

Research Article

OFFERING A SUITABLE MODEL TO INCREASE MENTAL HEALTH OF EXECUTIVE ORGANIZATION STAFF IN KERMAN CITY BY USING NEURAL NETWORK

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ABSTRACT

Mental health is the science of living better and social welfare that encompasses all life dimensions, from the early moments of embryonic life till death. In line with this idea, this article offers and evaluates a proper model to increase mental health of executive organizations staff in Kerman city by using neural network. The statistical population of this research comprises two groups: the first group includes 27710 staff of 67 executive organizations in Kerman city. This group has been used to determine the factors increasing mental health and to determine the amount of mental health. The second group includes 30 experts who help to design and validate a suitable model. It is important to mention that offering the model and the network of factors has been performed by an artificial nerve. The results indicate meaningful correlation between factors increasing mental health and amount of mental health in executive organizations staff. Among these factors, individual factors have the most intensity of relation in increasing the staff's mental health.

Keywords: *Mental Health, Individual Factors, Group Factors, Organizational Factors, Environmental Factors, Neural Network*

INTRODUCTION

The problems of today civilized society, and life pressures resulted, are not associated to specific people, but all individuals and groups in their personal, family and social life are affected by mental tensions and challenges. Therefore, mental health is an important issue that governmental and health authorities, and relevant authorities involved have done serious measurements about it for less than one century. So, world health organization has included mental health in primary health care. Although mental health has individual aspects, it is a social status and needs the cooperation and sympathy of the individual and society. The quality of individual and social relations between individuals, in family and society, is an effective factor on mental health. The more the individual be compatible, the more he/she has mental health. Incompatibilities and behavioral disorders in human societies are completely obvious and abundant. In any group, level and class, there are unbalanced people. In other words, no one has immunity against mental diseases and it is significant to deal with mental aspects of health. One of the main reasons of mental health significance is the high, debilitating, very intense and long term outbreak of these disorders. According to scientific circles reports, about 0.5 billion people in the world suffer from mental disorders and mental-social problems (Heidari and Mohammadi, 2008).

Now, according to the fore mentioned matters, the research questions are:

- 1 – What are the properties of a suitable model to increase mental health of executive organizations staff in Kerman city?
- 2 – How much is the validity of the proper model to increase mental health of executive organizations staff in Kerman city?

MATERIALS AND METHODS

World health organization defines mental health as: “the status in which person knows his/her abilities, can tackle with normal mental pressures of life, has the ability to work effectively and productively, and can be useful for the society (Joshani, 2007).

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Based on literature review (mentioned in reference), the factors increasing mental health, that are 55 components, have been examined by different theorists in different periods. For better conclusion, the researcher classified these factors in four groups: individual factors with 29 components, group factors with 10 components, organizational factors with 11 components and environmental factors with 5 components. The indices belonging to each group are as follows:

Individual Factors: These are factors which are individual and the individual himself/herself affects his/her mental health with them. The individual factors that affect mental health of staff are:

Growth, development and self-actualization, integration, integrity (Nooghabi, 2006), sense of identity (Sholts, 2007), reception of reality, sense of self-confidence, goal orientation, personal values (Hatami, 2004), individuality and uniqueness (Dehghan, 2006), emotional security (Sholts, 2007), self acceptability (Sapington, 2006), the philosophy of future life (Hassani and Azarbaijani, 2011), feeling of adequacy, courage, freedom from sin (Sathiyasusuman, 2011), self-confidence, self-awareness (Dehghan, 2006), spirituality (faith), good character, belonging and thinking, individual creativity (Brooker and Birmingham, 2009), balance, free of internal conflict, accepting mistakes (Di-Mateo and Rabin, 1999), continuous learning, lack of mental illness, living in the moment, independence, sense of safety and security (Hagquist, 2010).

Group Factors: These are factors that find expression in relation to others. Others include: family, coworkers, friends, and all people that affect the individual's mental health with the mentioned factors. The group factors that affect staff's mental health are:

Self concept extension, intimate relation with others (Morphet and Coworkers, 2012), realistic perception (others), humanism, no aggression, loving others, tolerance towards other's views (Khodarahimi, 2003), other's sense of security towards person's speech and behavior (Rogers and Pilgrim, 2004), decisiveness in dealing with others, staying away from arrogance (in relation to others) (Graham and Kelly, 2004).

Organizational Factors: These are factors that find expression in relation of individual with organization and affect staff's mental health. These factors are:

Sense of responsibility, skills and tasks, commitment to work (organizational commitment), timeliness of work (Hatami, 2004), clarity and agreement on goals, satisfaction of rewards, clarity and agreement on roles, satisfaction and agreement on procedures (Jordan, 2001), effectiveness of organizational communications, organizational creativity, physical factors in the work environment (Criag and coworkers, 2009).

Environmental Factors: These are factors that are in relation to life and work environment, and affect staff's mental health. These are:

Dominance on environment, resistance against culture, flexibility towards environment, freedom, receiving feedback from the profession (Brooker and Birmingham, 2009).

The amount of mental health was evaluated by dimensions of function (physical health – healthy eating and drinking – regular exercise – avoiding harmful habits – awareness and responsibility towards health – sense of good health – participation in preventive activities), anxiety (reaction to imaginations – real expression towards fears – real sense towards fears), social function (ability to do the works effectively – performing social roles efficiently) and depression (sadness – self-esteem of self-blaming – mental and motor retardation – resignation in relation to others – insomnia – anorexia) (Chen and Hung, 2007).

In this research, the predictive variable are factors increasing mental health (individual, group, organizational and environmental factors) and the control variable is the amount of staff's mental health.

In the present study, questionnaires have been used to collect information. The questionnaires used in this research are the followings:

The first questionnaire has been designed to identify the primary model. In this questionnaire the experts expressed their comments about agreement with primary model, factors increasing mental health, and components of factors increasing mental health. The second questionnaire, which was researcher made, has been used to determine the factors increasing mental health of executive organizations staff in Kerman city. This questionnaire comprises 55 questions that researcher has designed according to conceptual model in which factors increasing mental health are divided to individual, group,

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organizational and environmental factors and components of these factors. Among these 55 questions, 29 questions are related to individual factors increasing mental health, 10 questions are related to group factors increasing mental health, 11 questions are related to organizational factors increasing mental health, and 5 questions are related to environmental factors increasing mental health. These questions are formulated according to Likert five spectra.

The third questionnaire is mental health questionnaire, which has been used to determine the amount of mental health of executive organizations staff in Kerman city (GHQ-28). This test was created by Goldberg and Hiller (1979).

The fourth questionnaire has also been designed for experts to announce their success with the achieved model. It includes questions about the success of model and general questions.

After doing calculations, the validity of the questionnaire of factors increasing mental health was 0.97. The validity of the questionnaire of evaluating mental health amount was 0.96. The amount of Cronbach alpha for the questionnaire of factors causing mental health was 0.960, and for the questionnaire of the amount of mental health was 0.922.

In order to collect data, the researcher directly distributed 384 questionnaires among staff of executive organizations in Kerman city and collected them after being filled in.

The analysis was done by spss soft ware. Also, the Amos soft ware has been used for regression coefficient results and model validation.

Neural networks are built of simple operational elements in parallel form. These elements have been inspired from biologic neural systems. In nature the structure of neural networks is determined by the manner of connection between the components. After adjustment or neural network training, exerting a particular input on the neural network, produces a particular response (Kia, 2010). In this research, this function has been used to offer the model for increasing mental health. The analyses of neural network have been done by using Matlab soft ware. First, it is necessary to examine whether there is a relation between factors increasing mental health and the mental health amount of executive organizations staff in Kerman city.

To survey the amount of relationship between components of factors increasing mental health and the amount of staff’s mental health, the Pearson and Spearman correlation coefficients have been used (qualitative variables). The results of this test are illustrated in table 1.

Table 1: Pearson and Spearman correlation coefficients between components of factors increasing mental health and the amount of mental health

Correlation statistic	Correlation amount	Meaning coefficient (having the value -p)	Number	Existence of relationship	Type of relationship
Pearson	0.388	<0.001*	384	+	Direct
Spearman	0.398	<0.001*	384	+	Direct

*At the level of 0.05 meaningful, at the level of 0.01 meaningful

Based on the results of correlation test, the Pearson correlation coefficient was 0.388 and Spearman correlation coefficient was 0.398. This indicates that there is meaningful relationship between components of factors increasing mental health and the amount of mental health ($p < 0.05$). Because the calculated correlation coefficients are positive, there is direct relationship between these two variables.

Research Question One: What are the properties of the suitable model to increase the mental health of executive organizations staff in Kerman city?

The achieved model by correlation coefficients has been illustrated in diagram 1.

Research Question Two: How much is the validity of the proper model to increase mental health of executive organizations staff in Kerman city?

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The suitable model to increase mental health is illustrated in the following shapes. The validity of the model has been achieved by Amos soft ware.

Table 2: Model validity

Model	Amount of Chi square statistic	Freedom degree	Amount of -p	Model size	Validity
Introduced model	12284/032	3316	0.0001	2/998	

Whenever the model validity is between 1 to 3, this model is valid. In this research this amount is near to 3 that indicates the model validity.

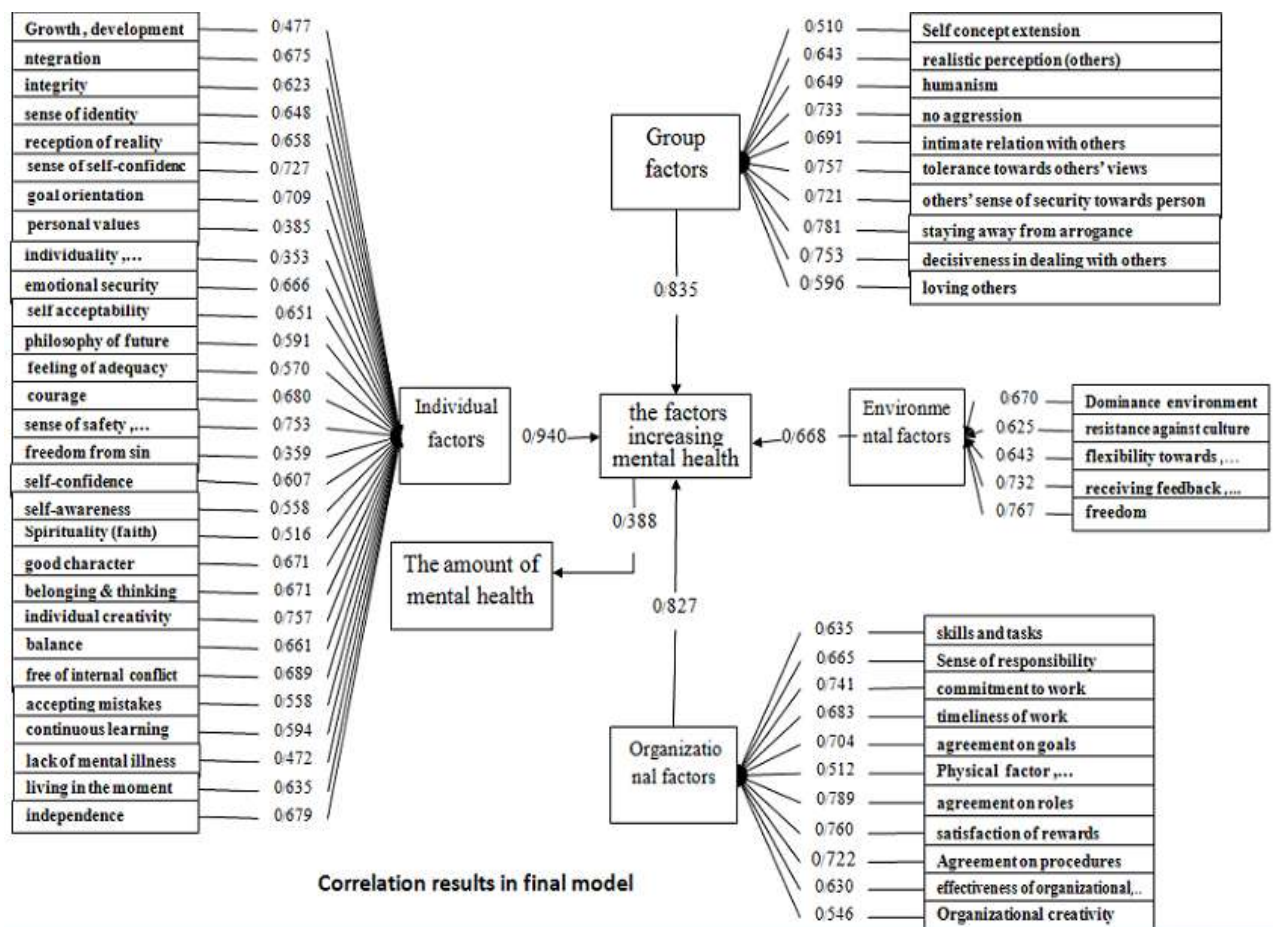


Diagram 1: Correlation results in the final model

Artificial Neural Network by using spss Soft Ware

In this section, by using artificial neural network tool box of spss soft ware, the weight coefficient and the role of each of the independent variables (the components of factors increasing mental health) in predicting the dependent variable (the amount of mental health) has been studied.

First, in order to classify the data, we divided them into two groups of training data and experimental data. For this purpose, we used 60 percent of data for training the network and 40 percent of the data for experiment.

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The network structure was selected multilayer with the on line training method, because it is the data specific method with large volume and great number of variables. The results of analyzing neural network are presented in table 3.

Table 3: The results of analyzing neural network

Properties	Quantity
number of middle layers	1
number of middle units	2
Training	Data volume 227
	Sum of errors square 95.667
	Proportional error 0.847
experimental	Data volume 157
	Sum of errors square 74/753
	Proportional error 0.812

Artificial Neural Network by using Matlab Soft Ware

The architecture of neural network in Matlab soft ware includes two-layer feed forward network. The first layer is sigmoid and the second layer is linear. This architecture can estimate any selected function with limited number of discontinuities. The number of first layer neurons is 60 and the number of second layer neurons (output) is 1; the number of network training samples is 333, and the number of network experiment samples is 51.

Table 4: The results of analyzing neural network with Matlab soft ware

Cases of network training	Min of test error	Max of test error	Mean of test errors	Mean of squared test errors
Case one: 300 times training	-0.0796	0.0548	-7,0285e-004	2,9356e-004
Case two: 600 times training (continuing previous training)	-0.0600	0.0282	-7,2251e-004	9,2783e-005
Case three: primary reinitialization of network weights and 300 times network training	-0.0066	0.0069	9,4554e-005	1,8905e-006

(In case three, the primary amount of neural network weights is an effective factor on network convergence speed in training process; therefore, the network with primary architecture was repeatedly created and trained. Then the results occurred).

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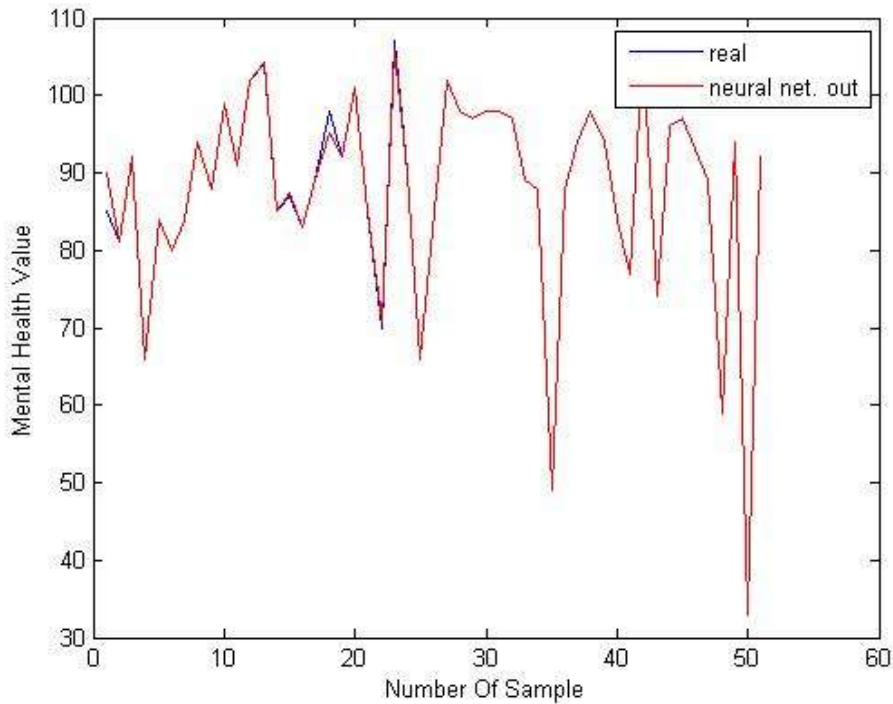


Figure 1: Outputs of experimental data with 600 times network training

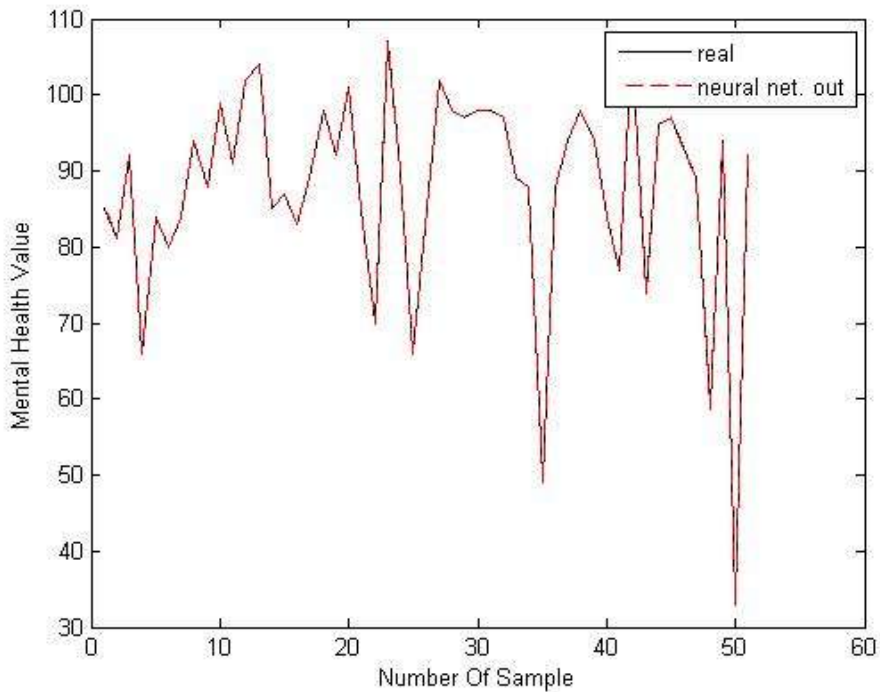


Figure 2: Outputs of experimental data with 300 times repeated network training

It is observed that, the network error is near to zero and the network output is consistent with real data. According to large number of variables (55 variables), the results indicate unique ability of the neural network to estimate the functions (offering the model).

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Surveying the Expert’s Comments

Table 5: Single variable chi square results to compare the effectiveness of all factors on increasing mental health

proper ty	effectivene ss	frequen cy	Frequen cy percent	Accumulati ve frequency	Chi suar e statist ic	Freedo m degree	meaningful ness	Sum of score s
All factors	Too much Much Average A little Little Total	29 1 0 0 0 30	96/7 3/3 0/0 0/0 0/0	96/7 100/0	26/133	1	<0.0001*	149/0 0

*At the level 0.05 is meaningful ($p < 0.05$)

Based on Chi test results, all the factors are generally effective on increasing staff’s mental health ($p < 0.05$). Also, the amount of χ^2_{ob} for all factors is equal to 26.133 and the amount of χ^2_{cr} of the table, at the level of 95 percent with one degree freedom is equal to 3.84. Because $\chi^2_{ob} > \chi^2_{cr}$ ($26.133 > 3.84$), the experts accept the effects of general factors.

RESULTS AND DISCUSSION

It has been observed that in the submitted model, the individual factors have the highest correlation coefficient (0.940). This means that individual factors or in other words personal factors have the most number and are the most effective factors on executive organizations staff’s mental health in Kerman city. Among these factors, the most correlation coefficients (with the highest effect) respectively belong to: creativity, sense of security and peace of mind, self-confidence, and goal-orientation and ...

The second class of effective factors is group factors with the correlation coefficient of 0.835. Among group factors, the highest correlation coefficient belongs to the component of staying away from arrogance. The items tolerance towards other’s views, decisiveness in dealing with others and lack of aggression are the next priorities.

The third class of effective factors is organizational factors with correlation coefficient of 0.827. Among them, the highest correlation coefficient belongs to clarity and agreement on roles. Satisfaction of rewards, commitment to work, clarity and agreement on procedures and objectives are the next priorities.

The fourth and the last class of effective factors are environmental factors with correlation coefficient of 0.668. Among them, the highest correlation belongs to component of freedom. Receiving feedback from job and dominance on environment are respectively next priorities.

It has been observed that, during three stages (status), the neural network was trained by training data (333 training data). At each stage, compared to previous stage, the error amount decreased significantly. This indicates the outstanding capability of Matlab soft ware to submit the model. In figure 2, the two diagrams for real data and experimental data coincided. This indicates the unique capability of neural network to estimate and submit models that can estimate the behavior and complicated human mind, in spite of many variables (55 variables).

The Comparison of Neural Network Results using Two Soft Wares

Noticing that the analysis of the discussion of research artificial neural network was performed by spss and Matlab soft wares, we concluded that spss has low ability to estimate artificial neural networks. This is because it could not receive the raw data of research (55 components) as input and only received the average of four classes of factors as input; It estimated mental health amount with a higher error than Matlab. While, Matlab soft ware could estimate the output (mental health amount) by using all 55

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components with little error (near to zero). It is possible to use spss soft ware for artificial neural network when there are little inputs. In this case, it is efficient, because the effect of factors has been included in its tool box abilities.

The Research Findings indicate the High Effect of Individual Factors (the highest Effect among Factors Increasing Mental Health) on Mental Health Amount of Executive Organizations Staff in Kerman City

It was observed and is predicted that individual factors, with highest correlation coefficient, have the most effect on mental health of executive organizations staff in Kerman city. This means that the staff initiates their new work and life before entering the organization with their personality characters and particular mental health that is institutionalized. They have a fixed creativity before entering the organization that they have learned it inheritedly and acquiredly, many years before birth. They have the sense of security and safety that is caused by their family, school and university lives. It is necessary to mention that the need for sense of security exists at any age and its sources of production are different. For infants, breast feeding and acceptance, and at school time, teachers and classmates have significant contributions to individual's sense of security. At adulthood, the sense of security is caused by factors such as health, social position, wealth, job progress and correct social relations in organization. At old age, being respected and being accepted are effective factors on sense of security. Any experiment that reinforces the sense of security leads to individual's progress and adaptation, and increases individual's mental health. In addition to sense of security, individuals bring to organization their sense of self-confidence and future goals to realize their goals and goals of organization. They also bring to the organization all the personal factors related to mental health in order to add to them. Individual factors are significant, have the record of number and have the most components.

The high effectiveness of individual factors indicates the outstanding significance of family, school, university, organization in which the individual works, and other organizations that the individual lives in from birth till death. Among these small but effective societies, family has an important place for individual's personality growth. Individuals, who have personality and mental problems and do not have mental health, have unhealthy families. Therefore, family has a significant place to supply the individual's mental health. It is necessary to identify and perform suitable guidelines in order to provide family's mental health. It is significant to identify the factors disturbing familie's mental health and recommend methods to confront with them. It is obvious that, not supplying family's mental health hinders individual's efforts to achieve individual and social goals and progresses. So, we should remind the great responsibility of the society with public training. Of course, organizations and managers should not be convinced that only organizational factors are controllable and they only can increase staff's mental health considering this viewpoint. But, the organization can also affect on individual components (in addition to family and other organizations) and can increase the staff's mental health. The organization can define and promote all individual components with public training, holding classes and ...

1- Noticing that all indices and factors increasing mental health have correlation coefficient more than average, it is suggested to hold periodical and regular in-course training classes in organization. Also, it is suggested that these factors be introduced and some guidelines to promote all the components be offered with participation of experts.

2- According to the matter that offered model has a high validity in Kerman executive organizations, it is suggested to examine this model in private companies and factories.

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