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Examining the Influencing Factors on HSE Management in Production and Operational Company of Shahid Abbaspour Dam

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Abstract: The human working force is the main capital of an organization. In order to protect the human and material capital in any organization, one has to care about the improvement of health, safety and the environment. The present study attempts to investigate the HSE management process, find out the strengths and weaknesses of HSE management and eventually to present practical strategies to reduce the malfunctional effects and enhance HSE management effects on this company. To this end, the effects of four factor, i.e. education, culture, functionality and technology on management were taken into account. The study was conducted by means of applying questionnaires and analyzing the data acquired. After completing and confirming the questionnaires by the employees of the dam, the data were analyzed by the Binomial, Friedman, One Sample Kolmogorov-Smirnov non parametric tests. results show that HSE principles were applied in the dam which led to job satisfaction of the employees.

Key words: Education · Culture · Functionality · Technology · HSE Management · Shahid Abbaspour Dam

INTRODUCTION

Due to the fact that humans are in the center of sustainable development, practicality analysis, programming and the implementation of any plan or project are not recommended by the experts if they are in contrast with health, safety and environmental principles although they offer a host of technical and economical benefits. That's why national and international standards and guidelines with this regard are mandated. Because these three elements are closely related and we can enjoy the simultaneous advantages of each such as the reduction of expenses and the time spent, nowadays, health, safety and environment are investigated as a single system.

It has been shown through experience that, exacting health, safety and environmental principles at all working levels (employees, employers and governments) are essential and beneficial to the same extent [1].

According to the Dominos model, hazards are created by unsafe actions and conditions. moreover, based on Henrishs studies, unsafe actions to 88% and unsafe conditions to 10% can play a role in accidents. Unsafe conditions are the result of unsuitable working conditions or systems, however, unsafe conditions are usually done by individual and endanger the individuals health and safety. As a result, the recognition of hazards is the process of the recognition of hazards and the actions and conditions arising them [2].

Regarding the fact that applying preventive methods for safety, health and environment have proved effective for the prevention and reduction of working accidents and diseases caused by job conditions, however, although human forces play an important role in societies, these factors are usually ignored and the number of incidents is high [3].

The present study analyzes four factors, namely, education, culture, functionality and technology. Education is infact an increase in awareness which results in a change in ones behavior through a change in ones attitude. According to Wilds theory the main goal of education should be based on lowering ones risk-taking ability so that he can be ready to assume responsibilities in future and altogether education should improve the organizations conditions and its fruitfulness [3].

Culture is a collection of beliefs, norms, incentives, roles and social and technical functionalities which decrease the likelihood of encountering dangerous and harmful conditions by employees, managers, consumers and the public in general [3].

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In any company, through establishing appropriate mental and physical hygienic conditions and employing correct guidelines and international management systems such as safety and job health (OHSAS18001), it is possible to improve the organizations conditions interms of its HSE functionality [4].

In any company, technological factors including appropriate suitable physical conditions in working places, improving working places, providing individuals, protection equipments, using human engineering, taking necessary measures for urgent conditions (fire, toxins, explosions, earthquakes), providing first aid in the working place, etc. can be utilized through which we can create safe conditions which lead to job satisfaction and increased turnover [5].

Golbaz and Jaafari studied the relationship between HSE and turnover (relationship of establishing safety management, Health, Environment and the systems turnover) in the Harbors and navigation organization. Results showed that according to this method, the hypothesis is not refuted which means that HSE has had positive effects on turnover [6].

Mohammad fam studied the assessment of safety culture in a power plant and found out that the score for safety culture of the unit under study ranged between 125 to 250. This means that safety culture is acceptable in this unit although there are some weaknesses [7].

Dordi Hoivik etal studied the HSE culture in a Norwegian company. they interviewed 31 position – holding and nonposition - holding employees. The purpose of the study was enhancing HSE culture among the employees. Results reveal that employees and managers differ slightly in their ideas with regard to the acceptance of HSE culture [8].

With regard to the hazards and accidents which happen annually all over the world and endanger valuable human and financial resources, it is necessary to pay attention to HSE health, safety and environment in industries and organizations. Definitely, effective HSE management along with planning and enactment of roles and principles in the organization based on scientific findings, especially staff training, increasing HSE cultural awareness and using effective technologies and so on can reduce the level of risks and prevent the accidents and thus result in an increase in turnover and a decrease in future expenses [9].

MATERIALS AND METHODS

Shahid Abasspour dam is a concrete two-arched dam located in 210 kilometers north-east of Ahwaz and in 55 kilometers north-east of Masjed-Soleyman and in 410 kilometers of the Karoon rivers delta in a place called Bard-e-ghamchi in Andika county. this dam includes two power plants, each of which generating 1000 megawatts. Figure 1. Depicts the location of the studied zone based on national divisions [10].

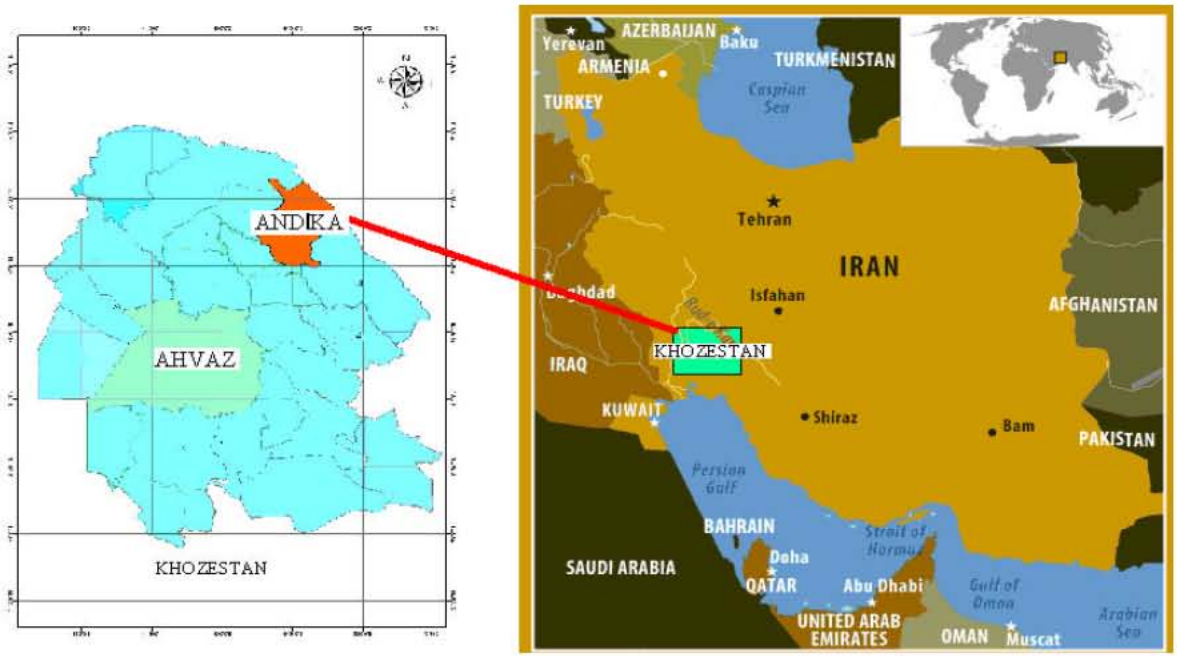

Fig. 1: Location of the studied zone based on national divisions

This study tested the hypotheses of Shahid Abasspour dam using a population including 248 employees of this organization. To collect the data through questionnaires, the Likret scale including 40 questions (each hypothesis included 10 questions) was used. for each question, there were four alternatives ordered from left to right (very low – low – average –high- very high) with grades from 1 to 5. In order to confirm the questionnaires at the preparation stage, first many references and papers related to HSE management were studied. After the determination of different aspects of the study, different questions were formulated for each aspect and then they were all revised. Afterward, a questionnaire was prepared under the supervision of HSE instructors and it was also confirmed by experts. Next, to determine the reliability of the questionnaire, data were randomly analyzed from 75 questionnaires (30%) by the SPSS through the Cronnbach Alpha. The reliability was calculated [11].

It is important to note that cronnbach α coefficient ranges from zero to one ($0< \alpha <1$) and the closer α is to 1 the higher is the reliability.

In the next stage, the normality or abnormality of the data was calculated through the One Sample Kolmogorov-Smirnov Test to identify appropriate statistical procedures. In this test, if the significance level is above 0.05, the data are normal and we can use parametric and normal tests (such as T test and so on) and if the significance level is below 0.05, the data are abnormal and we should use nonparametric tests. We can refer to Binomial Test as an nonparametric test. In other words, if we divide the data obtained from a population into two groups and the purpose of the test is to determine the differences in the distribution of the data, we use this test.

In the above method, the data were divided into two groups (< 3 and >3) and they were compared. With regard to the level of significance, the hypotheses were accepted or rejected as follows:

- If significance level is higher than meaningfulness level (0.05), H0 is accepted and the hypothesis is not meaningful.
- If significance level is lower than meaningfulness level (0.05), H0 is rejected and the hypothesis is rejected.

Generally speaking, if for each hypothesis, half of the population (50%) respond to questions high and very high, it means that the suitable implementation of the hypothesis (education, culture, functionality and technology) in the population and its positive effects on HSE management have occurred and this leads to job satisfaction in relation to the hypothesis. Otherwise, this can have negative effects on HSE management meaning that the hypothesis has not been implemented from the employees point of view. The Friedman test is another nonparametric test which was applied to determine the rank the four hypotheses and also the ranks of the 10 questions for each hypothesis. Therefore in each column the parameters under question are ranked [12, 13].

RESULTS AND DISCUSSION

Regarding the fact that questionnaires were used as the data collection instrument from the employees, to prepare this questionnaire, eminent experts of HSE were consulted with and the reliability of the questionnaire for all the four hypotheses was above 80%. Running the One sample Kolmogorov- smirnov Test, it was found out that because significance level was less than 0.05 for all the four hypotheses, the data were abnormal and nonparametric procedures were employed. Table 1 shows the results of One - sample Kolmogorov- smirnov Test and Table 2. Depicts the results of Binomial Test.

Table 1: results of kolmogorov – smirnov test

	Education	Culture	Functionality	Technology	Total average
Number	248	248	248	248	248
Sig	.006	.007	.002	.009	.008

Table 2: The Output of binomial test for four hypotheses

Effects of hypotheses on HSE management	1group (3>)	Group 2 (> 3)	Effects of hypotheses on HSE management	Sig	Number of hypotheses
Positive	27%	73%	effective	<05/0	1
Positive	29%	71%	effective	<05/0	2
Positive	27%	73%	effective	<05/0	3
Positive	33%	67%	effective	<05/0	4

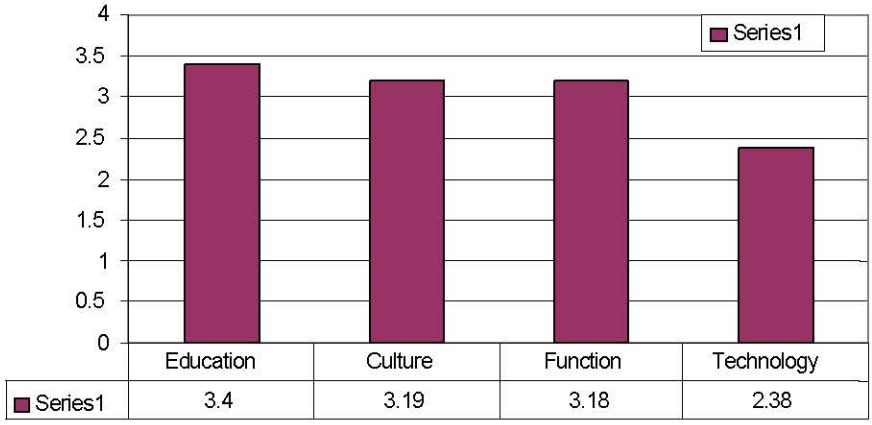

Fig. 2: Output of Friedman test for four hypothesis

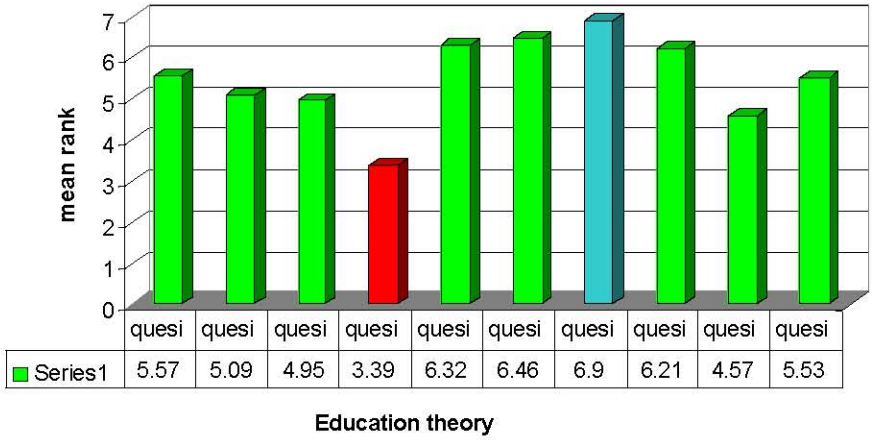

Fig. 3: Freidman test grading output for Education

Data obtained from the Binomial test for all the four hypotheses are represented in Table 2.

Then, the Friedman test was applied to determine the rank of each of the hypotheses and also the ranks of the 10 questions for each hypothesis. Findings of this test are as follows:

Rankings of the four hypotheses are shown in Figure 2. The education hypothesis ranked first, culture second, functionality third and technology fourth. It can be said that the reasons why technology ranked last refers to the fact that there is no special budget HSE section of the company and to achieve the specified goals of the HSE section, particularly the technology section needs to use the budget from other sections and this decreases the HSE managers freedom to take actions.

The rankings for the10 questions of each hypothesis are given in Figures 3, 4, 5 and 6.

In the education hypothesis, among the 10 questions, question number 7 (To what extent is education effective for the qualitative and quantitative increase in turnover levels?) had the highest score (6.90) and question number 4 (To what extent are the supervisors and personnel refered to for educational assessment ?) had the lowest score (3.39). The Reason explaining why question 4 scored the lowest is that the educational programs in the company are conducted in two technical and general forms. The general terms are carried out based on the educational schedule of the training institute of the Khuzestan water and power organization and with the agreement of the managing director of the company and in cooperation with the HSE and the training offices of the company. Therefore, the need to consulting with the employees is not felt by the managers of the company. For technical terms, which are needed by the technical staff, the terms are announced to training office by assistant managers of the technical engineering and the exploitation offices and are held by the agreement of the company's management.

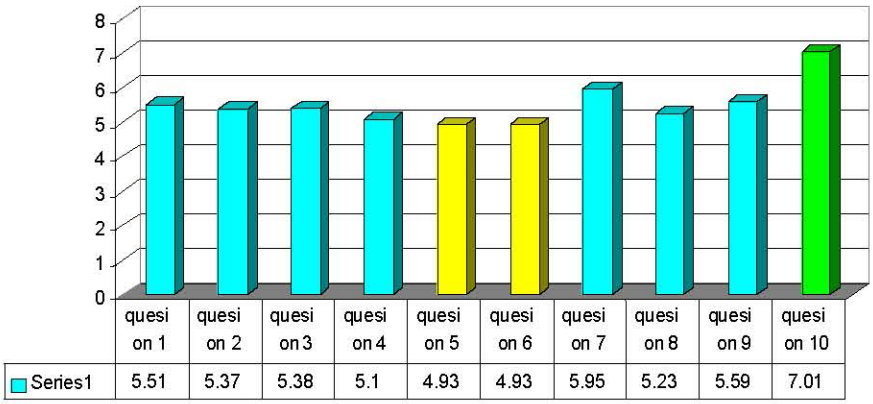

Fig. 4: Friedman test grading output for culture

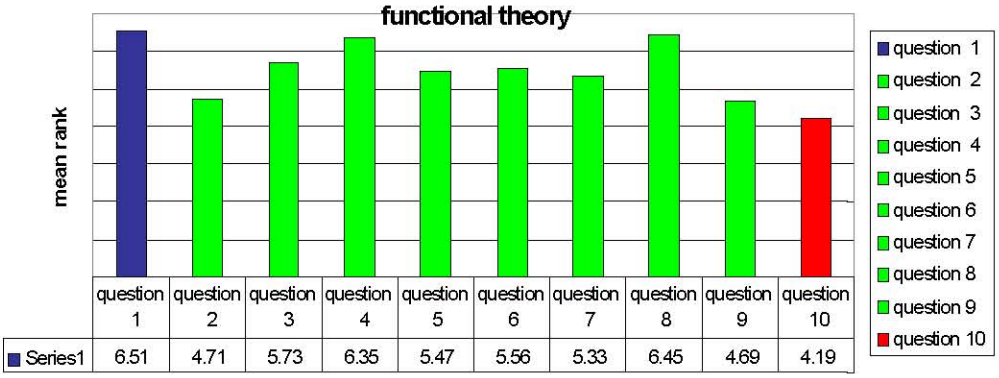

Fig. 5: freidman test grading out put for functionality

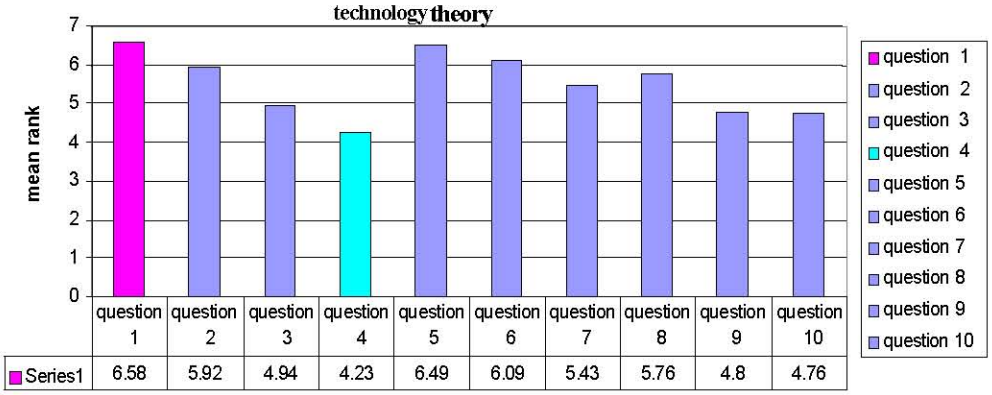

Fig. 6: freidman test grading output for technology

In the culture hypothesis, question number 10 (to what extent establishing HSE culture affects the personnel's turnover?) had the highest score (7.01) and questions number 5 (to what extent do managers and supervisor feel committed to increase awareness and use of modern sciences to upgrade HSE information?) And number 6 (To what extent do managers use the cooperation and consultation of the personnel to improve the existing conditions and HSE decisions?) had the lowest scores (4.93). The reason for this low score in question 4 is that the employees feel that they need to cooperate more in HSE to improve the conditions. And for question 5 the reason is that, from the employees, view point, the supervisory and managerial staff should remain up-to- date concerning modern and effective sciences so that safer conditions can be created and the employees will work comfortably in improved working conditions.

In the functionality hypothesis, question number 1 (To what extent are regular and constant supervisions (standard checklists) effective for improving unsafe conditions and operations?) had the highest score (6.51) and question number 10 (to what extent is wastes and sewage management done appropriately in the company?) had the lowest score (4.19). The reason for its being low is that the company's sewage system is not advanced and the sewage is stored in concrete reservoirs and when they are filled, the reservoirs are diluted through adding water by a pump located in the river's down stream.

In the technology hypothesis, question number1(To what extent protective equipments such as first aid boxes, stretchers, ambulances, safety shoes and helmet, gloves, clothes and respiratory filters and so on were available in the required number and on time by the company's officials?) had the highest score (6.58) and question number 4 (To what extent did the company observe human engineering principles?) had the lowest score (4.23). The reason for this lowness is that the employees more felt that they needed safer and more comfortable conditions and instruments. Providing suitable and standard equipments needs higher commitment on the side of the company's officials to observe human engineering principles and mangers should attempt more to do this to increase the employees, satisfaction.

In the end, this study was compared with the study conducted on safety management in Khuzestan Gas company in 2003. In that research, the four hypotheses of education, culture, technology and functionality in a population of 493 employees were studied. Data were collected through questionnaires and the analysis of the data was done by SPSS and through the One-Sample T-test. The following results were arrived at:

- The education hypothesis was rejected (i.e. educational factors do not have meaningful effects on safety management).
- The culture hypothesis was rejected (i.e. culture factors do not have meaningful effects on safety management).
- The functionality hypothesis was accepted (i.e. functionality factors had meaningful effects on safety management).
- The technology hypothesis was accepted (i.e. technology factors had meaningful effects on safety management).

In the gas company study, 50% of the hypothesis were accepted and had a positive effects on safety management and the need to establishing a safer environment, establishing OHSAS18001 and so on were felt in the company.

However, in the Shahid Abbaspour Dam study all the hypotheses were accepted and had positive effects on HSE. This shows that the HSE programs were carried out properly and HSE principles were observed which lead to employee's satisfaction.

CONCLUSION

In the end, it can be concluded that the four hypotheses of this study were accepted and had positive effects on HSE management and HSE management was evaluated to be in a satisfactory condition by the employees. And among the hypotheses, education obtained the highest score and technology the lowest score.

Finally, with regard to the findings of the study and the interviews to enhance the HSE conditions in the dam, it is recommended that along with considering the opinions and cooperations of the employees in HSE programs with the use of safe equipments and standard working environment for the personnel can be created and through creating motivations in individuals, the conditions are improved and the working turnover will increase both qualitatively and quantitatively. This study can be used as a paradigm for assessing HSE management conditions in working places, specially the dams.

REFERENCES

1. Arghami, Sh., 2001. Safety Culture. Symposium on Safety in Mines.
2. Walth, Y., 2000. Safety systems. Translated by Homayun Laheijaniyan. Science and Industry university Publications, 1(2): 55- 61 and 129-131.
3. Kazemi, B., 2004. Occupational safety& health. Fanavaran Publications, 13(16): 25-28.
4. Abdolahzadeh, M., 2001. Professional Safety and health management systems (OHSAS18001). J. Industry and Safety, No 80.
5. Broberg, O., 1997. Integrating Ergonomics into the product development process. Internatinal J. Industrial Ergonomics, 19: 315-323.

6. Golbaz, N. and A. Jaafari, 2007. The relationship between HSE and turnover (relationship of establishing safety management, Health, Environment and the systems turnover) in the Harbors and navigation organization. 3th International Conference on Harbors and navigation safety.
7. Mohammad Fam, I., 2006. Assessmen of cultural safety, Health & Environment in the powergeneration Conference on Power Generations.
8. Høivik, D., 2009. A study of occupational health and safety management in the Norwegian oil and gas. Safety Sci., 47(7): 992-1001.
9. Dicarlo Fall, R., 1999. Environmental, Health and Safety - University of Massachusetts, 5(3).
10. Alivar, M., 2000. History of Shahid Abbaspour Dam. production and operational company of Shahid Abbaspour Dam.
11. Batachria and Johnson, 2001. Principles & statistic ways. vol 1. Translated by F. Mikaili and M. Ashoub, Tehran University Publication.
12. Kinnear, P.R. and C.D. Gray, 2006. SPSS 14: 20-35, 45-65.
13. Esmailian, M., 2007. SPSS 12. Naghous Publication.
14. Dereamer, R., 1995. Modern safety practices. John Wiley and Sons Inc. Boston - USA, pp: 46-60.
15. Hankasalo, A., 2000. Occupational Health and Safety and Environmental Science and Policy, pp: 39-45.
16. Koren, H. and M. Bisesi, 1998. Handbook of Environmental Health and Safety (3rd edition). Principles and practices. Vol 1. Lewis Publishers.
17. Peterson, D., 1971. Techniques of safety management. Mcgraw-Hill book company. New York USA, pp: 104-106.
18. Shatalov, A., O.V. Pokrovskaya and P. Yu Popov, 1999. Reinforcing the safety system of industrial facilities. Journal of Chemical and Petroleum Engineering. Publisher: Springer New York, 35(5): 277-279
19. Shojaei, M., 2005. Individual protective Equipment. Fanavaran Publications, pp: 15-20.