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ORIGINAL ARTICLE

An investigation on safety culture among forest workers (Case study: Guilan province)

Fatemeh Mokhtari Gorabjavari[1], Seyed Armin Hashemi[2], Vahid Hemati Khoshkdasti[3]
[1]Department of Forestry, Lahijan Branch, Islamic Azad University Lahijan, Iran
[2, 3]Department of Forestry, Lahijan Branch, Islamic Azad University Lahijan, Iran

ABSTRACT
Safety culture is a factor by which all personnel from the managing director to the simple workers are committed to have a large contribution in the safety of their own and their colleagues. The present study aims to investigate the relation between factors influencing the safety culture among the forest workers of Shafaroud Company in Guilanprovince. This study was conducted on 110 forest workers. Questionnaire was used to collect data in this descriptive- analytical study. This questionnaire included 75 questions on the standard of safety culture and 6 questions on the accidents. After being encoded, the collected data were entered into SPSS 16. Chi-square test was used to analyze the data. In this study, with respect to the statistical analysis done, at the confidence level of 0.95 (p< 0.05), a significant relation was found between the safety culture and the level of education, working experience, age, marital status, type of accident and the injured part of the body, but no statistically significant relation was found between the safety culture and the consequence of the accident. Mostly, the consequences of the accidents were cuts or fractures. Recently, companies have been obliged to provide their workers with forestry work gloves, trousers, shoes and safety helmets and the workers have been obliged to use them to prevent accidents.
Keywords: *Safety culture, forest, Shafaroud basin*

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INTRODUCTION

Over the past sixty years, industries have tried to decline their number of accidents via applying different methods.The first step taken on this path was improving the hardware (using suitable protection and safer equipment and machinery). The next step taken during 1960s and 1970s included selecting appropriate individuals, training, establishing systems of remuneration and incentives.The third step was paying attention to the management systems especially those of safety management [1]. Each one of these steps reduced the count of accidents as much as possible but eventually was not fully successful.
Nowadays, it is believed that most events and accidents are caused by workers' failure and negligence; hence, it seems that the next step to decrease the accidents at work is establishing a proper safety culture[2]. Clearly, developing the proper safety culture shall correct the individual behaviors at first stage and shall decrease the human failures and the accidents at the end. One of the final methods to decrease accidents among workers is enhancement of the safety culture. Of course, different industrial accidents and consequences originated from them have a direct relation with the situation of safety culture[3]. Based on most theories, the safety culture of an organization must be led toward a turning point at which the curve of accidents reaches a stable level. At that point, the curve of negative events data converges to zero. No doubt, to go beyond this ideal level at which the rate of accidents is low and appears to be insignificant, and also to continue the improvement of safety efficiency, making ready the mind and the soul of managers and workers in a coordinated form is necessary[4].
Although numerous factors may be effective in creating a positive safety culture, but the results of researches done indicate that management is the most essential factor in the field of safety culture[5].A review on safety culture literature clarifies that the personnel's perceptions of managers behaviors and attitudes toward safety, production, planning, etc., is one of the most successful elements to measure the safety culture in an organization. Also, researches indicate that different management levels influence health and safety procedures on different aspects. Addressing health and safety strategies like safety

culture in the organization not only decreases the probability of accident occurrence, but also has financial and economic benefits which indicate organizational capital return in long term. Safety culture is a part of the inner core of safety management system, and accident prevention is one of the important safety goals[6]. Therefore, in this way and through these kinds of researches conducted on the development of safety culture, we would achieve our goal sooner. In this direction and based on researches done, via controlling and supporting the system safety processes and with respect to evaluation of the related reports, management tries to improve the situation of safety and to decrease the accidents. Wide studies have been conducted in this direction, among which those can be mentioned. Concerning the mentioned issues and taking into consideration the importance of this subject, attempts were made in this study to investigate the safety culture among the forest workers of Shafaroud Forest Joint-Stock Company in Guilan province.

SAFETY MANAGEMENT

Nowadays, industries are, everyday, confronted with new types of different forms of accidents and dangers. Compensating the damages caused by these accidents costs a lot for the industries. Also, the advancement of science and technology, change of machinery, new work places and finally different work processes make the situation more complicated. As a result, managers can never claim that they can secure the safety of the personnel and sections under their supervision. Can management achieve its goal: i.e. complete industrial safety, through taking benefit from numerous experts? The answer is that, as proved by the experiences, up to this time, the engineering section has not been successful in establishing what a manager may expect; hence, another method must be used, which is implementing the principles of safety management. Principles of safety culture include paying attention to safety in order to prevent the occurrence of accidents, injuries, and other undesirable events in organizational environments. This consists of actions like preventing or decreasing the accidents and events occurring for the workers and the equipment. All that meant by principles of safety culture can be included in localization of safety concepts in the industry, recognition of the available safety systems, design and plan of the safety principles, criteria for measuring safety, risk management, safety concepts in labor code and investigation of relevant by-laws[7]. Whereas safety is one of the important sections in the industrial organizations; hence, its management needs enough technical knowledge and sufficient experience in the related job. The issue of safety is addressed from different aspects, but frequently the most important principle of safety is its proper management which has two dimensions: cultural and engineering. Usually working on the managerial fields, especially on the cultural dimension, is difficult, but at the same time it is efficient. Annually, two million people lose their lives as a result of accidents at work. This number, beside the 270000000 on-the-job accidents and 160000000 diseases caused by work, presents shocking statistics to the industrial management. This clarifies the importance of safety management and the global need to establish a safety management system[8].

Safety management can be considered as the most essential tool in safety engineering. And, by observing its principles and standards, managers can achieve the highest level of safety in organizations. As the safety management system determines the organizational safety policy; hence the efficiency of all measures taken in the area of safety can be dependent on the appropriate implementation of the principles of safety management[8] .Through applying safety management principles, the costs originated from disregard for the safety standards and the decline of the safety coefficient of the system can decrease significantly. These costs include: cost of accidents (directly or indirectly), costs of reworking, cost of losing the company's reputation, current costs of safety and costs of prevention. Reducing the number of accidents, making system-oriented management decisions, considering safety as the quality aspect in providing products, increase of system confidence etc., are among the achievements of safety management system. It should be remembered that the tool of safety management system is in fact the safety engineering methods that if being neglected, will result into inefficiency of the safety management system. Principles of safety management system include: safety planning, organizing the safety system and its activities, directing and promoting the safety programs, controlling the operations and the obtained results (self-assessment).

GEOGRAPHICAL LOCATION OF THE STUDY AREA

This district is located at the elevation of 60 to 600 meters from the sea level in the restricted area of Rezvanshahr Department of Natural Resources at the western side of Guilan factory of wood and paper industry, the distance between its latest west side to the Poonel is 8 km. The district totally measures 1412 ha in area and is located at the altitude of 49º, 6', 20" to49º, 01', 52" and at the latitude of 37º, 33', 41" to 37º, 31', 25". The national empty spaces, the lands excluded or owned, the protected lands and road surfaces, the forest site, the land under exploitation plan, the sites of annual reforestations, and the

workable zones measure 23, 66, 150, 1173, 1122, 229, and 1145 ha in area, respectively. Lot 1817 was chosen as the control plot.

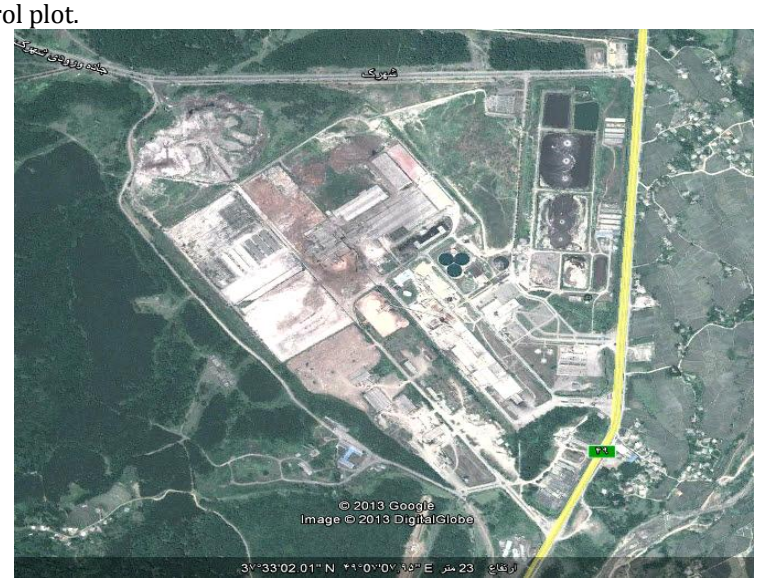

Fig.1. Position of Shafaroud basin in Guilanprovince on UTM

METHODOLOGY

This study was of descriptive-analytical type, which was done in cross-sectional method. The study sample composed of 110 workers of forest section of Shafaroud Forest Joint-Stock Company in Guilan province, each one of them were experienced in major forest activities including restoration and reforestation, cutting and converting, wood transport and road building. The simple random sampling method was used. The data collection tool was two-section questionnaire, the first section of which was related to the job and demographic data of workers and the second one was the standardized questionnaire of safety culture.

This questionnaire included 75 questions which were scored by using Likert scale. The participants specified their answers to each question by one of these: ''I fully agree", "I agree ", "I have no idea", "I disagree", and 'I fully disagree'. To maintain the balance I distributing the questionnaires, 40 questionnaires were distributed in each one of the restoration and reforestation, cutting and converting, wood transport and road building sections. The study was done by self-report semi-supervisory method. To evaluate the safety culture score, the following relation was used:

$$\mu = \frac{(5k + k)}{2} = \frac{(5 \times 75 + 75)}{2} = 225$$

With respect to the above relation and considering this fact that the questionnaire includes 75 questions, the safety culture was assessed as to be positive if the computed score of safety culture was higher than 225 and it was assessed as to be negative if the score was lower than 225. Other variables investigated in this study were: age, level of education, marital status, work experience, information related to accident occurrence, causes and effects. After being encoded, the collected data were entered into SPSS 16. To analyze the data, Chi-square test was used.

DISCUSSION

Safety culture study and evaluation can survey all the actions done by safety managementin organizations and industries and somehow can indicate the general attitude of the system toward safety. Results can show us the role of each work group toward the system safety as well as the contribution of each one of them in them.

Gender of the participants

Results obtained from questionnaires filled by 110 workers of the forest section of Shafaroud basin inGuilan province who participated in this study showed that all (100 %) of the participants were male.

Table1. Gender of the participants		
Studied Parameter: Gender		
Male Frequency (%)	**Female Frequency (%)**	**Total Frequency (%)**
110(100%)	0(0%)	110(100%)

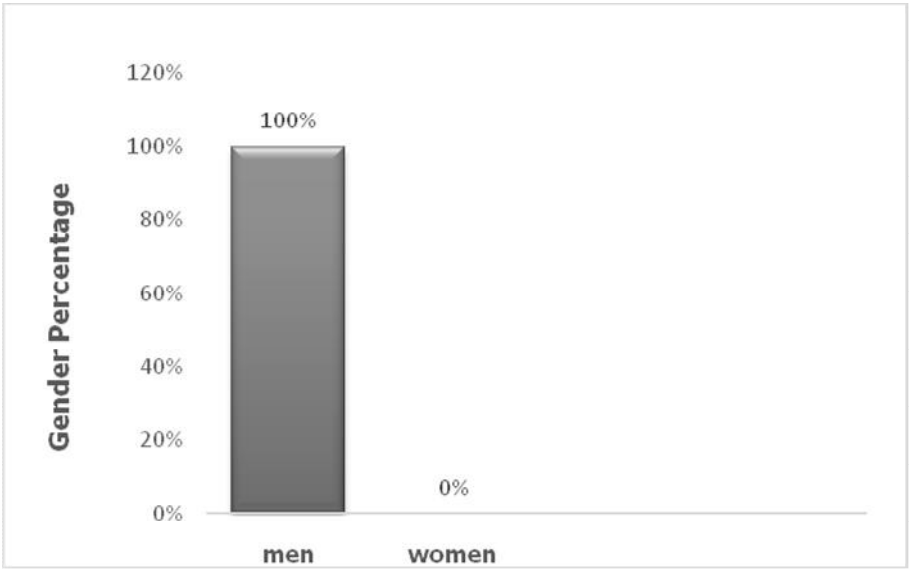

Fig2. Gender of the participants

Age status of the participants

Results of the questionnaires filled by 110 workers 110 workers of the forest section of Shafaroud basin inGuilan province who participated in this study showed that 14% of them (15 participants) aged less than 30, 29% (32 participants) aged between 30 and 40, and 57% (63 participants) aged more than 40.

Table 2. Age status of the participants			
Studied Parameter: Age			
Less than 30 Frequency (%)	Between 30 and40 Frequency (%)	More than 40 Frequency (%)	Total Frequency (%)
15(14%)	42(20%)	63(57%)	11(100%)

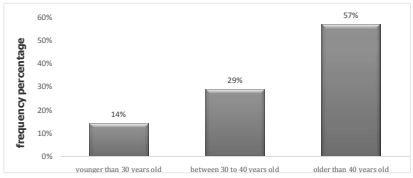

Fig.3. Age status of the participants

Marital status of the participants

Results of the questionnaires filled by 110 workers of the forest section of Shafaroud basin inGuilan province who participated in this study showed that 15 % of them (17 participants) were single and 85 %(93 participants) were married.

Table3. Marital Status of the Participants		
Studied Parameter: Marital Status		
Single **Frequency (%)**	**Married** **Frequency (%)**	**Total** **Frequency (%)**
17(15%)	93(85%)	110(100%)

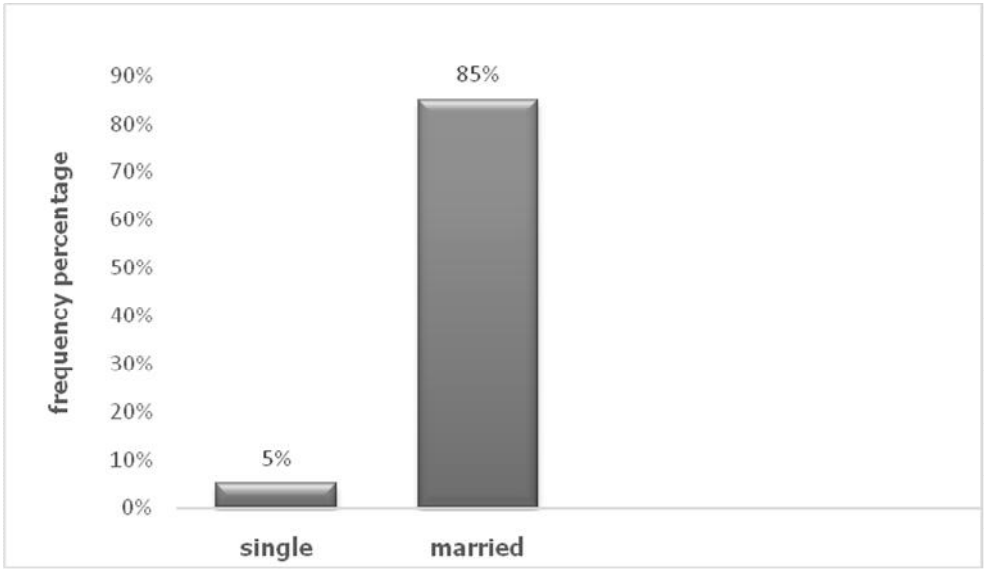

Fig.4. Marital status of the participants

Work experience of the participants

Results obtained from this study showed that 11 participants (10%) had the work experience of less than 5 years, 45 participants (41%) had the work experience of 5 to 10 years, 38 participants (34.5%) had work experience of 10 to 15 years and 16 participants (14.5 %) had the work experience of more than 15 years.

Table 4. Work experience of the participants				
Studied parameter: Workexperience				
Less than 5 years Frequency (%)	**5 to 10 years Frequency (%)**	**10 to 15 years Frequency (%)**	**More than 15 years Frequency (%)**	**Total Frequency (%)**
11(10%)	45(41%)	38(34.5%)	16(14.5%)	110(100%)

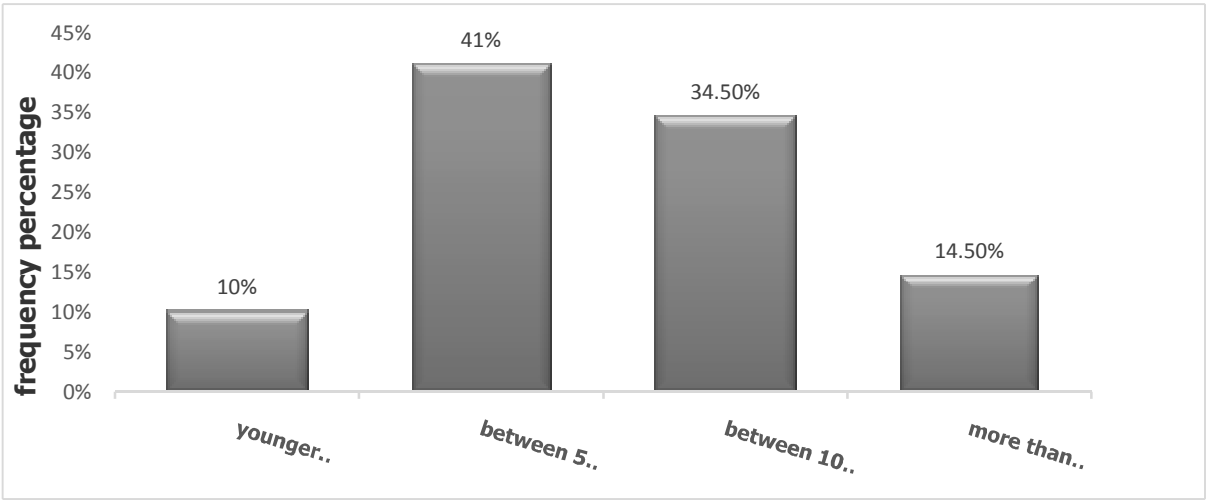

Fig.5.Working experience of the participants

Educational level of the participants

Results obtained from this study showed that 57 participants of the total 110 participants (52%) did not hold a high school diploma, 40 participants (36%) had high school diplomas, and 13 participants (12%) had associate degree or higher academic degrees.

Table 5. Educational level of the participants			
Studied Parameter: Level of education			
Under high school diploma Frequency (%)	High school diploma Frequency (%)	Associate degree or higher than that Frequency (%)	Total Frequency (%)
57(52%)	40(36%)	13(12%)	110(100%)

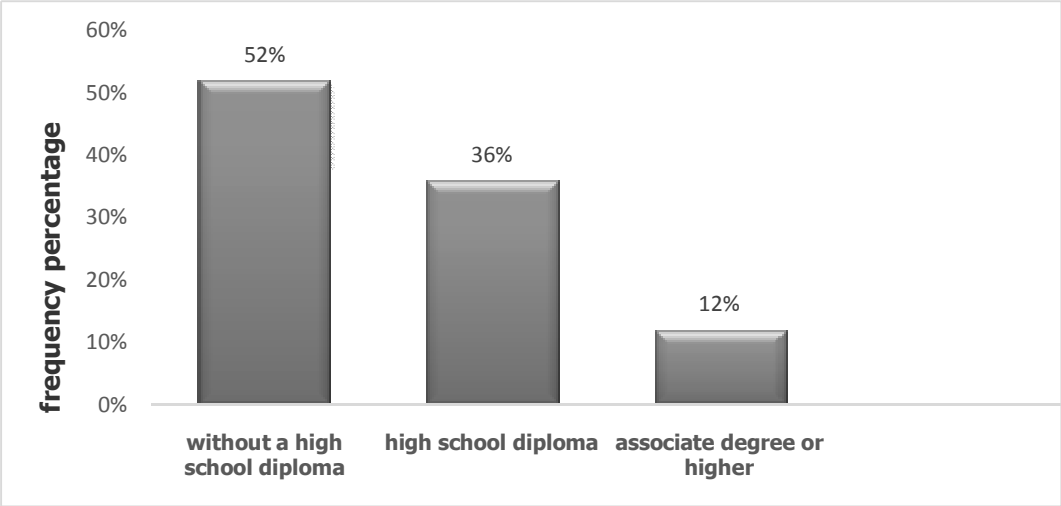

Fig.6. Educational level of the participants

Participants' satisfaction level with their job

Results obtained from this study showed that 61 participants (55%) liked their jobs, 26 participants(24%) were approximately satisfied with their jobs, 7 participants(6%) neither liked nor disliked their jobs, 11 participants (10%) were approximately unsatisfied with their jobs and 5 participants(5%) did not kike their jobs.

Table 6. Participants satisfaction with their jobs					
Studied parameter: satisfaction with the job					
I like my job Frequency (%)	I am approximately satisfied with my job Frequency (%)	I don't dislike my job Frequency (%)	I am approximately unsatisfied with my job Frequency (%)	I don't like my job Frequency (%)	Total Frequency (%)
61(55%)	26(24%)	7(6%)	11(10%)	5(5%0	110(100%)

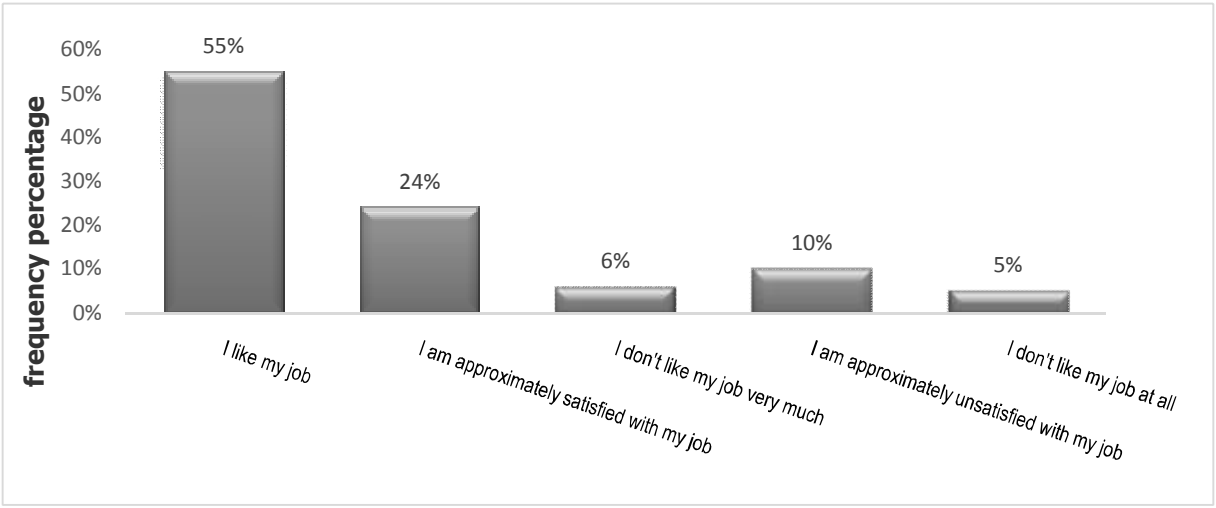

Fig.7. Participant's satisfaction with their job

Safety culture of the participants

Results obtained from data analysis showed that 64 of the total 110 participants (58%) of this study had positive safety culture whereas the rest 46 participants (42%) had negative safety culture.

Table7. Safety culture of the participants		
Negative Frequency (%)	**Positive Frequency (%)**	**Total Frequency (%)**
46(42%)	64(58%)	110(100%)

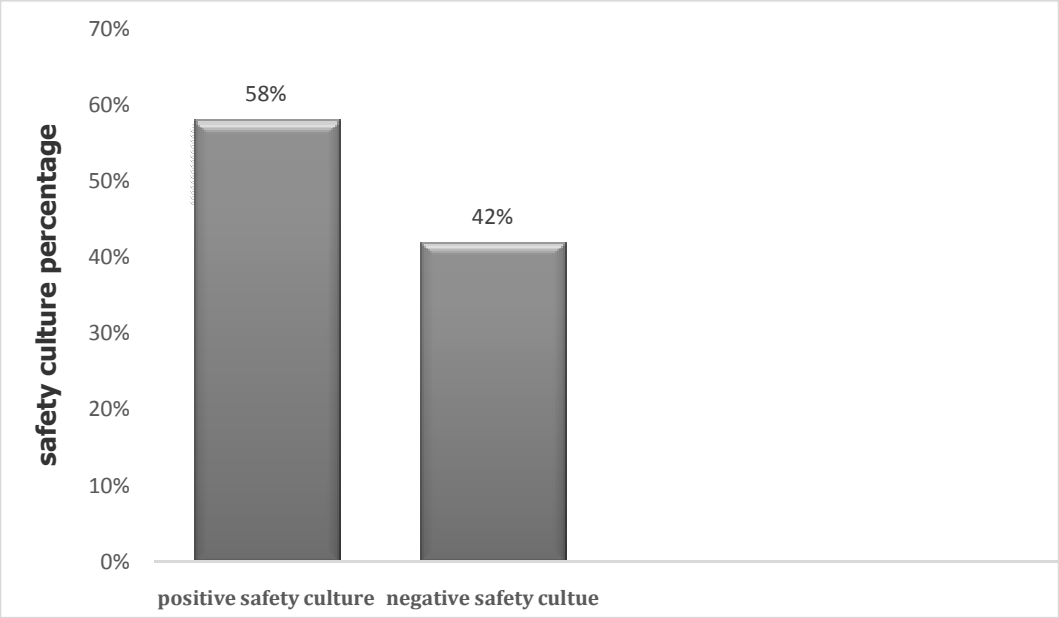

Fig.8 Safety culture of the workers of Shafaroud basin in Guilan province

CONCLUSION

Safety culture study and evaluation can survey all the actions done by safety management in organizations and industries and somehow can indicate the general attitude of the system toward safety. Results can show us the role of each work group toward the system safety as well as the contribution of each one of them in them.

The relation between safety culture and the age of the participants

The results of data analysis showed that the older workers were, the less was their positive safety culture, and in contrast, there was an increase in the degree of negative safety culture, in such a way that the highest negative safety culture was observed among people aged more than 40(48.3%) and the highest positive safety culture was observed among those aged less than 30(62.2%). Totally, at all of the age levels, the percentage of positive safety culture was higher than negative one; but results were not statistically significant at the confidence level of 0.95.

Table 8. The relation between safety culture and age of the participants			
Age	**Safety Culture**		
	Negative Frequency (%)	**Positive Frequency (%)**	**Total Frequency (%)**
younger than 30 years old	14(37.8%)	23(62.2%)	37(14%)
30 to 40 years old	18(41%)	26(59%)	44(29%)
older than 40 years old	14(48.3%)	15(51.7%)	29(57%)
Total	46(42%)	64(58%)	110(100%)

P-value= 0.395

The relation between safety culture and marital status of the participants

Results obtained from the data of marital status and their relation with the safety culture showed that the married participants had higher positive and lower negative safety culture compared to the single ones,

in such a way that 59.1 % of the married workers had positive safety culture and had the highest frequency in this regards compared to other categories.But the results were not statistically significant at the confidence level of 0.95.

Table 9. The relation between safety culture and marital status of the participants

Marital status	Safety Culture		
	Negative Frequency (%)	Positive Frequency (%)	Total Frequency (%)
Single	8(47.1%)	9(52.9%)	17(15%)
Married	38(40.9%)	55(59.1%)	93(85%)
Total	46(42%)	64(58%)	110(100%)

P-value= 0.395

The relation between safety culture and educational level of the participants

Results obtained from analyzing the relations between the data of safety culture and the educational level of participants showed that 67.5% of the workers holding a high school diploma and 69.2 % of the workers holding associated degree or higher academic degrees had positive safety culture and the highest frequency was observed in this category. The positive safety culture among the participants who had a high school diploma or degrees higher than that was more common compared to those who did not have a high school diploma[9] . Among the participants who did not have a high school diploma, the negative safety culture was more common than the positive one. The percentage of negative safety culture among the participants who did not have a high school diploma was 50.9. The relation between positive and negative safety cultures and the educational level of the participants was statistically tested and a statistically significant relation was found between positive and negative safety culture and the educational level at the confidence level of 0.95. Therefore, the higher the level of education, the higher was positive safety culture.

Table 10. The relation between safety culture and the educational level of the participants

Level of Education	Safety Culture		
	Negative Frequency (%)	Positive Frequency (%)	Total Frequency (%)
Lower than high school diploma	29(50.9%)	28(49.1%)	57(52%)
High school diploma	13(32.5%)	27(67.5%)	40(36%)
Associate degree or higher	4(30.8%)	9(69.2%)	13(12%)
Total	46(42%)	64(58%)	110(100%)

P-value= 0.010

The relation between safety culture and work experience of the participants

Results obtained from analyzing the relations between safety culture and work experience of the participants showed that 75% of the workers with the work experience of more than 15 years had positive safety culture and this group had the highest frequency. The negative safety culture of the participants was lower than their positive safety culture and decreased with the increase of work experience.

Table 11. The relation between safety culture and work experience of the participants

Work experience	Safety Culture		
	Negative Frequency (%)	Positive Frequency (%)	Total Frequency (%)
Less than 5 years	5(45.5%)	6(54.%%)	11(10%)
5 to 10 years	22(48.9%)	23(51.1%)	45(41%)
10 to 15 years	15(39.5%)	23(60.5%)	38(34.5%)
More than 15 years	4(25%)	12(75%)	16(14.5%)
Total	46(42%)	64(58%)	110(100%)

P-value: 0.271

SUGGESTIONS

1- Evaluating the safety culture in other north forests exploitation companies and comparing the results with each other and reporting their operations to improve the administration of affairs in providing the workers with safe work situations.
2- Evaluating safety culture in sections of tree nursery, cut and conversion, wood transport and road building separately for optimal management of affairs.
3- Evaluating safety culture in forests through using scaling methods other than Likert scale, comparing the applied methods and selecting the best one.

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