

A social work study using factor analysis on detecting important factors creating stress: A case study of hydro-power employees

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ABSTRACT

The study performs an empirical study based on the implementation of factor analysis to detect different factors influencing people to have more stress in a hydropower unit located in city of Esfahan, Iran. The study performed the survey among all 81 people who were working for customer service section of this company and consisted of two parts, in the first part; we gather all private information such as age, gender, education, job experience, etc. through seven important questions. In the second part of the survey, there were 66 questions, which included all the relevant factors impacting employees' stress. Cronbach alpha was calculated as 0.946, which is well above the minimum acceptable level. The implementation of factor analysis has detected 16 important groups of factors and each factor is determined by an appropriate name. The results of our factor analysis show that among different factors, difficulty of working condition as well as work pressure are two most important factors increasing stress among employees.

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1. Introduction

Stress is one of the most harmful factors, which not only impacts undesirable social relationships among workers in a firm but also it could harm people's health care. There are many conditions where the creation of stress among employees is unavoidable and people must find suitable ways to handle stress, properly. Nevertheless, understanding the nature and root of stress in organizations helps us reduce its impact using appropriate methods (Watson et al., 2011; Çekmecelioglu & Günsel, 2011). In fact, for many years, there were significant efforts on learning how it is possible to reduce stress among employees (Bassett et al., 1987; Law et al., 1995).

Gupta and Beehr (1979) studied the relationship between job stress and employee behaviors by investigating the relationship between four job stresses and two employee withdrawal behaviors

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including absenteeism and turnover. They concluded that prediction of subsequent behaviors was stronger than prediction of prior behaviors, and explained that the predictive power of job stress and background variables taken together was, at least, as powerful as the predictive power of background variables alone.

Smith et al. (1992) studied critical job design elements, which influenced worker stress responses in an electronic monitoring context. The results of their survey indicated that employees who had their performance electronically monitored perceived their working conditions as more stressful, and reported higher levels of job boredom, psychological tension, anxiety, depression, anger, health complaints and fatigue.

Slate and Vogel (1997) performed another study on the perceived atmosphere for participation in correctional decision making and its impact on employee stress and thoughts about quitting. They reported that as employee participation increased, physical and occupational stress decreased.

de Ruyter et al. (2001) performed a survey on the role of stress in call centers in terms of performance or job satisfaction. They explained that specifically the autonomy dimension of empowerment had a role-stress-reducing impact. Interesting substantive direct positive impacts of empowerment competence and leadership consideration on job satisfaction were also considered. Job satisfaction was found to be conducive to job performance. Besides, the study revealed that job satisfaction could reduce turnover intentions, directly or indirectly via organizational commitment.

Vearing and Mak (2007) performed another study on the joint influence of the big five personality factors and an extended model of work stress based on study on effort–reward imbalance (ERI), on employees' depressive symptoms. They explained an association between neuroticism (N) and OVC.

Kim et al. (2009) investigated the moderating roles of organization level and gender in the relationship between job satisfaction and role stress for hotel employees. The study includes measures of job satisfaction, role stress in terms of both conflict and ambiguity and demographic data was implemented to collect information from hotel employees in Republic of Korea. The results indicated that the impact of role stress on job satisfaction is substantially stronger for female employees and supervisory employees than male and non-supervisory workers.

Saastamoinen et al. (2009) examined the own and independent relationships of job strain, workplace bullying, organizational justice and work–home interface with pain. Among women, all psychosocial factors were considered for both acute and chronic pain when adjusted for confounders only. Among men, when adjusted for confounders only, all psychosocial factors were associated with acute and chronic pain, except for family-to-work conflicts among those with acute pain.

Chiang et al. (2010) studied the moderating impacts of job control and work-life balance practices on employee stress in the hotel and catering industry. The results of this survey described that high job demands coupled with low job control and the availability of work-life balance practices leads in a higher level of stress.

Tabatabaei et al. (2011) studied the general health, stress associated to the work and job satisfaction of the Hormozgan Cement Factory employees. The study was semi-experimental with the pre-test and post-test without control group and to improve mental health of employees, psychological trainings and motivational models were executed. The results demonstrated that general health and job satisfaction of employees were higher than average ($\alpha = 0.01$) but their job stress was lower than average ($\alpha = 0.01$). After intervention, results disclosed improvement of job stress and such trainings and models recommended for improvement of employees stress.

Coelho et al. (2011) performed a survey on the mediating impacts of role stress and intrinsic motivation using contextual factors and the creativity of frontline employees. They reported that the

creativity of frontline service employees is associated positively with role conflict and negatively with role ambiguity.

Costa et al. (2011) performed confirmatory factor analysis of posttraumatic stress symptoms in Brazilian primary care patients using an examination of seven alternative models. Their objective was to study whether the clusters of PTSD symptoms identified in North American and European studies could be replicated in a Brazilian sample composed of 805 primary care patients living in hillside slums. They reported that their results seemed to uphold the cross-cultural validity of the 4-factor, first-order model.

The present study investigates to find out the important factors influencing job stress in one of Iranian hydro facilities. The structure of this study first explains characteristics of all people who participated in our survey.

2. The proposed study

The study investigates different factors influencing people to have more stress in a hydropower unit located in city of Esfahan, Iran. Since there were only 81 people working for customer service section of this company and the proposed study tries to focus only on this part of the firm we have decided to distribute questionnaires among all of them. The questionnaire consists of two parts, in the first part, we gather all private information such as age, gender, education, job experience, etc. through seven important questions. In the second part of the survey, there are 52 questions, which include all the important factors influencing employees' stress.

2.1. Personal characteristics of surveyed people

As we explained, there are 81 people participated in our survey. In terms of their gender, there were 73 male and 8 female so approximately 90% of the surveyed people are from man. In terms of their educational background, 10 people had only 9 years of educational background, 48 people finished high school and 23 people had colleague education. While 15 people were single, 66 people were married. In terms of employment type, 21 people were permanent employee, 11 people maintained a five-year contract, 44 people had one-year contract and only 5 employee were on temporary contract.

In terms of job experience, 20 people aged between 20-29, 36 people aged between 30-39, 15 people were between 40 to 49 and finally, 10 employees were over 50 years of age. In terms of job experience, 45 people has from one to ten years of job experience, 15 people had between 11 to 20 years of job experiences and 21 people has between 21 to 30 years of job experience. Finally, 23 people were regular employee, 14 were workers, 30 people were working in customer service and 14 people were hired as accountants.

2.2. Methodology

In this survey, we use factor analysis to cluster different factors influencing stress. As usual, we use only factors whose Eigenvalues are greater than one. Therefore, we eliminate any remaining factors with small Eigenvalues. Next, we present details of our 66 questions along with common factors associated with each factor.

2.3. Questionnaire

Table 1 shows details of all questions associated with the proposed study of this paper. As we can see there are 66 questions and for each question the common factor is given.

Table 1
Details of survey

Q	Title	Common
1	The feeling that payment does not cover my expenses.	0.761
2	Firm does not pay enough attention to employee's accommodation.	0.821
3	Firm does not pay enough attention to employee's transportation.	0.703
4	There are significant noises in the organization.	0.766
5	Management does not care about job experience.	0.731
6	There are not sufficient equipments.	0.680
7	The employees are not sufficient to be responsive to customers.	0.806
8	Temperature is not properly adjusted.	0.717
9	There is not sufficient visibility.	0.743
10	There is a significant amount of work to do.	0.831
11	There are not supportive entertainment programs.	0.679
12	There is not enough respect towards employees.	0.772
13	There is fear that people may lose their jobs.	0.747
14	There are too much expectations from the workers.	0.798
15	The customers are mostly aggressive.	0.817
16	There is no support for hard working conditions.	0.718
17	There are discriminations among people with various types of employment.	0.709
18	There are discriminations among people with various types of job experiences.	0.757
19	The feeling that employee must always be a good voice of customer.	0.759
20	Special circumstances of work place.	0.750
21	There is not over pay for overtime work.	0.848
22	There is not enough time to finish all works on time.	0.712
23	Displacement of employees happens without asking the opinions of employees.	0.743
24	Management always looks for shortcoming and do not pay to other issues.	0.792
25	There are not enough hardware and software packages.	0.777
26	The people with more job experience work less.	0.840
27	The people with less job experience work less.	0.778
28	The employees are not participated in decision-making procedures.	0.857
29	Promotion policy is not good.	0.737
30	There is no trust among employees.	0.756
31	Connections work better than regulations.	0.835
32	Customers' complaints play important role.	0.850
33	Work duties are not clear for employees.	0.796
34	The management is making their decision selectively.	0.754
35	Limited number of employees performs a significant amount of work.	0.681
36	It is not possible to go to vacations.	0.801
37	Management does not care about employees' living and personal affairs.	0.869
38	The loans are sufficient.	0.770
39	There is poor management system.	0.742
40	All other problems are transferred to customers.	0.742
41	The rules and regulations have some flaws.	0.835
42	There is no promotion or punishment plan.	0.761
43	The working condition is boring.	0.835
44	Overtime work is insufficient.	0.717
45	The feedbacks from experienced people are not used.	0.835
46	There are extra job replacements.	0.689
47	There are just too much expectations from top management.	0.730
48	Employees are not sufficiently aware of the rules and regulations.	0.782
49	There are just too much attentions on degrees instead of experiences.	0.764
50	There is just too much discrimination among employees.	0.696
51	Stresses are transferred from other sections to employees.	0.739
52	There is just too much attention to customer care.	0.784
53	There is fear on making mistake due to high volume of work.	0.824
54	There are several issues associated with rate of charges.	0.724
55	There are eavesdropping among some employees.	0.745
56	Employees cannot use their vocational events due to high volume work.	0.786
57	There are just too much unreachable deadlines.	0.843
58	Employees are not feeling good for outsourcing activities.	0.682
59	The works are not performed properly.	0.754
60	Employees are asked to perform works while they are qualified for.	0.794
61	Works are not assigned fairly among employees.	0.773
62	There is no justice for giving awards.	0.702
63	There is no replacement for employees when some go on vacation.	0.816
64	There is no friendship relationship among employees.	0.727
65	There is feedback for customers' complaints.	0.726
66	Customers are not aware of rates and regulations.	0.719

From the results of Table 1, we can observe that the common factors for 66 questions of stressful factors are distributed from 0.679 to 0.857. Questions 6 (0.680), 11 (0.679), 35 (0.681), 37 (0.689), 46(0.689), 50 (0.696) and 58 (0.682) maintained the lowest common factor. On the other hand, questions 2 (0.821), 7 (0.806), 10 (0.831), 15 (0.817), 21 (0.848), 26 (0.840), 28 (0.857), 31 (0.835), 32 (0.850), 36 (0.801), 41(0.835), 43 (0.835), 45(0.835), 54(0.824), 57 (0.843), 63 (0.816) maintain the highest common factors. Next, we present details of our factor analysis.

3. Factor analysis

Table 2

The results of principal component analysis (PCA)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	Percent	Cumulative	Total	Percent	Cumulative
1	18.769	28.438	28.438	6.454	9.779	9.779
2	5.044	7.643	36.081	5.791	8.744	18.553
3	4.041	6.123	42.204	5.527	8.375	26.928
4	2.843	4.294	46.498	4.156	6.297	33.225
5	2.496	3.781	50.280	3.333	5.050	38.274
6	2.274	3.446	53.726	2.964	4.492	42.766
7	1.919	2.907	56.633	2.804	4.249	47.015
8	1.842	2.791	59.423	2.749	4.165	51.180
9	1.762	2.670	62.093	2.676	4.055	55.235
10	1.636	2.479	64.573	2.277	3.450	58.685
11	1.470	2.227	66.80	2.252	3.412	62.068
12	1.453	2.201	69.001	2.180	3.303	65.401
13	1.350	2.046	71.047	2.075	3.143	68.544
14	1.199	1.817	72.864	1.773	2.687	71.231
15	1.176	1.782	74.646	1.734	2.627	73.857
16	1.083	1.641	76.286	1.604	2.430	76.287

As we can observe from the results of Table 2, 16 factors maintain high Eigenvalues and they are shown in terms of non-increasing order. The first factor, which is the organizational and job related factor with the biggest Eigenvalue, 18.769, represents 28.438% of the total variance of stressful factors. In summary, 16 factors represent 72.286% of total variance of stressful factors.

3.1 First factor: Stress posed by hard job conditions

This factor includes eight items 10 (0.643), 16 (0.507), 22 (0.538), 34(0.420), 35 (0.712), 57 (0.649), 60 (0.762) and 63 (0.753) and based on what we observe from the related questions we nominate this factor as stress posed by hard job conditions.

3.2. Second factor: Stress posed by customers

The second factor includes six items of 14 (0.701), 15 (0.675), 25 (0.732), 32 (0.769), 52 (0.718) and 66 (603). Based on the question we call this factor as stress posed by customers.

3.3 Third factor: Stress posed by managers and colleagues

This factor includes only five items including 39 (0.678), 45 (0.877), 48 (0.804), 61 (0.478) and 62 (0472) and we can conclude that this factor represents stress posed by managers and colleagues.

3.4 Fourth factor: Lack of a good cooperation

This factor consists of 6 items including 23 (0.540), 26 (0.60), 27 (0.827), 28 (0.689), 30 (0.475) and 55 (0.589), which represent the lack of a good cooperation among workers.

3.5 *Fifth factor*: Stress posed by discrimination

Discrimination is an important factor coming from items 2 (0.789), 5 (0.640), 11 (0.489) and 17 (0.452).

3.6 *Sixth factor*: Stress posed by unsuitable rules and regulations

This item is another important factor, which includes item 8 (0.612), 9 (0.750), 36 (0.556) and 37 (0.435).

3.7 *Seventh factor*: Stress posed by boring operations high expectations

When there is no change on work and workers are expected highly they may feel stress and this is recognized by item 19 (0.585), 21 (0.537) and 43 (0.796).

3.8 *Eighth factor*: Stress posed by blaming for no good reason

This item is another important factor, which includes only item 24 (0.792) and we call it blaming for no good reason.

3.9 *Ninth factor*: Stress created by pressure posed from various divisions and lack of good human relationships

This item is another important factor, which includes four items, which are 12 (0.450), 38 (0.777) and 40 (0.482) and we call it stress created by pressure posed from various divisions and lack of good human relationships.

3.10 *Tenth factor*: Stress posed by lack of job security

This factor is detected within two factors of 13 (0.603) and 58 (0.761), which implies that job security plays an important role on stress.

3.11 *Eleventh factor*: Stress posed by lack of good outlook for job

This factor is detected within two factors of 29 (0.448) and 44 (0.613), which implies that a good outlook for job can reduce the bad impact of stress.

3.12 *Twelfth factor*: Stress posed by too much job exchange and lack of a good performance measurement

This factor is determined within two factors of 46 (0.729) and 65 (0.648), which implies that the lack of a performance measurement could increase stress among workers.

3.13 *Thirteenth factor*: Stress posed by lack of a good regulation for tasks

This item is another important factor, which includes only item 59 (0.650), which represents for lack of a good regulation for tasks assigned to workers.

3.14 *Fourteenth factor*: Stress posed by the fear of arriving on time

This factor is determined within two factors of 3 (0.805) and 53 (0.455), which implies that workers may feel bad for being late at work.

3.15 *Fifteenth factor*: Stress posed by lack of a good perception of job

This item is another important factor, which includes only item 33 (0.687), which represents for lack of a good perception for tasks assigned to workers.

3.16 Sixteenth factor: Stress posed by job location

This item is another important factor, which includes only item 20 (0.666), which is associated with job location.

In summary, the results of Factor analysis using principal component analysis can help us detect all important issues creating stress among workers.

4. Conclusion

In this paper, we have presented an empirical study to investigate different factors influencing people to have more stress in a hydropower unit located in city of Esfahan, Iran. Since there were only 81 people working for customer service section of this company and the proposed study tries to focus only on this part of the firm we have decided to distribute questionnaires among all of them. The results of our factor analysis indicated that among different factors, difficulty of working condition as well as work pressure are two most important factors increasing stress among employees.

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