

The Identification and Ranking of the Stressors Using AHP for Employees of the Gas Company in Markazi Province

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Received: December 1, 2016

Accepted: January 10, 2017

Online Published: January 16, 2017

Abstract

The most important factor for achieving optimal organizational productivity is efficient human resources. By increasing competition and the expansion of human resource methods, organizations try to keep their talented employees and empower them to exhibit high performance. Markazi province Gas Company requires motivated and capable staff and keeping and maintaining these employees and the efficient use of them is very important. One of the things that reduces employee productivity and increase the likelihood of accidents and the direct and indirect costs is stress factor and psychological pressure of Markazi province Gas Company's employees. By the literature and research review as well as interviewing employees of the Gas Company in Markazi Province, 7 factors and 33 sub-factors of organizational stress were identified. The ranking of these factors is conducted by the Analytic Hierarchy Process (AHP) method. The demand criterion has been identified as the most important criterion and role has been identified as the least important criterion. The sub-criterion of the right to choose the type of work in the environment relating to the control criterion was the most important sub-criterion and the sub-criterion of the awareness of the expectations in the workspace and organizational goals related to the role criterion were introduced as the least important sub-criterion.

Keywords: Occupational Stress, Markazi Province Gas Company, Analytical Hierarchy Process.

1. Introduction

Through exhaustive and extensive researches conducted by trade unions, researchers, companies and research organizations, it was made clear that the occupational stress is linked to many diseases as well as many organizational variables such as performance, efficiency, satisfaction, commitment, mobility and employment of staff, etc. and this was the beginning of a journey to study further. Such that nowadays various organizations around the globe are studying and thousands of sites are allocated to the occupational stress and the diseases and results and outcomes of it. Governments are creating and establishing governmental organizations to deal with this phenomenon and ways to reduce it. And in this regard the contribution of our country has been very little and perhaps still no such thing as occupational stress has come to the thought of politicians and governmental policy makers and large companies and their managers.

Employees are the most valuable resources of every organization. Today human resources are the major assets of organization and are considered as their competitive advantage. It should be considered that employee productivity does not mean working hard; rather its purpose is to work smarter, with better planning, better

organization and with more thought and creativity. Stress and psychological pressure is one of the effective factors on reducing productivity and the performance and the efficiency of employees in the organization.

Occupational stress is due to the lack of coordination between labor needs with skills, abilities and wishes. As increasing productivity, achieving high performance indicators, technology improvement, technology innovation, increasing the level of competitiveness, focusing on human dignity and considering human resources as the major organizational asset are among the main objectives, meeting these objectives requires removing obstacles that makes their achievement difficult. One of the major obstacles that can make it difficult to reach these goals, according to the nature of Markazi province Gas Company's employees, is neglecting the occupational pressures and stresses that employees face. In this regard, identifying occupational stressors that employees face and providing solutions for reducing these stress makers has a significant contribution to the achievement of predetermined targets in Markazi province Gas Company.

"Stress or psychological pressure" is a term borrowed from physics and today it has been used to explain the psychological pressures. Stress is a state of mind and body caused by psychological or physical pressures to the person. So perhaps psychological pressure may not be a precise equivalent to the stress, because stress is a condition caused by pressure, not the pressure itself, but with a little connivance stress can be meant as psychological pressure and consider it as a state that human shows to the adverse outside stimuli.

Various researches have shown that by the increase of stress in the work environment, the costs of compensating for the errors due to stress are increasing. Different researches related to the stress in industrial and non-industrial environments have been conducted and this explains the importance of this subject. In a study, the resources and intensity of occupational stress of the employees of South Pars Gas Complex and its relationship with the physical and psychological health were studied. The conducted research confirmed the fact that the stress level of employees in various refineries are different, in a way that the second refinery had experienced more stress comparing to the other refineries. In another study in the Directorate General of Tehran railways the relationship between the role conflict and psychological pressure and also the relationship between the leadership style and psychological pressure were investigated. The results showed that these factors have affected psychological pressures.

Identifying the relationship between occupation and the accidents during work among the Saipa Automotive company employees is another related study in which the most important occupational stressors were identified as: time pressure, payment methods, employee assessment and the interaction of employees with colleagues. In another research of automotive industry, from the 20 assessed stress factors, the rhythm of work, the physical condition of the workplace and workplace ergonomic conditions had the greatest contribution in the existing stress levels, respectively. Also, the stressor factor of relationship with colleagues obtained the least priority. The study on the workers of oil platforms in the North Sea indicated that the workers employed in the oil platforms had less psychological health, more occupational tensions and less safety and as a result more injuries and accidents comparing to the offshore workers.

2. Research Methodology

At first it is necessary to determine tension or psychological pressure factors in the work environment. For this purpose, 7 factors and 33 sub-factors of organizational stressors were identified by studies and interviews with employees of the gas company. The criteria include: the role, communication, managerial support, peer support, demand, changes and control.

The sub-criteria include: awareness of the expectations at work, knowledge of work methods, awareness of duties and responsibilities, awareness of workplace goals, awareness of the organization's objectives, bearing the inappropriate words and undesirable behavior, peer tensions, hurting by others, tension in work relations, receiving comments from others, authorities support in trouble, consulting the issues with the chief, helping the chief in mental issues, supervisor encouragements, peer support in trouble, enough respect of colleagues to each other, helping colleagues in need, attention of colleagues to work issues, the power to cease work, the power in the speed of work, the right to choose in workplace, the right to choose the work in the workplace, commenting rights, expectations of different groups, not having enough opportunity in work, hard work, neglecting duties due to the high volume of work, working long hours, the speed of work, the unrealistic time of works, time to do the tasks, consulting about the changes and the knowledge of the practicability of change.

170 questionnaires were distributed with 80% return rate and the filled tables were analyzed in terms of inconsistency rate and tables with more than 0.1 inconsistency rate were either excluded from calculations or returned to people to reconsider their judgments.

After presenting the views of experts in the questionnaire, decision making matrixes were formed and with respect to the inconsistency rate, appropriate questionnaires were merged. Analytical Hierarchy Process was conducted using Expert Choice software.

3. Analytical Hierarchy Process

The First Step: making model and transform it into a hierarchical structure

The problem should be obviously converted to a logical system like a hierarchy. This hierarchical structure can be obtained using brainstorming or any other suitable method like Delphi or nominal group technique. In this stage, the issue under consideration is converted to a hierarchical structure in which groups are considered as clusters. It is possible that the elements in a clutter have interdependence and these connections are shown by a bow attached to the cluster.

The Second Step: a binary comparison matrix and determining vector priority

In the binary comparison of AHP, the decision making elements in each of the clusters are compared two by two, based on their importance regarding control measures. The clusters themselves are compared two by two based on their role and effect on achieving goals. The effect of each element on another element is presentable by eigenvector. The relative importance is evaluated based on the 9 quantity scale of Saaty. In this section, the internal importance vector is calculated which indicates the relative importance (importance coefficient) of elements and clusters obtained by this relationship:

$$AW = \lambda_{max}W$$

Where,

A: Binary comparison matrix of criteria,

W: Eigenvector (importance coefficient),

λ_{max} : The maximum value.

In order to calculate the eigenvector W Saaty has proposed many methods. While the calculations are done without the use of special software, it is better to use the geometric mean approximation method. Thus, in this stage, internal priority vector are calculated.

Eigenvector also shows a natural measurement of the inconsistency degree of the existing information in a matrix as below:

$$C.I = \frac{\lambda_{max} - n}{n - 1}$$

Mr. Saaty shows that for a reversible and positive matrix λ_{max} is always higher than or equal to n (matrix dimension) and this value if and only if there is a matrix with complete consistency (compatibility), will be equal

to n. Thus $(\lambda_{max} - n)$ is a proper measurement of the inconsistency degree of a matrix. This Consistency Index (C.I) is expressed as the above formula after normalizing by the matrix dimension.

Mr. Saaty also compares C.I to a random index (R.I). R.I is obtained for different values of n by the production of random matrixes (D) and C.I calculation, from these matrixes, as follows:

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R.I	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.48	1.56	1.57	1.59

Given the R.I, a ratio known as Consistency Ratio (C.R), are calculated for a matrix as follows:

If $C.R \leq 0.1$, the consistency of the matrix according to Mr. Saaty is approved and if this ratio is higher than (0,1), it should be asked from the decision maker to reconsider his/her comparison judgments for more consistency.

The Third Step: calculating the final weights of sub-criteria

After binary comparisons and calculating the weights of criteria and sub-criteria, the final weights of the sub-criteria is calculated using Expert Choice Software.

4. Results and Discussion

Paired Comparisons:

In this stage employees make comparisons between decision making criteria and sub-criteria and determine its score comparing to each other. These comparisons are conducted based on 9 scale table (table 1). The priority of one choice or factor to itself is equal to 1, so the reverse principle of a factor than the other factors and the priority and one for a factor or option to itself are two properties of binary comparison matrix in AHP process.

Table 1. The 9 scale table of the binary comparison of indicators

Score	Definition	Explanation
1	Same	In achieving the objective, two indicators have equal importance
3	A little more important	Experience shows that to achieve this goal, the importance of i is little more than j
5	Strong utility	Experience shows that to achieve this goal, the importance of i is greater than j
7	Very important	Experience shows that to achieve this goal, the importance of i is much more than j
9	Very very important	The higher importance of i to j is conclusively proven
2,4,6,8	Intermediate numbers	Where the state is intermediate

Table 2 shows the relative importance of the general criteria in the experts' opinion. The inconsistency rate of the binary comparison of these criteria was 0.05, indicating the acceptable accuracy of this binary comparison.

Table 2. Weights of criteria related to occupational stress of Markazi Province Gas Company employees

Stress factors	role	communication	authorities	peers	control	demand	changes	criteria weights
role	1	0.143	0.111	0.143	0.111	0.111	0.111	0.0173
communication	7	1	0.333	1	0.5	0.2	0.5	0.1055
authorities	9	3	1	2	1	0.5	2	0.1853
peers	7	1	5.	1	0.5	0.25	0.5	0.1077
control	9	2	1	2	1	0.333	1	0.1636
demand	9	5	2	4	3	1	2	0.2604
changes	9	2	5.	2	1	0.5	1	0.1602

After comparing the general criteria for measuring occupational stress factors, sub-criteria of each of the general criteria are compared with each other as pairs.

Table 3 shows the relative importance of the role sub-criteria from the perspective of employees. Incompatibility rate of the binary comparison of these criteria is 0.01, indicating the acceptable accuracy of this binary comparison.

Table 3. The binary comparison matrix of the sub-criteria of role criterion

Role criterion	Awareness of expectations in the workplace	Awareness of working methods	Awareness of responsibilities and duties	Awareness of the objectives in the workplace	Awareness of the organizational goals	Sub-criteria weights
Awareness of expectations in the workplace	1	1	2	1	1	0.1538
Awareness of working methods	2	1	4	1	2	0.3077
Awareness of responsibilities and duties	1	0.25	1	0.25	1	0.0769
Awareness of the objectives in the workplace	2	1	4	1	2	0.3077
Awareness of the organizational goals	1	1	2	1	1	0.1538

Table 4 shows the relative importance of communication sub-criteria from the perspective of employees. Incompatibility rate of the binary comparison of these criteria is 0.02, indicating the acceptable accuracy of this binary comparison.

Table 4. The binary comparison matrix of the sub-criteria of communication criterion

Communication criterion	Bearing the inappropriate words and undesirable behavior	Peer tensions	Hurting by others	Tension in work relations	Sub-criteria weights
Bearing the inappropriate words and undesirable behavior	1	1	4	1	0.3134
Peer tensions	1	1	3	0.5	0.2463

Hurting by others	0.25	0.33	1	0.25	0.0821
Tension in work relations	1	2	4	1	0.3582

Table 5 shows the relative importance of the sub-criteria of the authorities support from the perspective of employees. Incompatibility rate of the binary comparison of these criteria is 0.03, indicating the acceptable accuracy of this binary comparison.

Table 5. The binary comparison matrix of the sub-criteria of authorities support criterion

Authorities support criterion	Receiving others' opinions	Manager support in trouble	Consulting with supervisor	Supervisor support in mental issues	Supervisor encouragements	Sub-criteria weights
Receiving others' opinions	1	0.25	0.5	0.13	0.17	0.0401
Manager support in trouble	4	1	3	0.25	0.5	0.1717
Consulting with supervisor	2	0.33	1	0.14	0.2	0.0721
Supervisor support in mental issues	8	4	7	1	2	0.4316
supervisor encouragements	6	2	5	0.5	1	0.2845

Table 6 shows the relative importance of peer support sub-criteria from the perspective of employees. Incompatibility rate of the binary comparison of these criteria is 0.05, indicating the acceptable accuracy of this binary comparison.

Table 6. The binary comparison matrix of the sub-criteria of peer support criterion

Peer support criterion	Peer support in troubles	Enough respect of colleagues to each other	Help of others in need	Attention of colleagues to the work problems	Sub-criteria weights
Peer support in troubles	1	1	9	0.5	0.3
Enough respect of colleagues to each other	1	1	9	0.5	0.3
Help of others in need	0.11	0.11	1	0.11	0.0348
Attention of colleagues to the work problems	2	2	9	1	0.3652

Table 7 shows the relative importance of demand sub-criteria from the perspective of employees. Incompatibility rate of the binary comparison of these criteria is 0.03, indicating the acceptable accuracy of this binary comparison.

Table 7. The binary comparison matrix of the sub-criteria of demand criterion

Demand criterion	Different group expectations	Not having enough opportunity in work	Hard work	Neglecting duties due to the high volume of work	Working long hours	The speed of work	The unrealistic time of works	Sub-criteria weights
Different group expectations	1	5	0.33	7	2	0.5	5	0.1885
Not having enough opportunity in work	0.2	1	0.13	2	0.33	0.14	1	0.0434
Hard work	3	8	1	9	5	2	8	0.3257
Neglecting duties due to the high volume of work	0.14	0.5	0.11	1	0.25	0.13	0.5	0.0238
Working long hours	0.5	3	0.2	4	1	0.25	3	0.1081
The speed of work	2	7	0.5	8	4	1	7	0.2669
The unrealistic time of works	0.2	1	0.13	2	0.33	0.14	1	0.0434

Table 8 shows the relative importance of control sub-criteria from the perspective of employees. Incompatibility rate of the binary comparison of these criteria is 0.02, indicating the acceptable accuracy of this binary comparison.

Table 8. The binary comparison matrix of the sub-criteria of control criterion

Control criterion	The power to cease work	The power in the speed of work	The right to choose in workplace	The right to choose the work in the workplace	commenting rights	Sub-criteria weights
The power to cease work	1	0.5	0.33	0.13	1	0.06
The power in the speed of	2	1	0.5	0.17	2	0.11

work						
The right to choose in workplace	3	2	1	0.2	4	0.2
The right to choose the work in the workplace	8	6	5	1	9	0.57
Commenting rights	1	0.5	0.25	0.11	1	0.06

Table 9 shows the relative importance of change sub-criteria from the perspective of employees. Incompatibility rate of the binary comparison of these criteria is 0.04, indicating the acceptable accuracy of this binary comparison.

Table 9. The binary comparison matrix of the sub-criteria of change criterion

Change criterion	Opportunity to ask about changes	Consulting about changes	The knowledge of the practicability of change	Sub-criteria weights
Opportunity to ask about changes	1	0.5	5	0.39
Consulting about changes	2	1	6	0.53
The knowledge of the practicability of change	0.2	0.17	1	0.08

Table 10 shows the ranking of stress factors in Markazi Province Gas Company.

Table 10. The final ranking matrix of criteria and sub-criteria

Criteria	Criteria weights	Sub-criteria	Sub-criteria weights	Final weights	Final ranking
Role	0.0173	Awareness of expectations in the workplace	0.1538	0.0027	28
		Awareness of working methods	0.3077	0.0053	26
		Awareness of responsibilities and duties	0.0769	0.0013	29
		Awareness of the objectives in the workplace	0.3077	0.0053	26
		Awareness of the organizational goals	0.1538	0.0027	28
Communication	0.1055	Bearing the inappropriate words and undesirable behavior	0.3134	0.0331	11

		Peer tensions	0.2463	0.0260	6
		Hurting by others	0.0821	0.0087	23
		Tension in work relations	0.3582	0.0378	10
Authorities support	0.1853	Receiving others' opinions	0.0401	0.0074	24
		Manager support in trouble	0.1717	0.0318	14
		Consulting with supervisor	0.0721	0.0134	18
		Supervisor support in mental issues	0.4316	0.08	4
		Supervisor encouragements	0.2845	0.0527	7
Peer support	0.1077	Peer support in troubles	0.3	0.0323	13
		Enough respect of colleagues to each other	0.3	0.0323	13
		Help of others in need	0.0348	0.0037	27
		Attention of colleagues to the work problems	0.3652	0.0393	9
Demand	0.2604	Different group expectations	0.1885	0.0491	21
		Not having enough opportunity in work	0.0434	0.0113	17
		Hard work	0.3257	0.0848	12
		Neglecting duties due to the high volume of work	0.0238	0.0052	1
		Working long hours	0.1081	0.0282	22
		The speed of work	0.2669	0.0695	8
		The unrealistic time of works	0.0434	0.0113	20
Control	0.1636	The power to cease work	0.0584	0.0095	3
		The power in the speed of work	0.1118	0.0183	25
		The right to choose in workplace	0.2012	0.0329	15
		The right to choose the work in the workplace	0.5721	0.0936	5
		Commenting rights	0.0564	0.0092	20
Change	0.1602	Opportunity to ask about changes	0.3854	0.0617	6
		Consulting about changes	0.5336	0.0855	2
		The knowledge of the practicability of change	0.0810	0.013	19

5. Conclusion

Considering the results of table 2 it was determined that from 7 criteria under investigation in the current study, demand criterion has higher weight than the other 6 criteria, and role criterion was the least important criterion among these criteria and on the other hand, according to table 10 the most important stressor among the 33 factors studied in the Markazi Province Gas Company employees are as follows:

The right to choose the work in the workplace related to control criterion, consulting the changes with employees related to change criterion, hard work related to demand criterion, authorities support in employee issues in the workplace and the speed of work related to demand criterion.

In this regard, the practical recommendations to reduce stress factors among employees according to results are presented as follows:

Reducing the volume and scale of work of the employees of these units, determining the scope of responsibility and grouping the employees of these units in a way that the employees have specific units and as a result a specific chief, so that receiving multiple inconsistent orders and demands be avoided, the improvement of leadership style so that the employees of these units have more freedom, the selection and appointment of individuals in accordance with stressful jobs and less stressful jobs, involving individuals in decisions about job evaluation and expectations and organizational goals, clarifying the tasks of individuals and mapping the employee responsibility scope, the development of a schedule or time management, providing classes and training courses tailored to each job, giving responsibility and more freedom to the employees in performing duties and the commensuration of the tasks with the allotted time to perform those tasks

References

- Menati, V., Niyazi, M., Menati, R., Khazayel, S. and Yasini, A., 2015, the relationship between occupational stress and psychological health of the nurses of the public hospitals of Ilam city, *Journal of Medical Sciences Sadra*, Volume 3, Issue 4, 247-258.
- Seyed Javad, Q., Somayeh, K., Jafar Gholi, Z, and Dargahi, H., 2015, the evaluation of stressor factors among the students of the Tehran University of Medical Sciences, *Journal of Health and Development*, Vol. 4, No. 3, 235-246.
- Moshtagh, Z., Aghayi, A., Peyman, A., and Amirkhani, A., 2015, the relationship between occupational stress and psychological health in male employees of the emergency center of Golestan province, *Journal of Research Development in Nursing & Midwifery*, Volume 12, Issue 1, 29-38.
- Javanmard, H., Goudarzi, 2014, the study and prioritizing of the effective factors on the occupational stress of the nurses, case study of Markazi province hospitals, *Industrial Engineering Journal*.
- Ghorbani, M, 2013, the study and prioritizing of the stressor factors in the Directorate General of Tehran railways, Master's degree thesis, Alameh Tabatabayi University.
- Sokhikian, M., Mirnejad, S., Tavari, M., 2012, the identification and prioritization of the effective factors on the human resource productivity using MADM techniques, *Journal of Industrial Management*, Volume 1, Issue 1.
- Azad Marzabadi, Esfandiyar and Gholami Fesharaki, Mohammad, 2010, investigating the validity and reliability of job stress HSE questionnaire, *Behavioral Sciences*, 4 (4), 291-297.
- Li, C. Y., Chen, K. R., Wu, C. H., (2013). Job stress and dissatisfaction In association with non-fatal injuries on the job in a cross-sectional sample of petrochemical workers. *Journal of Occupational Psychology*, 51, 50-55.

- Richter, A, Koch, C, (2014) , Integration differentiation and ambiguity in safety cultures,Safety Science, 42 (8), 703–722.
- Evangelosc, A, Vassiliki, p, (2014) , Stress, job satisfaction and quality of life in a sample of police officers in Greece , Safety Science, 5 (4) , 210-215.
- Nevin, D, Aral, N, (2015) , Linking person-job fit to job stress : the mediating Effect of perceived person-organization fit, Social and Behavioral Science, 2(7), 369–376.
- Li, C. Y., Chen, K. R., Wu, C. H., (2010). Job stress and dissatisfaction In association with non-fatal injuries on the job in a cross-sectional sample of petrochemical workers. *Journal of Occupational Psychology*, 51, 50-55.
- Murphy, L. R., (2012). Occupational stress management: review and appraisal. *Journal of Occupational Psychology*,51(3), 42-57.
- Richter, A., Koch, C., (2014). Integration differentiation and ambiguity in safety cultures. *Safety Science*, 42 (8), 703–722.