

Occupational health and safety awareness in wood, wood products and mushroom production sector in Turkey

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Abstract: The forest industry is one of the sectors where occupational accidents are the most common. In this study, it is aimed to reveal the differences in opinions of personnel in enterprises, which fall into Turkish wood, wood products and mushroom production group, concerning occupational health and safety. Within this framework, a questionnaire application was conducted based on face to face meeting in a total of 68 enterprises in Erzincan province. In the questionnaire, the 5-point likert rating scale was used in determination of agreement level to scale items containing 9 different opinions concerning occupational health and safety issue underlying demographic characteristics of personnel and features of enterprises. As the result of the study, it was detected that machinery maintenance frequencies are too far, necessary personal protective equipment is not supplied in time and basic occupational health and safety principle implementation has deficiencies. Besides, statistically significant differences ($p<0.05$) were identified between opinions of employees in relation to variances as age, marital status, department worked, total time of employment in the enterprise, machinery maintenance frequency that is applied, workplace change intervals and exposure to occupational accidents.

Keywords: Occupational health and safety, Timber products sector, Awareness, Small and medium sized enterprise

Türkiye ağaç, ağaç ürünleri ve mantar üretim sektöründe iş sağlığı ve güvenliği farkındalığı

Özet: Orman endüstri sektörü, en fazla iş kazası meydana gelen sektörlerden biridir. Bu çalışmada, Türkiye ağaç, ağaç ürünleri ve mantar imalatı grubunda yer alan işletme çalışanlarının iş sağlığı ve güvenliği konusundaki görüş farklılıkları ortaya koyulmaya çalışılmıştır. Bu kapsamda, Erzincan ilinde toplam 68 işletmeye yüz yüze görüşme esasına dayalı anket uygulaması gerçekleştirilmiştir. Ankette, çalışanların demografik özellikleri ile işletmelerin bazı özellikleri temelinde, iş sağlığı ve güvenliği konusunda 9 farklı görüş içeren ölçek maddelerine katılım oranlarının belirlenmesinde 5'li likert tipi derecelendirme ölçeği kullanılmıştır. Çalışma sonucunda, ağaç, ağaç ürünleri ve mantar imalatı sektöründe çalışanların eğitim düzeylerinin düşük olduğu ve orta yaş grubunda yer aldıkları görülmüştür. Diğer yandan sektörde, makine bakım sıklıklarının çok uzun olduğu ve gerekli kişisel koruyucu ekipmanların zamanında sağlanmadığı ve temel iş sağlığı ve güvenliği ilkelerinin uygulanmasında eksiklikler olduğu tespit edilmiştir. Bununla birlikte yaş, medeni durum, çalışılan departman, işyerindeki toplam çalışma süresi, uygulanan makine bakım sıklığı, işyeri değişim sıklığı ve iş kazalarına maruz kalma değişkenlerine ilişkin çalışanların iş sağlığı ve güvenliği hususundaki görüşleri arasında istatistiksel düzeyde anlamlı ($p<0,05$) farklılıklar olduğu tespit edilmiştir.

Anahtar kelimeler: İş sağlığı ve güvenliği, Kereste üretim sektörü, Farkındalık, Küçük ve orta ölçekli işletme

1. Introduction

International labour organization defines the work accident as “An occurrence arising out of, or in the course of, work which results in a fatal or non-fatal injury” (ILO, 2015). Occupational diseases are disease states that arise mostly from repeated activities because of the work's character and can show temporariness and continuity (Dirican and Bilgel, 1993). According to values of ILO, the weak and faulty occupational health practices correspond to roughly 4% of global gross domestic product, also one of the factors of 2.78 million accidents involving death occurring every year (ILO, 2018). “Occupational health and safety law- Turkish” with law no. 6331 was published in Turkey at Official Gazette on 30 June 2012 in accordance

with the norms of ILO and international institutions and legal legislations were carried out in compliance with this law.

The furniture manufacturing industry is regarded as a hazardous branch of industry (Ma et al., 1991; ÇSGB, 2009; ILO, 2015). Wood powder, formaldehydes, varnish, paint, adhesive, various solvent based products and lightning, vibration, noise and ergonomic risk factor that have physical effects can be shown among factors that cause work accidents and occupational diseases in wood works sector (HSE, 2002; Kürklü et al., 2013; Tankut et al., 2014).

In managements which do wood cutting, the present hazards related with occupational health and safety have been determined as general hazards mechanical hazards,

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exposure to noise, exposure to wood powder and the lack of personal protective equipment (PPE) usage (Akça, 2015).

In a study conducted towards the workers in furniture production sector in Sakarya Province, the circumstances in which employees were exposed to work accidents and occupational disease were inspected and the occurrence rate of work accidents and occupational disease were stated to be above the Turkey overall. The main matters that the employees working in furniture sector are most disturbed by are untidiness, mess, noise, ambient temperature, gases, dust, lack of sufficient warning signs and hand tools and machines which are old or don't have regular maintenance period (Gedik and İlhan, 2014). Aaltonen (1996) studied the work accidents at 18 furniture factories in a period of 1 year, among 214 work accidents with lost time, 2 of them resulted in the loss of fingertip. The disabling injury rate was 14.4% per year.

The furniture production sector with a nace code of 31 ranks in the hazardous class according to "hazard classes list announcement concerning the occupational health and safety" (ÇSGB, 2009). According to records of the Social Security Institution (SGK), the total number of the occupational disease is 6 recorded in this sector between years 2014-2016, the incapacity to work situations with respect to work accident cases in those years are shown in Figure 1 (SGK, 2018).

The purpose of this study, wood, wood products and the determination of the factors threatening the health of employees in the manufacturing sector mushrooms and occupational health and safety is to determine the level of awareness. Identifying occupational health and safety awareness factors in the sector, which is one of the sectors with the most occupational accidents and occupational diseases, will be effective in taking preventive measures.

2. Material and methods

The data collection tool was applied to a total of 100 employees in 27 manufacturers of wood, wood works and mushroom production located in Erzincan province.

This study was conducted in the small and medium sized forest products industry enterprises which produce wood, wood work and mushroom and operate in the city center of Erzincan. Since the activity area in the sub sector of forest products industry is spread across the country and consists of small and medium sized, it differs from other industry areas. The data collection tools of the study constitute of work place observations and surveys applied with face to face interview method.

In total, 68 participants in 27 different managements were reached in the study area where 32 managements and 100 employees are registered (SGK, 2016). Minimum conditions have been reached with the 25 workplace and 49 participants according to the Equation (1) (Yazıcıoğlu and Erdoğan, 2004; Baş, 2006). In the calculation in question, the significance level was accepted as 5% (p), the sampling error as 10% (d), both p and q were accepted as 0.5 and reliability coefficient as 1.96, assuming different opinions in the study population.

$$n = [N \cdot t^2 \cdot p \cdot q] / [d^2 \cdot (N - 1) + t^2 \cdot p \cdot q] \tag{1}$$

A total of 28 questions and 9 propositions measuring the agreement of the participant through 5-point Likert scale structure have been used as a data collection tool.

The statistical analysis of the data was conducted with the help of the SPSS 20.0 application. In the case of the results of data homogeneity test being $p > 0.05$, the factor distributions have been accepted as normal. However, the Central Limit Theorem states that the number of samples as ≥ 30 is sufficient for the normal distribution suitability of data (Kalaycı, 2010). According to this, the data were first subjected to the homogeneity test and the significance level for the 8 propositions was calculated as $p < 0.05$. Nevertheless, parametric tests have been decided to be used since the number of samples was 68. In this context, Independent Two Sample T-Test was used in comparisons with two independent variables and One-Way Variance Analysis (ANOVA) was used in comparisons with more than two independent variables in order to identify differences of views among participants. Arithmetic mean and percentage values of the data were calculated by using Microsoft Excel package program.

3. Results and discussion

Kaiser-Meyer- Olkin (KMO) validity test was applied to test the suitability of the factor analysis and the validity of the data obtained by data collection tools (Büyüköztürk, 2006; Kalaycı, 2010). KMO validity test was conducted on the data obtained in the study, KMO coefficient was calculated as 0.654. As the obtained value is > 0.50 , the sufficient validity to obtain was observed. On the other hand, because Barlett's test results were found to be significant with 95% reliability level ($p = 0.000$), the existence of the high-level correlation between variables can be stated (Kalaycı, 2010).

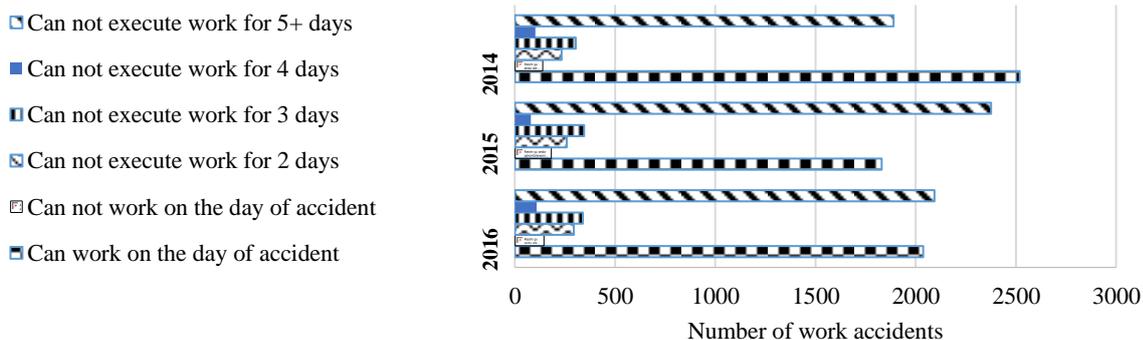


Figure 1. Incapacity to work cases originating from furniture production industry work accidents in years 2014 to 2016

The reliability analysis of the research data was calculated as 0.787 with the Cronbach Alpha method. This result showed that the reliability level of the scale used was sufficient (Tavşancıl, 2014).

In the study, it was observed participants are predominantly 45 years old and younger, and 57% of them are married also the same proportion of them are high school graduate (Table 1). The ratio of employees with associate degree was found as 4%, there are no employees with bachelor's degree among participants. In the study, the ratio of participants who work in the production of wood, wood works and mushroom was 4%, the ratio of personnel with term of employment until 5 years was 76%, the ratio for employees with employment terms between 5-10 years was determined as 19% (Table 1).

It has been identified that 18% of participants change their work in durations which are less than a year, 25% between 1 and 2 years, 26% between 3-5 years, 10% between 5-7 and 22% in longer durations. As it is seen in Table 2, statistically significant differences ($p < 0.05$) between the views of employees in different age groups concerning the occupational health and safety propositions have been identified. In general, as the ages of employees are raising, it is found out that they think they have more knowledge about the work conducted, raw material used and machines. On the other hand, participants have concerns with regard to workload causing health problems for workers. The studies reached at the literature prove that the increase in work load have important effects on the accident risk (Dwyer and Raftery, 1991; Uysal et al., 2005). The proposition which doesn't have significant difference of views between age groups but has the lowest agreement average is that employees have the adequate knowledge concerning occupational health, legal right and responsibilities. In general, it has been identified that participants come to an agreement in that they don't know their legal rights and responsibilities. It is reported that the age variable in the furniture production and other forest industry sectors causes differences in perception about occupational health and safety (Aydm et al., 2015; Yıldırım et al., 2015). On the other hand, it has been stated that throughout the industry sector the sensibility for workload and working conditions increases with the increase in workers' age (Graveling, 2011; Güler, 2015; Ofluoğlu and Albar, 2017).

Table 1. The distribution of participants according to some variables

Variable	Sub group	Frequency	Ratio (%)
Age	18-25	22	32
	26-35	12	18
	36-45	31	46
	46-55	3	4
Marital status	Married	39	57
	Single	29	43
Education background	Primary education	26	38
	High school	39	57
	Associate degree	3	4
Term of employment (Year)	0-1	9	13
	1-3	23	34
	3-5	20	29
	5-10	13	19
	> 10	3	4

With the raise in total term of employment at the workplace, participants think that they have more knowledge about the work done, the machinery-equipment used and raw materials (Table 3). It can also be inferred from Table 3 that with the increase in total time of employment and decrease in frequency for work change; the idea that the endured work load poses danger for human health becomes widespread although the view that gradually more knowledge is possessed about occupational health and safety, gains importance, even for the workers with the longest employment time, the sufficiency of the knowledge level causes uncertainties. On the other hand, the frequency of work change of participants is observed to be high from the Table 3. The dissatisfaction with work and insecurity are affirmed to be crucial factors for the increase in the frequency of work change (Eğinli, 2009). Unsafe and inappropriate working conditions in terms of health are known to have a noteworthy influence on the performance of the employee and occupational health and safety (Turan, 2013).

Participants were asked to determine work accidents causes considering the priority ranking from 1 to 5 and the obtained data were weighted according to the priority order (Figure 2). While the personal reasons have been identified as the most important reason for work accident; technical reasons, excessive work load, the inspection insufficiency at the workplace and lack of training in occupational health and safety have been determined as priority reasons for work accidents. On the other hand, the ratio for exposure to accident has been identified as 35% with 24 participants. The accident risk for 50% of participants who were exposed to work accident has been found as 2 or more. It has been reported that the risk of accidents in furniture enterprises is higher than other sectors and the most important causes of accidents are based on personal reasons such as carelessness and neglect (Uysal et al., 2005). Again, in a similar manner, it has been expressed that the accidents in general industrial activities arise from factors related to human with a ratio of 88% (Kepir, 1983).

18 of the injuries occurring after work accidents have been determined to occur as hand and finger injuries, 3 of them as torso injuries and 3 of them as arm injuries. The view that the injuries in the sector have occurred in general as mild and medium intensity injuries and the severe injury level is relatively low, has been supported with the studies in the literature (Uysal et al., 2005).

Table 2. One-way Variance analysis results according to participants' age variable

The propositions concerning the occupational health and safety	Age	N	M	F	Sig.
I have adequate knowledge about machines and raw materials used at the workplace	18-25	22	2.681	8.017	0.000*
	26-35	12	3.500		
	36-45	31	4.000		
	46-55	3	4.000		
	Total	68	3.485		
I have adequate knowledge about the work I'm carrying out.	18-25	22	2.818	10.708	0.000*
	26-35	12	3.500		
	36-45	31	4.290		
	46-55	3	5.000		
	Total	68	3.705		
The quality level of our products is high	18-25	22	3.545	10.143	0.000*
	26-35	12	3.250		
	36-45	31	4.419		
	46-55	3	5.000		
	Total	68	3.955		
The protectiveness of equipment we use are sufficient	18-25	22	3.590	9.593	0.000*
	26-35	12	3.000		
	36-45	31	4.322		
	46-55	3	4.000		
	Total	68	3.838		
The workload at the workplace is not in a level that can risk my health.	18-25	22	3.136	4.431	0.007*
	26-35	12	2.500		
	36-45	31	3.354		
	46-55	3	1.000		
	Total	68	3.029		
Environment and Work conditions at the workplace are suitable in terms of occupational health and safety	18-25	22	3.727	18.626	0.000*
	26-35	12	2.500		
	36-45	31	3.838		
	46-55	3	4.000		
	Total	68	3.573		
The machines at the workplace are placed correct and the size of the workplace is sufficient for a smooth production.	18-25	22	3.863	13.839	0.000*
	26-35	12	4.000		
	36-45	31	4.032		
	46-55	3	1.000		
	Total	68	3.838		
I have sufficient knowledge about my legal rights and responsibilities as well as occupational health and safety	18-25	22	1.727	1.935	0.133
	26-35	12	2.250		
	36-45	31	2.032		
	46-55	3	3.000		
	Total	68	2.014		
The workbench and other work areas at the workplace are compatible with body sizes of employees	18-25	22	4.318	14.241	0.000*
	26-35	12	3.000		
	36-45	31	4.354		
	46-55	3	5.000		
	Total	68	4.132		

N: Number – M: Mean – F: Test statistic value - *p<0.05

Table 3. One-way variance analysis results according to total term of employment and frequency of workplace change variables for participants at the workplace

The propositions towards the occupational health and safety	Term of employment (year)	N	M	F	Sig.	Workplace change frequency (year)	N	M	F	Sig.
I have adequate knowledge about machines and raw materials used at the workplace	0-1	9	2.6667	9.064	0.000*	0-1	12	2.2500	20.335	0.000*
	1-3	23	3.2609			1-3	17	2.8235		
	3-5	20	3.2000			3-5	17	3.7647		
	5-10	13	4.7692			5-10	7	4.5714		
	>10	3	4.0000			>10	15	4.4000		
	Total	68	3.4853			Total	68	3.4853		
I have adequate knowledge about the work I'm carrying out	0-1	9	3.0000	8.877	0.000*	0-1	12	2.7500	15.310	0.000*
	1-3	23	3.3913			1-3	17	3.0000		
	3-5	20	3.3500			3-5	17	3.5882		
	5-10	13	5.0000			5-10	7	5.0000		
	>10	3	5.0000			>10	15	4.8000		
	Total	68	3.7059			Total	68	3.7059		
The quality level of our products is high	0-1	9	3.6667	5.763	0.001*	0-1	12	3.250	8.861	0.000*
	1-3	23	3.8261			1-3	17	3.5882		
	3-5	20	3.5500			3-5	17	3.8235		
	5-10	13	4.7692			5-10	7	4.5714		
	>10	3	5.0000			>10	15	4.8000		
	Total	68	3.9559			Total	68	3.9559		
The protectiveness of equipment we use are sufficient	0-1	9	3.6667	6.152	0.000*	0-1	12	3.2500	5.246	0.001*
	1-3	23	3.4348			1-3	17	3.4118		
	3-5	20	3.7500			3-5	17	4.0588		
	5-10	13	4.7692			5-10	7	4.574		
	>10	3	4.0000			>10	15	4.2000		
	Total	68	3.8382			Total	68	3.8382		
The workload at the workplace is not in a level that can risk my health	0-1	9	3.3333	6.420	0.000*	0-1	12	3.0000	1.524	0.206
	1-3	23	2.5652			1-3	17	2.5882		
	3-5	20	3.0500			3-5	17	3.4118		
	5-10	13	4.0769			5-10	7	3.7143		
	>10	3	1.0000			>10	15	2.8000		
	Total	68	3.0294			Total	68	3.0294		
Environment and Work conditions at the workplace are suitable in terms of occupational health and safety	0-1	9	4.0000	2.142	0.086	0-1	12	3.2500	1.086	0.371
	1-3	23	3.4783			1-3	17	3.8235		
	3-5	20	3.3000			3-5	17	3.5294		
	5-10	13	3.7692			5-10	7	3.5714		
	>10	3	4.0000			>10	15	3.6000		
	Total	68	3.5735			Total	68	3.5735		
The machines at the workplace are placed correct and the size of the workplace is sufficient for a smooth production	0-1	9	4.3333	14.99	0.000*	0-1	12	3.5000	1.449	0.228
	1-3	23	3.7391			1-3	17	3.8235		
	3-5	20	3.7500			3-5	17	4.0588		
	5-10	13	4.4615			5-10	7	4.4286		
	>10	3	1.0000			>10	15	3.6000		
	Total	68	3.838			Total	68	3.838		
I have sufficient knowledge about my legal rights and responsibilities as well as occupational health and safety	0-1	9	1.333	2.697	0.039*	0-1	12	2.250	9.489	0.000*
	1-3	23	1.696			1-3	17	1.8235		
	3-5	20	2.1000			3-5	17	1.4118		
	5-10	13	2.3846			5-10	7	3.5714		
	>10	3	3.0000			>10	15	2.0000		
	Total	68	2.0147			Total	68	2.0147		
The workbench and other work areas at the workplace are compatible with body sizes of employees	0-1	9	4.0000	8.668	0.000*	0-1	12	3.5000	6.065	0.000*
	1-3	23	4.3043			1-3	17	4.4118		
	3-5	20	3.4500			3-5	17	3.7059		
	5-10	13	4.7692			5-10	7	4.5714		
	>10	3	5.0000			>10	15	4.6000		
	Total	68	4.1324			Total	68	4.1324		

N: Number – M: Mean – F: Test statistic value - *p<0.05

24% of participants have declared that they aren't given any (PPE), 76% have stated that PPE is provided in time. The most used PPE are ranked as protective glove, work clothing, protective mask and protective footwear (Figure 3). However, generally the workers in wood work sector aren't fully aware of the existing danger, and activities are stated to be conducted without using PPE (Turan, 2013). To decrease the rate of work accidents in industrial activities, it is regarded to be necessary that employees should receive trainings on PPE and these trainings should be repeated in periodic durations (Atılgan et al., 2015). Occupational health and safety in small-scale businesses in Turkey are inadequate measures to be attached to many different

reasons (Akyüz et al., 2019). On the other hand, occupational health and safety awareness is reported to be low compared to other forest industry sectors, especially in timber industry (Yıldırım et al., 2018).

It has been understood that 74% of workplaces where the study was conducted doesn't have the adequate warning signs, although 91% of workplaces doesn't have the personnel that can perform machinery maintenance and repair, 90% doesn't carry out machinery equipment starting controls (Table 4). Again, it can be deduced from the table 4 that emergency and evacuation drills, which are among fundamental components of occupational health and safety, are not conducted (82%).

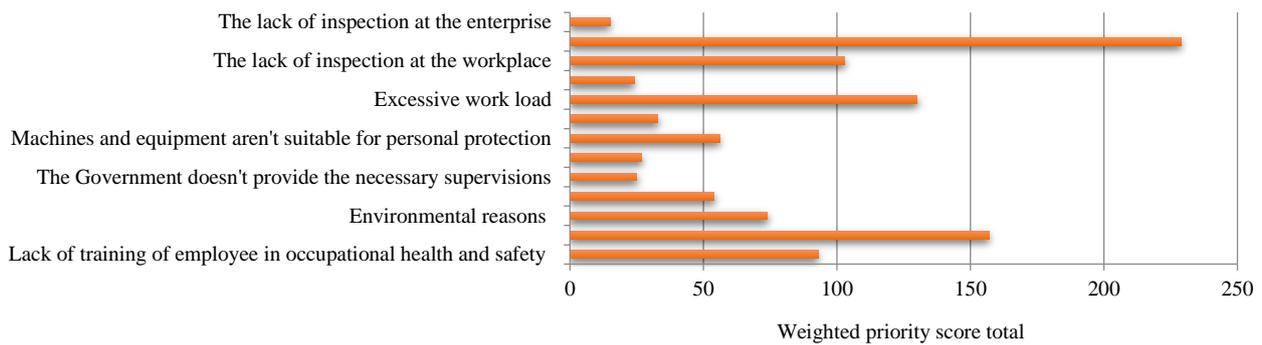


Figure 2. Reasons for work accidents according to views of participants

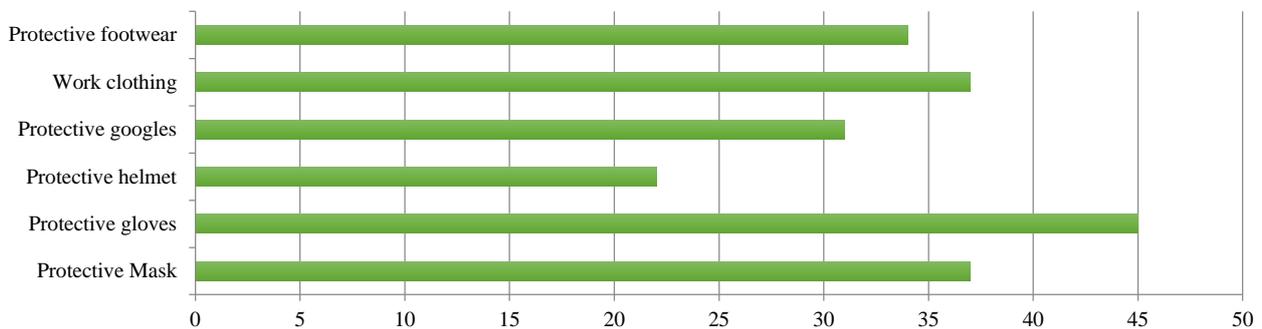


Figure 3. The most used personal protective gears (%)

Table 4. The approach to some occupational health and safety principles

Some Occupational Health and Safety Principles	Opinion	Frequencies	Ratio (%)
The necessary warning signs towards the factors threatening the health and safety are found at the workplace	Yes	18	26
	No	50	74
Machines and protective gear are checked before starting work at the workplace	Yes	7	10
	No	61	90
The necessary precautions for risks concerning the usage of dangerous chemicals (cancerogenic substances, irritants, varnish, paint, thinner, source gases) have been taken beforehand at the workplace	Yes	35	51
	No	33	49
Emergency and evacuation drills (fire, earthquake, chemical explosions) have been carried out at the workplace	Yes	12	18
	No	56	82
There are technical personnel that can repair and make maintenance of the machineries at the workplace and can defect measurements	Yes	62	91
	No	6	9

4. Conclusion

In general, it is observed that low-education individuals find employment opportunities and lack of sufficient information and experience due to frequent workplace change increase the sensitivity in occupational health and safety. It is understood that occupational health and safety training and exercises are ignored due to economic concerns and PPEs which are needed are not supplied. In the business class sector, which has no appeal in terms of income and working conditions, the discrepancy between employee age and workload is an important problem. It has been observed that there are deficiencies in the provision and supervision of minimum conditions for occupational health and safety at workplaces. It is necessary to increase the controls on the implementation of legal regulations on occupational health and safety in small and medium-timber enterprises.

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