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Evaluating the Effectiveness of Health, Safety, and Environment Management System (HSE-MS) Training Programs. Case Study: Department of Urban Affairs -Tehran 9th District Municipality

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ABSTRACT
One of the methods to evaluate the positive performance and effectiveness of HSE management system in an organization is studying the role of training and its effectiveness in promoting corporate culture and the effectiveness of training courses can be trusted when they fulfill the actual needs of the organization. The present study was conducted to evaluate the effectiveness of health, safety, and environmental management system (HSE-MS) training programs on promoting the organizational culture of the staff of department of urban affairs of Tehran 9th district municipality in 2013-2014. The sample size included 72 subjects which were selected randomly and two questionnaires were completed by the respondents according to Kirk Patrick model containing four levels of reaction, learning, behavior, and results. In order to analyze the data, T-test and analysis of variance (ANOVA) were used. The results showed that holding training programs was effective in increasing the knowledge, changing the attitude, and enhancing the skills of the staff. Nevertheless, with respect to the results of the research, considering the importance of training the staff by the organizations' managers such as participating in training courses and also paying attention to appropriate times for presenting the materials, introducing and providing course materials and curriculums by the instructors, and the possibility of taking advantage of training equipments can enhance the effectiveness of training programs.
Keywords: Training Evaluation, Kirk Patrick model, HSE, Tehran 9th District Municipality

INTRODUCTION
Human societies' industrialization provides prosperity, welfare, and progress for human beings on one hand and causes some problems and difficulties in the environment, human health, occupational accidents, safety, etc., on the other hand [1]. It is very necessary to address the establishment of health, safety, and environmental management systems and also to audit and monitor them in the organizations. One of the monitoring tools is studying the effectiveness of training in all organization activities in order to assess how to reduce the risk, promote HSE culture, reduce damage and costs, and increase the productivity [2, 3]. If the goals are defined as the optimal condition of the organization in the future, then the organization effectiveness is the degree or extent to which the organization achieves its desired objectives. There are different models to assess training programs such as Odiorne Model [4], Philips Model [5, 6], Kirk Patrick Model [7], etc., among which the Kirk Patrick Model can be referred to as the most important one. Kirk Patrick model includes four levels of reaction, learning, behavior, and results and is an integrated model for assessing training effectiveness and its role in promoting organizational culture [8].
Several studies have been done on HSE and the valuation of effectiveness in organizations among which the study conducted by Hillary Mc Dermontt can be referred to which was done on the practical models of training, shifts in organizations, and the belief in effectiveness in 150 different organizations in England. It was found that inspiring and motivating the staff and legal requirements were considered as the main tools and or the absence of illness and absence from work were the main results of effectiveness

measurement [3]. In another study, it was found that focusing on education and promoting public awareness of individuals (workers) had been emphasized in order to achieve better HSE management [9]. In another study, creating a monitoring, refining, and measurable environment that would meet the needs of occupational safety at workplace was investigated and it was found out that organizational health system managements (OHSM) would act as an intermediary between the work domestic environment and the world trade; furthermore, giving priority to the environment and guaranteeing a safe and healthy workplace would be necessary and considering different aspects of workplace such as psychological factors would be important and would increase the effectiveness [10]. Other similar studies have been done by Nijsjan D. *et al.* [11] in Denmark entitled "Health, safety, and environmental management in industrial processes" or by Mohammad Saeid entitled "Evaluating the effectiveness of training and development using Kirk Patrick model" [12]. In this research, the effectiveness of health, safety, and environmental management system (HSE-MS) on promoting the organizational culture of the staff of department of urban affairs and green spaces of Tehran 9th district municipality in 2013-2014 was investigated by using Kirk Patrick model. The results of the research were suggested to be used by the senior managers of the organization in order to improve the system process.

MATERIALS AND METHODS
The research was conducted on the basis of collecting data through completing the questionnaires by all the staff and the heads of the department of urban affairs of Tehran 9th district municipality (72 person) who had already been trained using Kirk Patrick model [13, 14]. The first question was related to reaction (20 questions) learning (6 questions) and the second questionnaire was related to behavior (23 questions) and results (7 questions) which were prepared based on Kirk Patrick model and were scored on Likert 5-point scale as: 1= very little, 2 = little, 3 = average, 4 = much, and 5 = very much. Moreover, the Cronbach's alpha was used to calculate the reliability coefficients of the questionnaires. After calculating the frequency, mean, and standard deviation of the questions via SPSS software, the descriptive statistics as well as statistical tests such as T-test, ANOVA, post hoc test LSD (at significance level of 0.05) were used to analyze the data. Finally, the executive suggestions were offered based on the analysis of collected data and the obtained results.

RESULTS AND DISCUSSION
As mentioned in research method, the results were extracted from the completed questionnaires based on four levels of Kirk Patrick model and were analyzed. In this study, 33% of the participants were women and the highest percentage of the participants by 55.6% belonged to the group with 1to10 years of job experiences and the lowest percentage by 6.7% belonged to the group by 21 to 30 years of job experiences. Moreover, in terms of education level, the highest frequency by 61.1% belonged to the participants with bachelor degree and the other frequencies respectively belonged to the participants with diploma, associate degree, master degree or higher educational degree.

Table (1): Distribution of mean score for different levels of Kirk Patrick model

Means of levels of Kirk Patrick model				Mean of four levels
Reaction	Learning	Change of behavior	Results	
3.54	3.63	3.55	3.63	3.59

As specified in Table (1), the lowest mean score by 3.54 belongs to the level of reaction and the highest mean score by 3.63 belongs to the levels of learning and results by participants in HSE-MS training programs. The total mean of four levels of Kirk Patrick model is 3.59 which is more than the assumed mean, i.e. 3 (medium rate); therefore, holding HSE-MS training programs has been evaluated positively by the staff. In a similar study conducted by Mohammad Khani et al. [15], entitled "The effectiveness of tour guide training programs in Tehran", the effectiveness of training in reaction level and its significance among the trainees was approved [16].

Table (2): One sample T-test results related to the levels of Kirk Patrick model

Kirk Patrick model levels	Mean	Degree of freedom	T value	P value
Evaluating participants reaction to training programs	3.54	71	34.30	0
Evaluating learning enhancement of the participants in training programs	3.63	71	29.09	0
Evaluating the effect of training programs on the staff behavior in workplace	3.55	71	5.05	0
Evaluating the results of training programs	3.63	71	29.65	0

In the present study the results showed that in all four levels the scores were above the mean score (3). In spite of its low level, the score indicates the effectiveness of the carried out activities. In a study conducted in a university in relation to the effectiveness of training activities with regard to Kirk Patrick model, the obtained scores for the levels of reaction, behavior, and results were 2.76, 2.64, and 2.53, respectively which indicated lack of the expected effectiveness while the score for the learning was 3.23 [16].

Table (3): One-way ANOVA for comparing the mean of staff evaluation based on Job experience

Evaluation levels of Kirk Patrick model	Sources of variations	Sum of squares	Degree of freedom	Mean of squares	F	P
First level Reaction	Intergroup	23.53	22	1.07	2.38	0.006
	Intragroup	21.96	49	0.44		
	Total	45.5	71	__		
Second level Learning	Intergroup	28.38	22	1.29	1.77	0.04
	Intragroup	33.61	49	0.73		
	Total	64	71	__		
Third level Behavior	Intergroup	23.13	22	1.05	1.92	0.03
	Intragroup	26.74	49	0.54		
	Total	49.87	71	__		
Fourth level Results	Intergroup	29.22	22	1.19	0.93	0.56
	Intragroup	62.89	49	1.28		
	Total	89.11	71	__		

As it is observed in Table (3), there is no significant difference between the evaluations of the fourth level (results) by the participants who have taken part in HSE-MS training programs. In other words, all the staff had almost the same assessment of the mentioned level. However, there is a significant difference between their assessments of reaction, learning, and behavior compared to the fourth level (results). Of course, the analysis of variance does not reveal which groups are significantly different from each other in term of job experiences. Therefore, the post-hoc analysis of LSD was used the results of which are presented in Table (4).

Table (4): The results of LSD post hoc test for comparing the means of staff evaluations based on their job experiences

Row	Job Experience (year)	Mean			
		Reaction	Learning	Behavior	Results
1	1-10	3.47*	3.75*	3.47*	3.65
2	11-20	3.2	3.3	3.15	3.3
3	21-30	3.58*	4*	3.91*	4

As it is observed and specified by (*) in Table (4), there is a significant difference between the evaluation of reaction, learning, and behavior by the staff who have participated in HSE-MS training programs, so that the staffs with 21-30 years of job experience had higher mean scores than the ones with 1-10 years of job experience in terms of reaction, learning, and behavior levels.

Table (5): One-way ANOVA for comparing the means of the staff evaluations based on their working office

Evaluation levels of Kirk Patrick model	Sources of variations	Sum of squares	Degree of freedom	Mean of squares	F	P
First level Reaction	Intergroup	4.08	6	0.68	1.06	0.39
	Intragroup	41.41	65	0.63		
	Total	45.5	71	__		
Second level Learning	Intergroup	6.53	6	1.09	1.23	0.3
	Intragroup	57.46	65	0.88		
	Total	64	71	__		
Third level Behavior	Intergroup	4.71	6	0.78	1.13	0.35
	Intragroup	45.15	65	0.69		
	Total	49.87	71	__		
Fourth level Results	Intergroup	18.7	6	3.11	2.87	0.01
	Intragroup	70.4	65	1.08		
	Total	89.11	71	__		

As it is observed in Table (5), there is no significant difference between the evaluations of three levels (reaction, learning, and behavior) by the participants who have taken part in HSE-MS training programs. In other words, all the staff had almost the same assessment of the mentioned levels. However, there is a significant difference between their assessments of the results compared to the other three levels. Of course, the analysis of variance does not reveal which groups are significantly different from each other in term of job experiences. Therefore, the post-hoc analysis of LSD was used the results of which are presented in Table (6).

Table (6): The results of LSD post hoc test for comparing the means of the staff evaluations based on their working office

Row	Work office (year)	Mean			
		Reaction	Learning	Behavior	Results
1	Recycling	3.3	3.4	3.2	3.2*
2	Urban services	3.25	3.5	3.32	3.17*
3	Green space	3.36	4.27	3.45	4.27*
4	Beautification	3.88	3.44	3.44	3.66
5	Bookkeeping	3.71	3.85	4	3.8*
6	Environment	3.6	3.8	4	3.8
7	Watercourses and aqueducts	3	4	3.5	4

According to Table (6), there is a significant difference between the evaluations of the results by the participants who have taken part in HSE-MS training programs. That is, there is a significant relationship between the staffs of recycling, urban services, green spaces, and bookkeeping offices, but there is no significant difference between the other offices. The mean of evaluating the results by urban services office is less than that of recycling, greens spaces, and bookkeeping departments (there is a smaller significant difference). Also, the mean of evaluation by green spaces staff is more than the means of evaluation by bookkeeping, urban services, and recycling departments.

Table (7): One-way ANOVA for comparing the means of the staff evaluations based on their education

Evaluation levels of Kirk Patrick model	Sources of variations	Sum of squares	Degree of freedom	Mean of squares	F	P
First level Reaction	Intergroup	0.34	3	0.11	0.17	0.9
	Intragroup	45.15	68	0.66		
	Total	45	71	__		
Second level Learning	Intergroup	3.77	3	1.25	1.42	0.24
	Intragroup	60.22	68	0.88		
	Total	64	71	__		
Third level Behavior	Intergroup	2.36	3	0.78	1.13	0.34
	Intragroup	47.5	68	0.69		
	Total	49.87	71	__		
Fourth level Results	Intergroup	5.64	3	1.88	1.5	0.21
	Intragroup	83.47	68	1.22		
	Total	89.11	71	__		

As it is observed in Table (7), there is no significant difference between the evaluations of four levels (reaction, learning, behavior and results) by the participants who have taken part in HSE-MS training programs based on their education. In other words, the staffs with different educational degrees had almost the same evaluations of the four mentioned levels. In order to identify the insignificant difference, the LSD post hoc analysis was used which showed that there was no significant difference between the evaluation of four levels (reaction, learning, behavior, and results) by the participants who had taken part in training programs in terms of their education. In other words, the staffs who were working at urban affairs and green spaces departments of the 9th district municipality had almost the same evaluation of four levels of Kirk Patrick model regardless of their education.

Table (8): the results of LSD posthoc test for comparing the means of the staffs evaluations based on their education

Row	Education	Mean			
		Reaction	Learning	Behavior	Results
1	Diploma	3.5	3.9	3.8	3.6
2	Associate degree	3.55	3.88	3.55	4.11
3	Bachelor degree	3.38	3.68	3.43	3.63
4	Master degree and more	3.33	3.11	3.11	3

It is clear that in evaluating and determining the effectiveness of some organizations, three levels of Kirk Patrick model (reaction, learning, behavior) have been used, but in this research all four levels were applied and analyzed) [7]. The review of the famous training evaluation models shows that they have followed the four-level model of Kirk Patrick. This model is more complete than the other models such as Transition or T.V.S approach which focus on the position of training, intervention, impact, and value of training program. Of course, TVS (Training Validation System Approach) has been used in training settings such as the ministry of education, as well [13].

Nevertheless, in the present study, the effectiveness of training programs and activities was confirmed by using Kirk Patrick model, which is described as a comprehensive, simple, and practical model for many training situations and which is known by many specialists as a benchmark in this area, and with the help of statistical analysis. Further studies need to be done in this regard in the municipality.

CONCLUSION

In this study it was identified that Kirk Patrick model with regard numerous questions in four mentioned levels (reaction, learning, behavior, and results) can be used to help the managers determine the effectiveness of training programs of the organization and to promote organizational culture in terms of HSE. The effectiveness of training programs in four levels was determined in the study by the mean scores of 3.54 for reaction, 3.54 for learning, 3.54 for behavior, and 3.63 for the results which were all above the desired mean. With regard to the present study, it is suggested to investigate the effectiveness of training programs in other municipality departments such as technical and developmental department, financial and administrative department, technical and traffic department, based on different levels of Kirk Patrick model. Furthermore, this is the first study on HSE which was conducted in Tehran 9th district municipality and it is hoped that by using this method in all municipalities an appropriate evaluation can be carried out with regard to training activities.

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