledge workers and, as a result, this model was utilized in the present study. Antikainen believes the basic factors of the knowledge workers' productivity to be categorized into three groups of inputs, process, and outputs. Inputs are also divided into two groups of organizational and personal. Analyzing these items determines where the opportunity for improving productivity exists [7].

On the other hand, the role of human resources is more important when it is investigated in the central fields of organizations since most jobs in such fields are knowledge-intensive and, at the same time, physical resources and consumable materials are not utilized for providing services. The central field of Shiraz University of Medical Sciences is responsible for supervising, organizing and supporting health centers, hospitals and medical schools which are located in Fars, a province of Iran, and consists of 761 knowledge workers which include 60% of the white-collar workers and the support staff. Moreover, because most of the activities are in form of services and do not have direct income provision, a bulk of the university current budget is spent for paying the rights and benefits of these workers.

According to the studies conducted by the researcher, no localized questionnaire was available for measuring the knowledge workers' productivity. Therefore, the present study aims to evaluate the validity of the structure of KWPA questionnaire, localize the questionnaire and use it for the knowledge workers of the central field of Shiraz University of Medical Sciences.

2. Methods

The present study is an analytic one which was conducted in a cross-sectional manner. The questionnaire designed by Antikainen et al [7], which was the only identified model for subjective assessment of the knowledge workers' productivity, was used as the pattern for this study. It was also utilized as the basis for localization of the questionnaire employed in the present study. This questionnaire, which includes 4 sections and 60 questions, was designed in 2005 and its sections are as follows:

1. The section related to the organizational inputs, including human resources, potential of creativity, organizational standards, current activities, information systems, communication networks, time allocation, working environment, and aims.
2. The section related to the personal inputs, including motivation, job satisfaction, personal communication network, personal issues, and physical fitness.
3. The section related to process, including work organization, task division, decision making organization,

clarity of job description, team work, knowledge transfer, delay and waiting, and the ability to affect one's own work.

4. The section related to outputs, including innovations, quality, utilization of innovations, time efficiency, and fulfillment of customer's expectations.

In the present study, the structure of questions are negative and the 5-point Likert scale (1=always, 2=usually, 3=sometimes, 4=hardly ever, and 5=never) was used in order to identify the staff's perception of their own productivity.

In the questionnaire utilized in the present study, the productivity factors whose mean score is lower than 3, show a problematic situation which requires attention. On the other hand, the factors whose mean score is higher than 3 show the desirable productivity in the working environment. In order to produce the Persian version of the questionnaire, first, the English questionnaire was translated to Persian. Then, the translated version was given to a translator and back translated to English. Afterwards, all the 3 versions were studied, corrections were made through the Persian version, and the main version was prepared.

Furthermore, in order to gather the demographic information, 8 questions, regarding age, sex, marital status, working experience, level of education, organizational post, place of work, and employment status, were placed at the beginning of the questionnaire.

It should be noted that this questionnaire was used for the first time in Iran. Besides, its strong point is that it is particularly designed for knowledge workers and there is no similar questionnaire in local studies.

In order to determine the superficial validity of the questionnaire, its content was studied and confirmed by 6 specialists of health service management. Moreover, test-retest method and Cronbach's alpha coefficient were used in order to determine the reliability of the questionnaire.

In the test-retest method, based on the statistics advisor's opinion, the questionnaire was first completed by 30 respondents in the pilot study. After a week, the same respondents completed the questionnaire in similar conditions. Then, the correlation coefficient of the scores was computed for both sets of responses and the means were compared through paired samples T-test. The correlation coefficient of the knowledge workers' assessment questionnaire was obtained as 0.809 which confirms the reliability of the questionnaire.

In addition, Cronbach's alpha coefficient was employed in order to determine the internal compatibility of the questionnaire. When the first 30 questionnaires were completed, the alpha of 0.905 was obtained which proves the reliability of the questionnaire.

Considering the fact that the sample size of the questionnaire-based studies is 5-10 times more than the number of the questions, a sample size of 300 individuals was determined for the present study.

The samples were selected through the stratified random sampling; in a way that in the first step, each of the 9 sections of the research community was considered as a stratum. Then, random sampling was performed according to the volume of each stratum in the target community. In order to select the study samples from each section, the questionnaires were given to about $1/2$ or $1/3$ of the knowledge workers located in each section's subcategories through the simple random manner. Of course, the staff was not forced to take part in the study. After all, a total of 314 questionnaires were distributed in the research community in June 2011.

The research community consisted of all the knowledge workers of the central field of Shiraz University of Medical Sciences which included 761 individuals; i.e., 60% of all the white-collar workers and the support staff. Moreover, the research environment included different sections of the central field of the university, including the deputy of developing management and resources, deputy of health, deputy of treatment, deputy of food and medicine, deputy of education, deputy of research, deputy of cultural affairs, deputy of student affairs, and the central administrative office.

The inclusion criterion of the study was being a specialist, not particularly having B.A. or B.S. degrees. In this way, different individuals with a diploma, A.D., B.A. or B.S., M.A. or M.Sc., and Ph.D. could work in organizational posts of specialist, head of section or manager. Therefore, the individuals who, in spite of having university degrees, did simple office works were excluded from the study. It should be noted that the questionnaires were anonymous and the subjects entered the study quite voluntarily.

Considering the objectives of the study, after collecting the data from the 300-subject sample size, factor analysis was used in order to identify the main as well as the secondary components of the knowledge workers' productivity questionnaire and localize it. Then, the reliability of the questionnaire was determined through Cronbach's alpha coefficient. Afterwards, descriptive statistics, such as mean and SD, were presented in tables. Finally, correlation coefficient, independent sample T-test, and ANOVA were utilized in order to determine the relationship between the knowledge workers' productivity and demographic variables.

3. Results

In the present part of the article, the results of the statistical tests are discussed in three sections of the localization of questionnaire, descriptive results of the knowledge workers' productivity assessment, and analytic results of the relationship between the knowledge workers' productivity and demographic variables in the study sample.

Determining the reliability of the questionnaire as well as the validity of its structure for the localization of the questionnaire: As mentioned before, the knowledge workers'

productivity questionnaire was used in Iran for the first time. Therefore, exploratory factor analysis through principal components analysis with varimax rotation was used in order to determine whether the aspects of the original questionnaire were repeated in the intended population in the translated version of the questionnaire, identify the main as well as the secondary components of the questionnaire, and localize the questionnaire.

Before conducting the factor analysis, KMO index and Bartlett's test were used to ensure the adequacy of the sample. The KMO index is located in a range between 0 and 1; if the index is close to 1, the data are considered appropriate for factor analysis. In addition, if the significance level of Bartlett's test is below 5%, factor analysis is considered appropriate for identification of the factors. In the present study, the KMO index was measured as 0.879 which shows the adequacy of the study sample. Besides, the significance level of Bartlett's test was below 0.001 which confirms the appropriateness of factor analysis for investigation of the structure of the knowledge workers' productivity questionnaire.

Since factor analysis aims to link several variables in order to create a factor, the variables whose correlation coefficient was more than 0.3 in the correlation matrix were located in one group and formed the parts of each component. Consequently, factor analysis resulted in identification of 8 main components of the knowledge workers' productivity. These components are familiarity with tasks and job description, conformity of the staff's personal characteristics and abilities to their tasks and working environment, process and method of working, information systems and the quality of organizational information, inner satisfaction from performing one's duties, the ability to perform team works, time allocation and time efficiency, and job performance.

These 8 components explained 53.163% of the changes in the knowledge workers' productivity. In addition, compared to the unrotated solution, the primary correlation was more precisely recreated by the rotated factors. Moreover, the varimax rotation revealed that, except for 5 questions (questions 3, 6, 26, 42, and 56 in Antikainen's questionnaire), all the questions were located on the factors and after removing these 5 questions, the Cronbach's alpha coefficient of the knowledge workers' productivity questionnaire increased from 0.942 to 0.945; therefore, these questions were excluded from the questionnaire.

The results of the factor analysis and the recommended main components of the questionnaire are presented in Tables 1 and 2. Furthermore, in order to investigate the internal compatibility of the new aspects to the whole questionnaire, the Cronbach's alpha coefficient was measured and obtained as 0.945 which confirms the reliability of the new version of the questionnaire. Therefore, further studies can be performed by the new version of the questionnaire. Table 3 shows the Cronbach's alpha coefficient of each aspect of the questionnaire.

Table 1. Exploratory factor analysis, identification of eight main components of the knowledge workers' productivity

Number	Main components	Number of variables	% of Variance	Initial eigenvalues
1	Familiarity with tasks and job description	10	% 9.489	14.609
2	Conformity of the staff's personal characteristics and abilities to their tasks and working environment	9	% 7.888	2.611
3	Process and method of working	7	% 6.836	2.360
4	Information systems and the quality of organizational information	6	% 6.649	2.186
5	Inner satisfaction from performing one's duties	6	% 6.533	1.972
6	The ability to perform team works	6	% 6.062	1.834
7	Time allocation and time efficiency	5	% 4.877	1.695
8	Job performance	5	% 4.829	1.442
	Total	54	% 53.163	28.709

Table 2. Matrix of the main components of the knowledge workers' productivity questionnaire after varimax rotation with loading rate of each variable

Number	Question	First aspect	Second aspect	Third aspect	Fourth aspect	Fifth aspect	Sixth aspect	Seventh aspect	Eight aspect
29	I don't know what I am expected to do in different stages of my work.	0.445							
31	Others do not know what I need for doing my duties.	0.311							
32	I don't know who is responsible for doing different tasks.	0.660							
33	I don't know exactly what I am supposed to do.	0.734							
34	I don't know who makes decisions about my working outcomes.	0.654							
35	I don't know my duties.	0.712							
36	I don't know what my colleague is supposed to do.	0.720							
46	I don't know where I can find the information I need.	0.543							
47	I don't know the customers' needs.	0.595							
48	I don't know the requirements of other units.	0.514							
1	I cannot use my abilities or previous experiences.		0.522						
2	I cannot use other staff's experiences.		0.362						
5	The organization's working method stops my work from being effective.		0.472						
16	There are gaps and disorders in my working environment.		0.552						
18	My working environment makes me stressful.		0.453						
19	I cannot express my opinions in my working environment.		0.512						
20	My criticisms are either neglected or rejected.		0.580						
21	I am not motivated and this worsens my performance.		0.521						
23	I don't receive sufficient remuneration for what I do.		0.550						
43	I have to wait for what my superiors do.			0.611					
44	I have to wait for what the other employees do.			0.639					
45	I have to wait for what the clients do.			0.485					
49	If I can choose my working method, I will be more effective.			0.403					
50	I have to work based on the methods determined by others.			0.672					
51	I cannot be creative.			0.539					

Number	Question	First aspect	Second aspect	Third aspect	Fourth aspect	Fifth aspect	Sixth aspect	Seventh aspect	Eight aspect
52	I cannot create new solutions for the clients' problems.			0.447					
10	The organization's information systems are not appropriate for my work.				0.561				
11	I cannot obtain the information I need from the available information systems.				0.655				
12	There are errors in the information provided for me.				0.679				
13	I have to wait for the documents I need for my work.				0.647				
14	I have to search for the documents I need for my work.				0.646				
15	I don't know where I can search for particular information about my intended group.				0.462				
4	I think my personal characteristics are not appropriate regarding what I do.					0.619			
22	I don't know my working objectives.					0.572			
24	I'm not internally satisfied with what I do.					0.595			
25	I only work for money.					0.535			
53	I'm not satisfied with the quality of what I do.					0.366			
59	I cannot provide my clients with satisfying solutions.					0.421			
37	Team work is not satisfying in our group.						0.517		
38	In our group, each member only focuses on his/her own task.						0.630		
39	I have to solve my working problems on my own.						0.754		
40	I cannot discuss my work with other group members.						0.637		
41	Team thinking does not sufficiently exist in our group.						0.633		
57	Other team members' tasks come to an end sooner than the allocated time.						0.555		
7	I need more time for performing my duties.							0.760	
8	Incorrect programming causes problems for my work.							0.432	
9	I cannot perform my duties the way I like since I don't have enough time for doing new tasks.							0.701	
17	Not having enough time to rest has caused problems for my work.							0.569	
30	If others take responsibility for doing a part of my daily activities, I can work more effectively.							0.544	
27	My physical health affects my performance.								0.514
28	Due to the problems in my personal life, I cannot concentrate on what I do.								0.525
54	My working outcomes are not used in other projects.								0.576
55	My working outcomes are not utilized completely.								0.561
58	The clients are not satisfied with the results of my work.								0.369
60	Recently, I am less productive in what I do.	(as the last question and the personal opinion of the staff)							

Table 3. The results of the reliability assessment of the knowledge workers' productivity questionnaire after the factor analysis

Aspects of the knowledge workers' productivity questionnaire after the factor analysis	Cronbach's alpha coefficient
Familiarity with tasks and job description	0.889
Conformity of the staff's personal characteristics and abilities to their tasks and working environment	0.844
Process and method of working	0.753
Information systems and the quality of organizational information	0.799
Inner satisfaction from performing one's duties	0.747
The ability to perform team works	0.791
Time allocation and time efficiency	0.739
Job performance	0.620
Whole questionnaire	0.945

Descriptive results of the knowledge workers' productivity assessment: Based on the demographic information of the study sample, almost 78% of the study subjects were less than 40 years old. Besides, 87% of the participants of the study had less than 20 years of working experience, which shows that most of the organization's employees were young. Moreover, the proportion of males to females was almost equal, and the ratio of the married staff to the single ones was obtained as 3 to 1. Furthermore, more than 84% of the staff had at least B.A. or B.S. degrees, and 78% of the participants were working as specialists, which confirms the fact that their jobs were knowledge-based. Also, their employment status, the top to bottom, were official, contractual, semi-official, and project staff, who were working in 9 sections, including 8 departments and the central administrative office.

After conducting the factor analysis and identifying the 8 components of the knowledge workers' productivity, 87.7% of the employees revealed desirable productivity regarding the familiarity with tasks and job description, 62.7% regarding the conformity of the staff's personal characteristics and abilities to their tasks and working environment, 57.1% regarding the process and method of working, 57.9% regarding the information systems and the quality of organizational information, 89.5% regarding the inner satisfaction from performing one's duties, 64.5% regarding the ability to perform team works, 44.6% regarding time allocation and time efficiency, and 84.5% regarding job performance, and the mean score of these aspects was calculated as 3.84 ± 0.675 , 3.22 ± 0.707 , 3.15 ± 0.628 , 3.16 ± 0.659 , 3.95 ± 0.694 , 3.37 ± 0.755 , 3.00 ± 0.734 and 3.66 ± 0.641 , respectively.

Also, except for time allocation and time efficiency, all the aspects' mean scores were above 3 which show the desirable productivity in the working environment. However, the closer the mean score to 5, the more desirable the productivity. Therefore, the study sample has not been much productive in these aspects which suggests the necessity for improving the productivity.

Considering the overall productivity which refers to all the 8 aspects, the mean score of the study sample was obtained as 3.45 ± 0.495 . In fact, 19.3% of the staff had undesirable productivity, while 80.7% had desirable productivity; of course, their productivity level was quite far from the ideal

status, i.e., score 5 that is the best status. In sum, productivity and its aspects were not highly desirable in the organization under study (Table 4).

Analytic results of the relationship between the knowledge workers' productivity and demographic variables: In order to investigate the relationship between the knowledge workers' productivity and demographic variables, the mean scores of different aspects of productivity were compared in different groups. According to the results, a significant correlation was found between familiarity with tasks and job description and age, working experience, and place of work. In addition, the conformity of the staff's personal characteristics and abilities to their tasks and working environment was significantly correlated with sex. Plus, significant relationship was found between process and method of working and age, information systems and the quality of organizational information and place of work, and, finally, inner satisfaction from performing one's duties and age as well as employment status. Of course, the overall productivity only revealed a significant positive relationship with age. Nevertheless, no significant correlation was observed between the aspects of productivity and marital status, level of education, and organizational posts.

Table 5 presents the details of the relationships between different aspects of productivity and demographic characteristics. In this table, the cells which are colored gray show a significant relationship with 5% significance level.

4. Discussion

As mentioned before, the results of factor analysis led to the identification of eight main components of the knowledge workers' productivity questionnaire whose main aspects are two times more than those of Antikainen's questionnaire. In comparison to the names of the aspects of Antikainen's questionnaire which were categorized into four groups of organizational inputs, personal inputs, process, and outputs, the strong point of the names of the aspects of the questionnaire used in the present study is that the new names are more functional and, at the same time, more tangible for the readers, which makes the comparison with other studies easier, as well. Moreover, the present questionnaire is specialized for evaluating the knowledge workers' productivity, while the Hersey and Goldsmith model, which

Table 4. Mean and SD of the knowledge workers' productivity score, and the frequency distribution of the status of productivity in the study sample

Aspects of the knowledge workers' productivity	Mean and SD	% of the respondents with desirable productivity
Familiarity with tasks and job description	3.84 ± 0.675	% 87.7
Conformity of the staff's personal characteristics and abilities to their tasks and working environment	3.22 ± 0.707	% 62.7
Process and method of working	3.15 ± 0.628	% 57.1
Information systems and the quality of organizational information	3.16 ± 0.659	% 57.9
Inner satisfaction from performing one's duties	3.95 ± 0.694	% 89.5
The ability to perform team works	3.37 ± 0.755	% 64.5
Time allocation and time efficiency	3.00 ± 0.734	% 44.6
Job performance	3.66 ± 0.641	% 84.5
Overall productivity	3.45 ± 0.495	% 80.7

Table 5. Correlation between the knowledge workers' productivity as well as its aspects and demographic variables

Aspects of the knowledge workers' productivity	Age		Working experience		Sex	Marital status	Level of education	Organizational post	Place of work	Employment status
	Correlation coefficient	P-value	Correlation coefficient	P-value	P-value	P-value	P-value	P-value	P-value	P-value
Familiarity with tasks and job description	0.152	0.010	0.124	0.038	0.341	0.737	0.721	0.358	0.016	0.805
Conformity of the staff's personal characteristics and abilities to their tasks and working environment	0.076	0.211	0.009	0.889	0.040	0.337	0.365	0.552	0.094	0.686
Process and method of working	0.119	0.046	0.100	0.097	0.259	0.606	0.323	0.805	0.377	0.789
Information systems and the quality of organizational information	-0.016	0.787	-0.015	0.803	0.746	0.935	0.121	0.643	0.003	0.101
Inner satisfaction from performing one's duties	0.129	0.028	0.108	0.069	0.210	0.832	0.631	0.150	0.360	0.001
The ability to perform team works	0.007	0.905	-0.018	0.771	0.704	0.642	0.672	0.873	0.089	0.728
Time allocation and time efficiency	-0.002	0.969	0.040	0.504	0.413	0.553	0.302	0.968	0.060	0.235
Job performance	0/040	0.502	-0.005	0.934	0.263	0.317	0.271	0.958	0.082	0.256
Overall productivity	0.143	0.038	0.088	0.207	0.215	0.756	0.687	0.751	0.271	0.62

*In each cell, P-value of the correlation between the columnar and the serial variable is presented. Regarding the two quantitative variables of age and working experience, the correlation coefficient of the two variables is presented, as well. In addition, the cells which are colored gray show a significant relationship with 5% significance level.

includes seven components of ability, job recognition, organizational support, motivation, performance feedback, reliability, and environmental compatibility, is a general model for the assessment of productivity and can be used for any carrier field. In the present study, after conducting factor analysis and designing a localized questionnaire, the productivity of the study subjects was assessed. According to the results, a significant relationship was only found between the overall productivity and age. Nevertheless, after classifying productivity to its aspects, differences were observed which are going to be discussed in the same section of the article.

As the findings of the present study showed, familiarity with tasks and job description, inner satisfaction from performing one's duties, and the overall productivity had a significant positive relationship with age. In addition, a

significant positive correlation was found between familiarity with tasks and job description and working experience. Furthermore, conformity of the staff's personal characteristics and abilities to their tasks and working environment revealed a significant correlation with sex; in a way that in comparison to females, males had a higher level of productivity in this regard. On the contrary to the results of the present study, Monajem Zadeh et al, revealed no significant relationship between the staff's performance and working experience. Of course, in line with the findings of the present research, they showed that male employees had performed better than female ones [13]. Moghadas et al, also showed no significant correlation between productivity and working experience. However, they argued that the groups including more female employees had been more productive [14]. The positive relationship between

productivity and age as well as working experience in the present study may result from the increase in the individuals' experience which, consequently, leads to their better performance and more desirable productivity. Besides, a difference was observed between males and females regarding the conformity of the personal characteristics and abilities to their tasks and working environment. This might be due to the fact that as males are more self-confident and, at the same time, the society cares more about males, the male employees have had a higher evaluation of their productivity level.

According to the results of the present study, working environment was significantly correlated with familiarity with tasks and job description as well as information systems and the quality of organizational information. Moreover, the employees working in the deputy of education, deputy of research, and the central administrative office showed the highest level of productivity regarding the familiarity with tasks and job description, while those working in the department of cultural affairs showed the lowest level of productivity in this regard. Of course, the overall productivity score was not included in this comparison. Considering this aspect of productivity, the higher productivity of the sections mentioned above might be due to better task organization as well as in-service training. On the other hand, low productivity of the department of cultural affairs might result from unfair task division or lack of clarity in job description.

Regarding the information system and the quality of organizational information, the employees of the deputy of research had the highest productivity level, while those of the department of health and the department of cultural affairs had the lowest level of productivity. This difference can be related to using new technologies of information transfer, such as Intranet and Internet, instead of the traditional, paper-based systems.

The results of the present study revealed a significant relationship between inner satisfaction from doing one's duties and the employment status; in a way that in comparison to official, contractual, and semi-official employees, the project staff were less satisfied from performing their duties. This might be the result of the high level of expectations of the individuals who have newly graduated and started working. On the other hand, Moghadas et al, revealed no significant relationships between productivity and the employment status [14], which is in line with the overall results of the present study. The lack of difference in the productivity of the individuals with different employment statuses may result from the fact that the individuals with different employment statuses have almost similar capabilities and, at the same time, different employment statuses have no apparent differences regarding rights and benefits as well as job security.

In the present study, none of the aspects of productivity was

significantly correlated with marital status, level of education, and organizational posts. In the study conducted by Monajem Zadeh et al, no significant relationship was found between productivity and organizational posts, while a significant positive correlation was observed between level of education and productivity [13]. Moghadas et al, also revealed no significant relationship between productivity and organizational posts. However, they showed that regarding the managers, level of education has no significant relationship with productivity, while it has a significant positive correlation with productivity on the part of the employees [14]. In the present study, the employees with different levels of education and organizational posts were not different regarding productivity, which might be due to the fact that all the study subjects were knowledge workers and had high levels of education and capabilities.

5. Conclusion

Based on the data obtained from the localized version of the knowledge workers' productivity assessment questionnaire, regarding the eight aspects of productivity and the overall productivity, the study population had a low level of productivity which was far from the ideal status. Therefore, strategies must be considered in order to improve the knowledge workers' productivity. These strategies include institutionalizing the ethics [14], holding in-service training courses [15], providing opportunities for the knowledge workers to perform tasks according to their field of study, clarity of job description, job enrichment, cooperative management, the ability to affect one's own work, management of the staff's free time in order to meet their psychological needs and reduce the stress of their working environment [16], improving the quality of the staff's working life [4, 7, 9, 17, 18], developing the technology and improving the working methods, creating specialized committees of productivity, and the administrators' support of operational programs in order to improve the productivity.

For future studies, recommend that the productivity be assessed in other groups, such as faculty members, teachers, and the health staff working in different sections of the health system, and compared to the productivity of the employees of other state as well as private organizations. Also, the factors affecting productivity should be identified in an interventional manner.

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Authors' Contribution

All author had an equal role in this study.

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