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Research Article

Safety Training and Competence, Employee Participation and Involvement, Employee Satisfaction, and Safety Performance: An Empirical Study on Occupational Health and Safety Management System Implementing Manufacturing Firms

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ABSTRACT

The objective of the study is to investigate the relationships between safety training and competence, employee participation and involvement, employee satisfaction, and safety performance. Data were collected from 128 manufacturing firms implementing the Occupational Health and Safety Management System in Turkey. The data were analysed through respectively exploratory and confirmatory factor analysis. The findings indicated that safety training and competence has a significant positive effect on employee participation and involvement; while employee participation and involvement has a significant positive effect on employee satisfaction; and safety performance has a significant positive effect on employee satisfaction. Furthermore, it was also found that employee satisfaction is indirectly affected by safety training and competence through employee participation and involvement.

Keywords: Safety Training and Competence, Employee Participation and Involvement, Safety Performance, Employee Satisfaction, Occupational Health and Safety Management System

1. Introduction

In recent years, occupational health and safety management (OHSM), as well as managing issues such as quality, environment and human resources, have become the main area of interest for companies (Boyar, 2014). Hence, managing risks has become ever more important. OHSM systems (OHSMS) are an integrated institutional mechanism designed to monitor and control possible risks that might influence the Occupational Health and Safety (OHS) of employees and also make possible the company to easily adapt to the safety arrangements (Fernández-Muñiz et al., 2009). The implementation of an OHSMS reduces the employee time loss, and production and operational interruptions due to work-related accidents and injuries (Gesellschaft für Consulting, Business und Management mbH, 2014); it allows lower injury rates and usually higher productivity (O'Toole, 2002) and improves both the safety performance and employee satisfaction (Bayram & Ünğan, 2018). This enhances the economic strength of a company (Gesellschaft für Consulting, Business und Management mbH, 2014).

The basic elements of a successful safety management are management commitment, employee participation, hazard identification and control, training and education, and risk management (Keleş, 2005). It is imperative to train managers and employees in accordance with new procedures concerning the introduction and implementation of OHSMS in everyday work (Gesellschaft für Consulting, Business und Management mbH, 2014). Safety training helps individuals acquire knowledge, skills, and attitudes to empower them in health and safety matters. This includes organized vocational training, on-the-job coaching and counselling, and instruction (Health and Safety Executive, 2013). The basic principle of OSHMS is to establish responsibilities for all employees at an organization (International Labor Office, 2011). Employee participation has been required for too many OHS management standards (The General Directorate of Occupational Health and Safety, 2013). Businesses and governments have paid attention to OHSMS as a promising strategy to complement OHS and business requirements and to ensure active employee involvement in the implementation of preventive measures (International Labor Office, 2011).

Employee participation is a key component of an OHSMS. An effective OHSMS plays a substantial role in worker involvement (Seixas et al., 2013). Since OHS is essential, the responsibility of all members of the company (from board members through to executive management) must be emphasized when implementing OHSMS, because it is only possible to reach the OHS goals with the participation of all members (Gesellschaft für Consulting, Business und Management mbH, 2014). If employers make an effort to improve safety performance by eliminating the hazards and the risks in the workplaces, then employees who reported complaints and given suggestions to the authorities tend to participate in safety management issues (Masso, 2015).

Measuring safety performance, which may include safety management, safety measures, accident statistics, accident investigations, and safety training practice, can be considered as a part of total organizational performance (Wu et al., 2008). Job satisfaction reflects perceptions of employees' safety environment and priorities of

the organization (Stoilkovska et al., 2015). Optimum productivity is achievable through job satisfaction, which is created through participating OHS practices of the employees by giving safety training (Al Idrus et al., 2018).

Although the relationships among OHSMS practices, the employee satisfaction, and safety performance were examined by several authors (for example, Bayram and Ünğan, 2018), there has been a lack of studies that directly examine the relationships between *safety training and competence*, *employee participation and involvement* and *safety performance* in the OHSMS literature. The objective of the study is to empirically investigate the relationships between *the safety training and competence* and *the employee participation and involvement*, both are the two basic components of OSHMS, *the employee satisfaction*, and *the safety performance*, both directly affect the firm's performance and productivity. The study aims to make a significant contribution to the OHSMS literature.

Specifically, this study is intended to address the following questions.

- Is there any relationship between safety training and competence, employee participation and involvement and safety performance?
- Is there any relationship between employee participation and involvement, safety performance, and employee satisfaction?

For this purpose, a proposed model was designed. To validate the proposed model, a survey approach was used. The data were collected from 128 manufacturing firms implementing OHSMS in Turkey. The data were analysed through respectively Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). Results showed that this study makes an important contribution to the OHSMS literature as some of the relationships mentioned above are poorly investigated empirically.

2. Literature and Research Hypotheses

2.1. Safety Training and Competence

Safety training enables employees to acquire skills, knowledge and attitudes to ensure that they are competent to perform their jobs in a healthy and safe manner (Goldstein, 1986). Competence means more than training employees (Goldstein, 1986). Competence can be improved by safety training, OHS knowledge and skill (Health and Safety Executive, 2019). The skills, attitudes and safety awareness of all members of a company are important for safe situations and actions, and therefore for the overall success of the company (Gesellschaft für Consulting, Business und Management mbH, 2014).

Employee training is also considered critical when organizations deploy total quality management (Chang et al., 2010). According to OHSMS, employers must describe OHS qualification requirements and make all arrangements to ensure that all employees are knowledgeable enough to execute the safety and health aspects of their jobs (Gesellschaft für Consulting, Business und Management mbH, 2014). Vinodkumar and Bhasi (2010) have stated that safety training is the most important OHS management practice, predicting both safety knowledge and safety participation. In parallel, safety training for all employees is an important factor in the

implementation of an OHS program (Gesellschaft für Consulting, Business und Management mbH, 2014). A good safety training program can improve a firm's safety performance (Cohen & Colligan, 1998).

A survey conducted by Nytro (1998) on Small Manufacturing Enterprises in Norway has indicated that the strongest factors that provide success in health and safety management are the competent OHS staff and training of professionals. In this respect, there are two basic elements of OHS competence. The first is to work with and/or consult with the OHS professionals; while the second is to inform and train the managers, and workers involved in OHS (The General Directorate of Occupational Health and Safety, 2013).

Few studies have examined the relationships between the *safety training and competence* and *employee participation and involvement*, and between *the safety training and competent* and *safety performance.* Research has shown that effective safety training helps reduce accidents and injuries (Bahn and Barratt-Pugh, 2014). Burke et al. (2011) argues that due to better and more effective safety training, employees and organizations with higher safety knowledge have higher safety performance. Wilkins (2011) reported that the high injury rate in the construction sector is due to insufficient OHS training and knowledge. However, Bahn and Barratt-Pugh (2014) concluded that the relationship between occupational safety training and improved safety performance could not be confirmed.

Training of employees' and employees' representatives is one of the main factors influencing the effectiveness of the employees' participation (Health and Safety Executive, 2005).

Therefore;

- H_1: There is a significant positive relationship between safety training and competence and employee participation and involvement.
- H_2: There is a significant positive relationship between safety training and competence and safety performance.

2.2. Employee Participation and Involvement

Employee participation, which influences the effectiveness of an OHSMS, is "a variety of processes and structures which enable, and at times encourage, employees to, directly and indirectly, contribute to and influence decision" (Pawlowska, 2013). OHSMS models emphasize the active participation of employees as a critical element in improving safety performance (Walters & Frick, 2000). The purpose of employee participation in OSHMS is to reduce the accidents at work and to improve the employee health (Brück, 2016). In other words, employee participation in OHS management is crucial for the success of OHSMS and safety performance (Redinger et al. 2002). Involved and satisfied employees perceive that safety is accorded the priority it deserves by everyone, at all levels of the organization. This comprehensive approach to employee participation leads to fewer accidents and injuries in the workplace (Grant et al., 2007).

Mullen et al. (2017) reported that there has been strong empirical evidence between safety participation and the reduction of accidents and injuries. However, there are few studies in the OHSMS literature that examine the relationship between the active participation of employees in OHS related issues and safety performance. However, Li et al. (2010) and Neal and Griffin (2006) empirically found that participation has a positive effect on reducing injuries. Widerszal-Bazyl and Warszewska-Makuch (2008) showed that employee involvement in OHS activities has a positive effect on reducing absenteeism rates arising from occupational accidents and diseases. Carrivick et al. (2005) determined that a participatory ergonomics approach provided a 35 percent improvement in reducing injuries from manual handling. Moreover, Reilly et al. (1995), Hillage et al. (2000) and Shearn (2005) have shown that OSH committees can positively influence a company's OSH performance. Furthermore, International Labor Office (2011) reported that there were relationships between lower rates of lost-time injuries and the presence of coordinated OHS committees or coordinated trade union participation.

Several researchers (for example Fernández-Muñiz et al. (2014) found a significant positive relationship between participation and employee satisfaction. On the other hand, some researchers (Chang et al. (2010), Martin & Kaufman (2013) and Zhu et al. (2015) have reported that the safety participation positively affects the employee satisfaction. Furthermore, Wagner (1994) has argued that there is a statistically significant (but small) relationship between the participation and the performance or the satisfaction.

Therefore:

- H_3: There is a significant positive relationship between *employee participation and involvement* and *safety performance*.
- H_4: There is a significant positive relationship between *safety performance* and *employee satisfaction*.

2.3. Safety Performance

An effective OSHMS requires appropriate and reliable OSH performance measurement (Pawłowska, 2015). Safety performance can be defined as "the level of safety that determines the incidences of workplace accidents, injuries and fatalities" (Ashour et al., 2018). Accident rates are the criteria most commonly used to measure safety performance (Idoro, 2011). While factors based on accident weight ratios are good indicators of managing accidents resulting in employee injury, they are poor indicators of controlling major hazard risks (Health and Safety Executive, 2017). Today, the indicators of OHS performance are often a combination of lagging indicators and positive performance indicators. Lagging indicators measure the effectiveness of the organization in achieving the targets while positive performance indicators measure the achievements in reaching the targets (Ünlü, 2013).

Improved safety performance can enhance employee satisfaction, which manifests itself in terms of Improved productivity, mental and physical health and reduced turnover and absenteeism. Employees are negatively affected by injuries or accidents occurring in the workplace, this leads to poor job satisfaction and stress (Vandyck et al., 2015). Only a few researchers investigated the relationship between safety

performance and employee satisfaction. Bayram et al. (2017) and Fernández-Muñiz et al. (2009) found a significant positive relationship between safety performance and employee satisfaction. On the other hand, Gyekye (2005), who investigated the relationship between job satisfaction and safety perception, showed that satisfied employees have lower accident rates than others.

Therefore:

- H_5: There is a significant positive relationship between *the safety performance* and *the employee satisfaction*.

2.4. Employee Satisfaction

Locke and Lathan (1976) define job satisfaction as "a pleasant or positive emotional state resulting from the evaluation of a person's job or professional experience." Job satisfaction is a result of the perception of how well the employee's job provides what is considered important (Rajeswari & Rajakrishnan, 2015). According to Sempane et al. (2002), the job itself can affect the quality of life of the employee.

Employees want to work in a healthy and safe environment free from risks that threaten their physical and spiritual well-being. If an organization takes the necessary precautions to protect the safety of its employees, they are more easily satisfied (Çabukel, 2008). Apart from the organizational context, dissatisfaction can harm one's physical and mental health and reduce one's well-being, happiness, and self-esteem (Satuf et al., 2016). According to Dawal & Taha (2006), a low job satisfaction rate is the most important sign indicating that the workplace has poor working conditions. So, job satisfaction has crucial importance in establishing safe and healthy organizational environment (Dawal & Taha, 2006).

Huang and Sharyn (2014) reported that studies focused mainly on employee satisfaction because of its impact on organizational performance. Aytaç (2011) states that if employee satisfaction is provided, the quality of production, firm's performance and physical and mental health of employees increase. Grawitch et al. (2007) demonstrated that employee satisfaction with healthy workplace practices could predict employee outcomes including well-being and intention to leave. Fernández-Muñiz et al. (2009) argued that worsening conditions in a factory, attributable to insecure working conditions, might cause employees to lose morale and motivation and quit their jobs. Nadinloyi et al. (2013) confirmed that the job satisfaction plays a positive role in the provision of mental health of employees. Furthermore, Fernández-Muñiz et al. (2012) empirically demonstrated that employee satisfaction would have a positive influence on a firm's performance.

2.5. Hypotheses and Development Research Model

Considering the literature study above, the research model given in Figure 1 was developed.

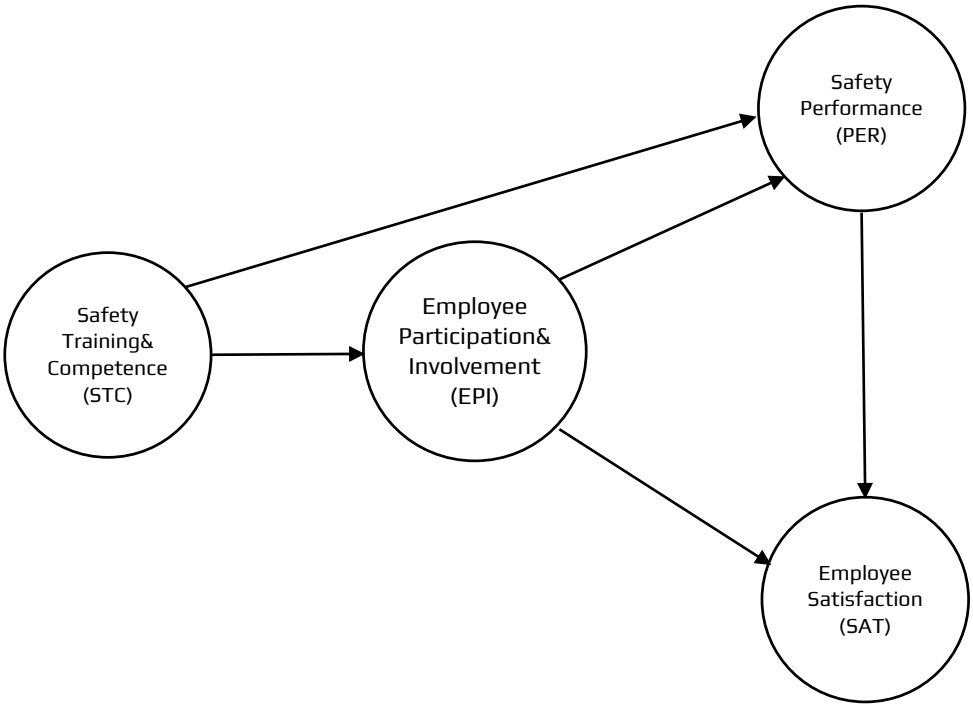


Figure 1. The proposed model

3. Method

3.1. Data Collection and Sample

To affirm the proposed model, a survey approach was used. The data were collected from the manufacturing firms implementing OHSMS which was selected as a target group. To realize the aim of the study, 529 OHSMS certified firms operating in different industries, different sizes and different workplace hazard class in Turkey were found via certification firms, the authors' social network and firm websites. The questionnaire was both mailed and e-mailed to the managers, which are responsible for OHS of each organization. A cover letter explaining the aim and explanation of the study was also attached.

As a result, 131 filled forms were returned from the companies. Since three of the questionnaire forms were unusable, 128 questionnaire forms were exposed to the analysis. The response rate was 24.2%, which could be acceptable for survey-based studies (Baruch & Holtom, 2008). The sample size of 128 is sufficient for this study. Because, the sample size should be five or more times bigger than the number of variables for multivariate analysis (Büyüköztürk, 2002). To test for non-response bias, Armstrong & Overton (1977) were followed. The objective to test non-response bias is to see whether there are significant differences between early and late participants. The results showed that there was no significant difference between the two groups.

Companies of different sizes and hazard classifications engaging in manufacturing activities in Turkey with a majority of private sector ownership were included in this survey. The sample consisted of 94.5 percent private sector ownership and 5.5 percent public sector ownership; 32.8 percent very dangerous, 59.4 percent dangerous, and 7.8 percent less dangerous hazard class; and 7.8 percent less than 50,

33.6 percent between 50 and 250, and 58.6 percent with more than 250 employees working in the firms. Considering industries according to NACE codes, the sample consisted of 20.3 percent metal industry; 18.0 percent chemical-rubber-plastic industry; 12.5 percent glass-ceramics, industry; 11.7 percent road and railway vehicles manufacturing; and 37.5 percent others. Participant distribution of the sample was 34.4 percent OHS management representatives, 23.4 percent OHS managers, and 42.2 percent OHS experts.

3.2. Scales

Two scales, safety training and competence (STC) and employee participation and involvement (EPI), were adopted from the scale of OHSMS Practices (Bayram and Ünğan, 2018), were developed by the author. Initially, the scale of OHSMS Practices consists of 38 elements covering all standard items of OHSAS 18001 standard the most widely used OHSMS standards in the world and Turkey. After an exploratory factor analysis (EFA), 33 elements brought together under a single factor named as OHSMS Practices. In this study, the four elements related to Competence, Training and Awareness Section of the OHSAS standard (Clause 4.4.2) in the OHSMS practices scale formed the scale of Safety, Training and Competence (STC) and similarly the four elements related to Communication, Participation and Consultation Section of the OHSAS standard (Clause 4.4.3) formed the scale of Employee Participation and Involvement (EPI).A 5 point Likert-type scale was used for the variables of STC and EPI (1 = The least, ... 5 = The most). The scales of employee satisfaction (SAT) and safety performance (PER) were developed by respectively Bayram et al. (2017) and Bayram (2018). A 5 point Likert-type scale was used for the variables of SAT and PER (1= strongly disagree to 5= strongly agree). Table 1 indicates the preliminary list of the scales.

Variables	Description
STC	Safety Training and Competence
STC1	To what degree are your employees competent in what to do in the face of dangerous, risky, and emergency situations
STC2	To what degree are your employees trained on occupational safety issues about themselves
STC3	To what degree your safety management system personnel are knowledgeable about the hazards, risks and precautions to be taken
STC4	To what degree new entrants are informed about the dangers and risks in the workplace and the rules to be followed
EPI	Employee Participation and Involvement
EPI1	To what degree the opinions of affected employees and workplace representatives are asked when there is a change in production processes and works
EPI2	To what degree decisions made based on the recommendations of employees and OHS professionals
EPI3	To what degree your employees *(including subcontractors)* actively participate in occupational safety practices
EPI4	To what degree employees contributing to the improvement of occupational safety appreciated and awarded
SAT	Employee Satisfaction
SAT1	Employee performance improved
SAT2	Employee absenteeism reduced
SAT3	Employee harming the enterprise reduced
SAT4	Employees' physical and mental health statuses improved
SAT5	Employee turnover rate improved
PER	Safety Performance
PER1	Accident frequency rate reduced
PER2	Accident severity rate reduced
PER3	Accidents involving death and/or loss of limb reduced

PER4	Tangible losses reduced

Table 1. The preliminary list of the scales

4. Results

The study was conducted in two phases. First was the exploratory phase and the second was the confirmatory phase. SPSS Statistics version 20 was applied for the exploratory phase, and then SmartPLS3 software package was employed for the confirmatory phase (structural equation modelling). The partial least squares - structural equation modelling was tried for the confirmatory phase (Ringle et al., 2015).

4.1. Exploratory Factor Analysis (EFA)

Firstly, EFA with varimax rotation was performed to evaluate whether the items share one underlying factor for each latent construct. The procedure suggested by Lumpkin & Dess (2001) was followed when performing EFA. Prior to this, Bartlett's (1954) sphericity test (BST) and the Kaiser-Meyer-Olkin (KMO) test (Kaiser, 1974) were performed. BST was used to investigate the factor's feasibility and the KMO test was used to measure sampling adequacy. The result of BST was p =0.000< 0.01 and the KMO value was 0.844, which is above the recommended limit. Therefore, the adequacy of the sample was confirmed by means of BST and KMO index. In the initial analysis, STC1 was eliminated due to cross loading. After it was eliminated, factor analysis was run again, resulting in four factors explaining 69.52% of the total variance. The first factor, termed 'PER', contained four items, which made up 38.77% of the total variance. The second factor, termed 'SAT', contained five items, which made up 13.85% of the total variance. The third factor, termed 'EPI', contained four items, which made up 11.58% of the total variance. The fourth factor, termed 'STC', included three items, which made up 6.03% of the total variance.

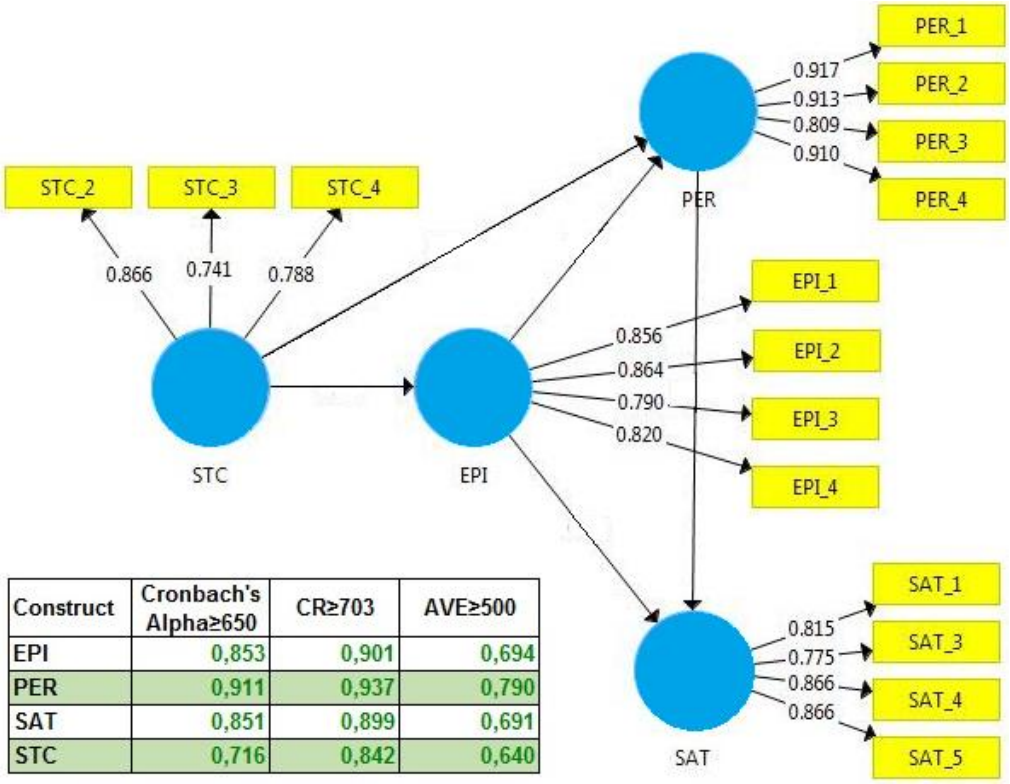
4.2. Confirmatory factor analysis (CFA)

After EFA, all items were analyzed via Smart PLS3 to assess the measurement and structural model except STC1 which was eliminated due to cross loading.

4.3. Outer measurement model

To assess validity of the proposed model, convergent and discriminant validity were applied. To verify the convergent validity of the scales, three criteria must be fulfilled (Fornell & Larker, 1981; Hair et al., 2014). First, the indicator loads should be greater than 0.703. Second, CR scores for each construct must be greater than 0.8 or Cronbach's alpha values should be greater than 0.65. Third, the Average Variance Extracted (AVE) for each structure needs to be greater than 0.5.

As seen Figure 2, the outer loadings, except SAT2, ranged between 0.741 and 0.917. The indicator loading of SAT2 was 0.636, below the accepted cut-off value for outer loading. For this reason, SAT2 has been removed from further analysis. The Cronbach's Alpha values exceed 0.65, the CR values range from 0.842 to 0.937 and the AVE changes from 0.640 to 0.790 after the fall of SAT2. In summary, three conditions are provided for convergent validity.



Construct	Cronbach's Alpha≥650	CR≥703	AVE≥500
EPI	0,853	0,901	0,694
PER	0,911	0,937	0,790
SAT	0,851	0,899	0,691
STC	0,716	0,842	0,640

Figure 2. Construct reliability and validity

To assess the discriminant validity, a procedure recommended by Fornell and Larker (1981) was followed. For each latent variable, its cross-loading value must be greater than that in any other constructs. Table 2 indicates the Fornell and Larker criterion test. As seen in the Table 2, a comparison of the square roots of AVEs and correlations in the diagonal indicates that there is sufficient discriminant validity for all constructs.

Construct	EPI	PER	SAT	STC
EPI	0.883			
PER	0.320	0.889		
SAT	0.420	0.320	0.831	
STC	0.600	0.345	0.369	0.800

Table 2. Discriminant Validity Result

4.4. Inner structural model

For evaluating inner structural model outcomes, the predictive relevance of the model (Q^2), the coefficient of determination (R^2), The Standardized Root Means Square Residual (SRMR), the level of the Variance Inflation Factors (VIF), path coefficient (β value) and T-statistic value are the key standards.

The path model's quality can be evaluated by calculating the Q^2 statistics. As a result of the Q^2 statistics, both CV-communality and CV-redundancy values were found positive (see Table 3). Therefore, the quality of both the measurement and the structural model was good.

	CV-communality	CV-redundancy
EPI	0.467	0.229
PER	0.601	0.096
SAT	0.465	0.128
STC	0.296	

Table 3. CV-communality and CV-redundancy.

R^2 of the endogenous latent variables can be applied to evaluate the model's explanatory power. The results of the structural model analysis are given in Figure 3. The proposed model is able to explain 36.0% of the variance (R^2) of the EPI, 21.5% of the SAT and 13.9% of PER. For this study, the R^2 values are acceptable. The results of the proposed model support for all hypotheses, except H_3 (see Figure 3).

The f2 value can be used to measure the effect size, which is the degree of the impact of each exogenous latent construct on the endogenous latent and defines whether the removed latent exogenous construct has a significant influence on the value of the latent endogenous construct (Hussain, 2018). The ƒ2 is assessed as 0.35 (large), 0.15 (medium) and 0.02 (small) (Cohen, 1998). As seen in Table 4, the effect size for STC on EPI were 0.757 (large), the effect size for EPI on SAT were 0.190 (medium), the effect size for EPI on PER were 0.087 (small) and the effect size for PER on SAT were 0.128 (small).

	f2 value	Total Effect
STC -> EPI	0,757	large
EPI -> SAT	0,190	medium
EPI -> PER	0,087	small
PER -> SAT	0,128	small

Table 4. Effect size.

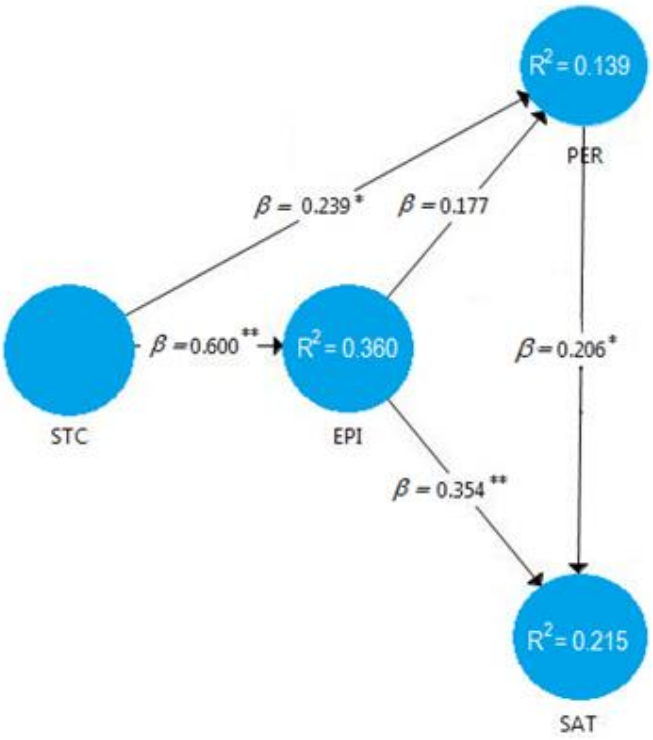


Figure 3. The results of the proposed model, **p<0,001

SRMR is a measure of estimated model fit for Smart PLS (Henseler et al., 2014). For this study, The SMRM value was found to be 0.063, which shows a good fit, since the value is less than 0.08 (Hu and Bentler, 1998).

The problem of multicollinearity was assessed. According to Ringle et al. (2015), the maximum level of the Variance Inflation Factors (VIF) should be "5". Since VIF of all the items ranges from 1.284 to 4.116, no multicollinearity problem among the independent variables was found (see Table 5).

Variables	VIF		Variables	VIF
EPI1	2,163		SAT1	1,747
EPI2	2,261		SAT3	1,750
EPI3	1,688		SAT4	2,219
EPI4	1,844		SAT5	2,199
PER1	4,116		STC2	1,698
PER2	3,788		STC3	1,284
PER3	2,248		STC4	1,503
PER4	3,368			

Table 5. VIF of all items.

The significance of the hypothesis was assessed through the β value. Through the T-statistics the β value should be verified for its significance level. The bootstrapping procedure using 500 subsamples was used to assess the significance level of the hypotheses. As seen Table 6, the results of the hypothesis testing are provided. Additionally, indirect and total effects between the constructs were assessed (see Table 6). The results showed that these effects were statistically significant, except H_3 (p< 0.010). Additionally, it was found that *SAT* is indirectly affected by *STC* through *EPI*.

The results of direct effects					
Hip.	Link	β	t-value	p Values	Results
H_1	STC-EPI	0.600**	9.557	0.000	S
H_2	STC-PER	0.239*	2.316	0.021	S
H_3	EPI-PER	0.177	1.601	0.110	NS
H_4	EPI-SAT	0.354**	4.674	0.000	S
H_5	PER-SAT	0.206*	2.207	0.028	S
The results of indirect effects					
STC-EPI-PER		0.106	1.582	0.114	NS
STC-EPI-SAT		0.212**	3.908	0.000	S
EPI-PER-SAT		0.036	1.361	0.174	NS
STC-EPI-PER-SAT		0.022	1.308	0.191	NS
STC-PER-SAT		0.049	1.429	0.154	NS
The results of total effects					
H_1	STC-EPI	0.600**	9.557	0.000	S
H_2	STC-PER	0.345**	4.873	0.000	S
H_3	EPI-PER	0.177	1.601	0.110	NS
H_4	EPI-SAT	0.391**	5.312	0.000	S
H_5	PER-SAT	0.206*	2.207	0.028	S
	STC-SAT	0.284**	5.511	0.000	S

Note: * p<0.050,**p<0.001, S=Supported, NS=Not Supported

Table 6. Path coefficient and T-statistics.

5. Discussion

Firstly, the relationships between *safety training and competence*, *employee participation and involvement*, and *safety performance* were analyzed. Secondly, the relationships between *employee participation and involvement*, *safety performance*, and *employee satisfaction* were investigated. This study makes an important contribution to the OHSMS literature, as some of the relationships mentioned above were poorly investigated empirically previously.

It was found that *employee participation and involvement* is directly affected by *the safety training and competence*. This relationship was empirically examined for the first time in this study to our knowledge. On the other hand, the finding supports the works of Bahn & Barratt-Pugh (2014) and Ghahramani (2016).

It was found that *the safety performance* is directly affected by *the safety training and competence*. The empirically examined findings support studies conducted by Burke et al. (2011), Wilkins (2011), Bahn and Barratt-Pugh (2014) and Ashour et al. (2018). Ashour et al. (2018) suggested a conceptual framework for improving safety performance and argued that safety performance is influenced by safety training.

No direct relationship was found between *employee participation and involvement* and *safety performance*. The empirically examined findings do not support studies conducted by the Hillage et al. (2000), Shearn (2005), Neal and Griffin (2006) and Li et al. (2010). Reilly et al. (1995) indicated that the joint consultative committees, with all employee representatives appointed by unions, significantly reduce the work-place injuries compared to the workplaces. Hillage et al. (2000) and Shearn (2005) have shown that OHS committees can positively influence a company's OHS performance. Neal and Griffin (2006) empirically indicated that employee participation has a positive impact on reducing injuries. Additionally, this finding is not consistent with the studies conducted by the International Labor Office (2011) and Reilly et al. (1995), which suggests that there is a relationship between the presence of an OHS committee or trade union in an organization and a reduction in the rate of lost-time injuries.

It was found that there is a significant positive relationship between *employee participation and involvement* and *employee satisfaction*. This finding confirms the Fernández-Muñiz et al. (2014) study and is consistent with studies by Chang et al. (2010), Martin & Kaufman (2013), Zhu et al. (2015) and Wagner (1994), which were reported that the safety participation affects the employee satisfaction positively. Chang et al. (2010) discovered that total quality management practices such as employee participation and employee retention are significant positive predictors of the employee satisfaction. Fernández-Muñiz et al. (2014) found a direct positive relationship between safety participation and employee satisfaction. Conducted a survey research and compared the results with the other 10 related articles, a resulting employee participation was found as a positive impact on satisfaction, but the effect level was not very high (Zhu et al., 2015). Martin and Kaufman (2013) suggest that the organizations should consider paying attention to the human resource practices such as recruitment, benefits and compensation, training and development, evaluation and auditing to improve employees' job satisfaction.

It was found that *the employee satisfaction* is directly affected by *the safety performance*. This finding supports the studies of Fernández-Muñiz et al. (2009) and Bayram et. al (2017). However, the effect of satisfaction on safety performance has been mentioned more in the safety literature. For example, Stoilkovska (2015) stated that the satisfied employees face fewer accidents and injuries and Bayram (2018) empirically found that employee satisfaction has a significant positive effect on safety performance.

6. Conclusion

The main objective of this paper was to assess the relationships between *safety training and competence*, *employee participation and involvement*, *safety performance* and *employee satisfaction*, since they were previously poorly investigated empirically. To demonstrate these relationships a research model has been developed and the data, which were collected from 128 manufacturing firms implementing OHSMS in Turkey, were analyzed through EFA and CFA, respectively. The findings indicated that *the safety training and competence* has a significant positive effect on *employee participation and involvement*, *safety training and competence* has a significant positive effect on *safety performance*, it was not found that there is a significant positive effect between *employee participation and involvement* and *the safety performance*, it was found that there is a significant positive effect between *employee participation and involvement* and *employee satisfaction*, it was found that there is a significant positive effect between *safety performance* and *employee satisfaction*. Furthermore, it was also found that *the employee satisfaction* is indirectly affected by *the safety training and competence* through *the employee participation and involvement*. So, this study made an important contribution to the OHSMS literature.

Overall, the findings of this study suggest that the firms must encourage their employees to become actively involved and participate in the OHS issues for an improved safety performance and job satisfaction. To encourage participation, organizations may re-design their organizational structure and decision-making system. Also, they need to provide considerable training for their workers to participate in OHS related decisions meaningfully. Finally, they must take preventive measures to improve safety performance and obtain satisfied employees.

Future work in this area should focus on the relationships between the basic elements of OHSMS. In addition, similar studies may be conducted for employees to confirm the findings of this study. One of the difficulties in our work lies in determining whether firms have implemented OHSMS because there is no database of OHSMS-implemented companies in Turkey. Therefore, we cannot ascertain the precise number of firms that have implemented OHSMS in Turkey.

References

Ashour, A.M. Hassan, Z. & Alekam, J.M.E. (2018) A Conceptual Framework for Upgrading Safety Performance by Influence Safety Training, Management Commitment to Safety and Work Environment: Jordanian Hospitals, International Journal of Business and Social Research, 08(07), 25-35. doi: http://dx.doi.org/10.18533/ijbsr.v8i7.1117

Al Idrus, S. Abdussakir. & Ansari, S.A. (2018). The effect of organizational learning on market orientation moderated by job satisfaction. Cogent Business & Management, 1-12. doi: 10.1080/23311975.2018.1475048

Armstrong, J.S. & Overton, T.S. (1977). Estimating non-response bias in mail surveys. Journal of Marketing Research, 14, 396–402. doi:10.2307/3150783

Aytaç, S. (2011). The Importance of Safety Culture in Prevention of Work Accidents [İş kazalarını önlemede güvenlik kültürünün önemi]. Türkmetal Dergisi, October – November, 1–8.

Bahn, S. & Barratt-Pugh, L. (2014). Safety training evaluation: The case of construction induction training and the impact on work-related injuries in the Western Australian construction sector. International Journal of Training Research, 12(2), 148–157. doi: 10.1080/14480220.2014.11082037

Bartlett, M.S. (1954). A note on the multiplying factors for various chi square approximations. Journal of Royal Statistical Society, 16(Series B), 296–298.

Baruch, Y. V Holtom, B.C. (2008). Survey response rate levels and trends in organizational research. Human Relations, 61(8), 1139–1160. doi: 10.1177/00187267080948 63

Bayram, M. (2018). The Management Commitment to OHS, Employee Satisfaction and Safety Performance: An Empirical Study. International Journal of Latest Engineering and Management Research. 03(07), 63-71.

Bayram, M. & Ünğan, M.C. (2018). The relationships between OHS prevention costs, OHSMS practices, employee satisfaction, OHS performance and accident costs. Total Quality Management & Business Excellence, 1–20. doi: 10.1080/14783363.2018.1480897

Bayram, M. Ungan, M.C. & Ardıç, K. (2017). The relationships between OHS prevention costs, safety performance, employee satisfaction and accident costs. International Journal of Occupational Safety and Ergonomics, 23(2), 285-296. doi: 10.1080/10803548.2016.1226607

Boyar, C. (2014). 6331 Sayılı İş Sağlığı ve Güvenliği Kanununun Matbaacılık Sektöründe Devlet İşçi İşveren Arasındaki İlişki" [The relationship among the government, workers and employers in printing industry] Master's Thesis, Yeni Yüzyıl University, Istanbul, Turkey.

Brück, C. (2016). Methods and effects of worker participation [Internet]. Sep 19 [cited 2016 March 1]; [about 1 screens]. Available https://oshwiki.eu/wiki/Methods_and_effects_of_worker_participation

Burke, M. J., Salvador, R. O., Smith-Crowe, K., Chan-Serafin, S., Smith, A., & Sonesh, S. (2011), The dread factor: How hazards and safety training influence learning and performance, Journal of Applied Psychology, 96(1), 46-70.

Büyüköztürk, Ş. (2002). Faktör analizi: temel kavramlar ve ölçek geliştirmede kullanımı, Eğitim Yönetimi Dergisi, 32, 470-483.

Carrivick, P. J. W., Lee, A., Yau, K. K. W., and Stevenson, M. (2005) Evaluating the effectiveness of a participatory ergonomics approach in reducing the risk and severity of injuries from manual handling. Ergonomics, 48(8), 907-914.

Chang, C.C. Chiu, C.M. & Chen, C.A. (2010). The effect of TQM practices on employee satisfaction and loyalty in government. Total Quality Management & Business Excellence, 21(12), 1299–1314. doi: 10.1080/14783363.2010.530796

Cohen, J. (1988) Statistical Power Analysis for the Behavioral Sciences. NJ Lawrence Earlbaum Assoc.

Hair, J.F. Hult, G.T.M. Ringle, C. and et al. (2014) A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), Sage, Thousand Oaks (CA), USA.

Cohen, A. & Colligan, M.J. (1998). Assessing Occupational Safety and Health Training: a Literature Review, DHHS (NIOSH) Publication No. 98-145, the National Institute for Occupational Safety and Health Publications Dissemination 4676 Columbia Parkway Cincinnati, Ohio.

Çabukel, R. (2008) Employee Satisfaction Analysis [Çalışan Memnuniyeti analizleri]" Master's Thesis, Marmara University, Istanbul, Turkey.

Dawal, S.Z.M. & Taha, Z. (2006). The Effect of Job and Environmental Factors on Job Satisfaction in Automotive Industries. International Journal of Occupational Safety and Ergonomics. 12(3), 267–280. doi: 10.1080/10803548.2006.11076687

Fernández-Muñiz, B. Montes-Peón, J.M. & Vázquez-Ordás, C.J. (2009). Relation between occupational safety management and firm performance. Safety Science. 47, 980–99. doi: 10.1016/j.ssci.2008.10.0220

Fernández-Muñiz, B. Montes-Peón, J.M. & Vázquez-Ordás, C.J. (2012). Safety climate in OHSAS 18001-certified organisations: antecedents and consequences of safety behaviour. Accident Analysis & Prevention. 45, 745–758. doi:10.1016/j.aap.2011.10.002

Fernández-Muñiz, B.F. Montes-Peón, J.M. & Vázquez-Ordás, C.J. (2014). Safety leadership, risk management and safety performance in Spanish firms. Safety Science. 70, 295–307. doi: 10.1016/j.ssci.2014.07.010

Fornell, C. & Larker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50. doi:10.2307/3151312

Gesellschaft für Consulting, Business und Management mbH. (2014). Guideline for the Implementation of an Occupational Health and Safety Organisation. Retrieved from file:///C:/Users/Sau/Desktop/Guideline-Implementation-OHS-Organization_EN_CBM-2014.pdf

Ghahramani, A. (2016). An investigation of safety climate in OHSAS 18001-certified and non-certified organizations. International Journal of Occupational Safety and Ergonomics. 22(3), 414-421. doi: 10.1080/10803548.2016.1155803

Goldstein, I.L. (1986). Training in work organisations. Annual Review of Psychology, 31, 229-272.

Grant, A.M. Christianson, M.K. & Price, R.H. (2007). Happiness, health, or relationships? Managerial practices and employee well-being tradeoffs. Academy of Management Perspectives, 51–63. doi: 10.5465/AMP.2007.26421238

Grawitch, M.J. Trares, S. & Kohler, J.M. (2007). Healthy workplace practices and employee outcomes. International Journal of Stress Management, 14(3), 275–293. doi:10.1037/1072-5245.14.3.275

Gyekye, S. A. (2005). Workers' Perceptions of Workplace Safety and Job Satisfaction. International Journal of Occupational Safety and Ergonomics. 11(3), 291-302.

Hair, J.F. Hult, G.T.M. Ringle, C. and et al. (2014) A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), Sage, Thousand Oaks (CA), USA.

Health and Safety Executive. (2017) Key Process Safety Performance Indicators, A short guide for Directors and CEOs [Internet], Health and Safety Executive, UK. [about 1 screens]. Available from: http://www.hse.gov.uk/leadership/keyindicators.pdf

Health and Safety Executive. (2013) Managing for health and safety, Report HSG65, Third edition, The Health and Safety Executive, London. Retrieved from http://www.hse.gov.uk/pubns/priced/hsg65.pdf

Health and Safety Executive. (2005) Obstacles preventing worker involvement in health and safety, Prepared by ECOTEC Ltd for the Health and Safety Executive, UK. Retrieved from: http://www.hse.gov.uk/research/rrpdf/rr296.pdf

Health and Safety Executive (2019). Training and competence (Retrieved from: http://www.hse.gov.uk/work-equipment-machinery/training-competence.htm).

Henseler, J. Dijkstra, T.K. Sarstedt, M. et al. (2014). Common beliefs and reality about partial least squares: comments on Rönkkö & Evermann (2013). Organizational Research Methods, 17(2), 182–209. doi:10.1177/1094428114526928

Hillage, J. Kersley, B. Bates, P. & Rick, J. (2000) The role and effectiveness of safety representatives in influencing workplace health and safety, Contract Research Report CRR 268/2000, Health and Safety Executive, UK. Available from: http://www.hse.gov.uk/research/crr_pdf/2000/CRR00268.pdf

Hu, L. & Bentler, P.M. (1998). Fit indices in covariance structure modeling: sensitivity to underparameterized model misspecification. Psychological Methods, 3(4), 424–453. doi:10.1037/1082-989X.3.4.424

Huang, Y.T. & Sharyn, R-T. (2014). The moderating effect of cultural congruence on the internal marketing practice and employee satisfaction relationship: An empirical examination of Australian and Taiwanese born tourism employees. Tourism Management, 42, 196–206. doi: 10.1016/j.tourman.2013.12.005

Hussain, S. Fangwei, Z. Siddiqi A. F. Ali, Z. Shabbir, M. S. (2018) Structural Equation Model for Evaluating Factors. Affecting Quality of Social Infrastructure Projects, Sustainability, 10, 1415, 1-25. doi:10.3390/su10051415

Idoro, G.I. (2011). Comparing occupational health and safety (OHS) management efforts and performance. J. Constr. in Dev. Ctries., 16(2), 151–173.

International Labor Office. (2011) OSH Management System: A Tool for Continual Improvement, International Training Centre of the International Labor Office, Turin, Italy.

Kaiser, H.F. (1974). An index of factorial simplicity. Psychometrika, 39, 31–36. doi:10.1007/BF02291575

Keleş, R. (2005). The role of occupational health and safety ın total quality management. 4th Research/Expert Conference with International Participations. QUALITY 2005. Fojnica, B&H. 73– 78.

Li, J. Guangtao, Y. Yongjuan, L. & Feng, L. (2010). Perceived colleagues' safety knowledge/behavior and safety performance: Safety climate as a moderator in a multilevel study. Accident Analysis & Prevention. 42, 1468–1476. doi: 10.1016/j.aap.2009.08.017

Lumpkin, G.T. & Dess, G.G. (2001). Linking two dimensions of entrepreneurial orientation to firm performance: the moderating role of environment and industry life cycle. Journal of Business Venturing, 16, 429–451. doi:10.1016/S0883-9026(00)00048-3

Martin, M.J., & Kaufman, E.K. (2013). Do Job Satisfaction and Commitment to the Organization Matter When It Comes to Retaining Employees? Journal of Extension, 51(4), 1-7. Available from https://www.joe.org/joe/2013august/pdf/JOE_v51_4rb1.pdf

Masso, M. (2015). The determinants of employee participation in occupational health and safety management. International Journal of Occupational Safety and Ergonomics. 21(1), 62-70. doi: 10.1080/10803548.2015.1017959

Mullen, J., Kelloway, E. K., & Teed, M. (2017). Employer safety obligations, transformational leadership and their interactive effects on employee safety performance. Safety Science, 91, 405-412.

Nadinloyi, K.B. Sadeghi, H. & Hajloo, N. (2013). Relationship Between Job Satisfaction and Employees Mental Health. Procedia - Social and Behavioral Sciences, 84, 293–297.

Neal, A. Griffin, M.A. (2006) A Study of the Lagged Relationships Among Safety Climate, Safety Motivation, Safety Behavior, and Accidents at the Individual and Group Levels, Journal of Applied Psychology. 91(4), 946–953.

Nevhage, B. & Lindhal, H. (2008). A conceptual model, methodology and tool to evaluate safety performance in an organization. Master's Thesis, Lund University, Lund, Sweden.

Nytrö, K.S. (1998). Organisational prerequisites for the implementation of systematic health, environment and safety work in enterprises. Safety Science. 30(3), 297–307.

O'Toole, M. (2002). The relationship between employees' perceptions of safety and organizational culture. Journal of Safety Research, 33, 231–243.

Pawlowska, Z. Occupational safety and health management systems and workers' participation [Internet], (2013) 2018 June 18 [cited 24 April 2013] [about 1 screens]. Available from https://oshwiki.eu/wiki/Occupational_safety_and_health_management_systems_and_workers%E2%80%99_participation

Rajeswari, P. & Rajakrishnan, V.S. (2015). An analysis of job dimensions on organizational commitment with special reference to sales representatives at Nagapattinam district. International Journal of Advenced Scientific Research & Development, 02(04), 10–20.

Redinger, C.F. Levine, S.P. Blotzer. M.J. & Majewski, M.P. (2002). Evaluation of an Occupational Health and Safety Management System Performance Measurement Tool—II: Scoring Methods and Field Study Sites. AIHA Journal, 6, 34–40. doi: 10.1080/15428110208984689

Reilly, B. Paci, P. & Holl, P. (1995). Unions, safety committees and workplace injuries. British Journal of Industrial Relations, 33(2), 273-88. doi: 10.1111/j.1467-8543.1995.tb00435.x

Ringle, C. M., Wende, S., & Becker, J.-M. (2015). SmartPLS 3. Boenningstedt: SmartPLS GmbH, Available from: http://www.smartpls.com.

Satuf, C. Monteiro, S. Pereira, H. Esgalhado, G. Afonso, R.M. & Loureiro, M. (2016) " The protective effect of job satisfaction in health, happiness, well-being and self-esteem. International

Journal of Occupational Safety and Ergonomics. 24(2), 181–189. doi: 10.1080/10803548.2016.1216365

Seixas, N. Crollard, A. Neitzel, R. Stover, B. & Dominguez, C. (2013). Intervening at the Bottom: Can a Health and Safety Committee Intervention Influence Management Commitment? Policy and Practice in Health and Safety, 11(1), 61-78. doi: 10.1080/14774003.2013.11667785

Sempane, M.E. Rieger, H.S. & Roodt, G. (2002). Job satisfaction in relation to organisational culture. SA Journal of Industrial Psychology, 28(2), 23-30. Retrieved from http://www.sajip.co.za/index.php/sajip/article/view/49/47

Shearn, P. (2005) Workforce Participation in the Management of Occupational Health & Safety, Report HSL/2005/09, Health and Safety Executive, UK. Retrieved from: http://www.hse.gov.uk/research/hsl_pdf/2005/hsl0509.pdf

Stoilkovska, B.B. Pančovska, V.Z. & Mijoski, G. (2015). Relationship of safety climate perceptions and job satisfaction among employees in the construction industry: the moderating role of age. International Journal of Occupational Safety and Ergonomics. 21(4), 440-447. doi: 10.1080/10803548.2015.1096059

The General Directorate of Occupational Health and Safety, Turkey [İSGGM]. (2013). Good Implementations of Occupational Health and Safety Management Systems in EU [Avrupa Birliği'nin İş Sağlığı ve Güvenliği Yönetim Sistemleri İyi Uygulamaları], İSGGM Press, Ankara.

Ünlü, A. E. (2013). İs sağlığı ve güvenliği uygulamalarının işletmeler üzerindeki ekonomik etkileri [Economic effects of OHS practices on businesses]. Bursa: ÇSGB, İş Teftiş Kurulu Başkanlığı yayını.

Vandyck, E. Fianu, D. Papoe, M. & Oppong, S. (2015) "Safety management systems, ergonomic features and accident causation among garment workers," Les Actes de la troisième Conférence internationale sur Les application de l'ergonomie dans les pays en voie de développement, Algeria, pp. 109-114.

Vinodkumar, M.N. and Bhasi, M. (2010). Safety management practices and safety behaviour: Assessing the mediating role of safety knowledge and motivation. Accident Analysis & Prevention. 42(6), 2082–2093. doi: 10.1016/j.aap.2010.06.021

Wagner, I. (1994). Participation's effects on performance and satisfaction: A reconsideration of research evidence. The Academy of Management Review, 19(2), 312–330.

Walters D.R. & Frick, K. (2000). Worker Participation and the Management of Occupational Health and Safety: Reinforcing or Conflicting Strategies?" In Systematic Occupational Health and Safety Management – Perspectives on an International Development, K. Frick, L.P. Jensen. M. Quinlan and T. Wilthagen, eds, pp. 43-65, Pergamon Press, Oxford, UK.

Widerszal-Bazyl M, Warszewska-Makuch M. (2008) Employee Direct Participation in Organisational Decisions and Workplace Safety. International Journal of Occupational Safety and Ergonomics, 14(4), 367–378

Wilkins J.R. (2011) Construction workers' perceptions of health and safety training programmes, Construction Management and Economics, 29:10, 1017-1026, doi: 10.1080/01446193.2011.633538

Wu, T.C. Chen, C.H. & Li, C.C. (2008). A correlation among safety leadership, safety culture and safety performance. Journal of Loss Prevention in the Process Industries, 21, 307-318. doi: 10.1016/j.jlp.2007.11.001

Zhu, Y. Xie, Y. Warner, M. & Guo, Y. (2015). Employee participation and the influence on job satisfaction of the 'new generation' of Chinese employees. The International Journal of Human Resource Management, 26(19), 2395-2411, doi: 10.1080/09585192.2014.990397.