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 (OHS Management), 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-Muniz et al., 2009). The implementation of an OHSM 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 OHSM. An effective OHSM 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

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:

- **H1**: There is a significant positive relationship between safety training and competence and employee participation and involvement.
- **H2**: 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:

- H5: 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.
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.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STC</td>
<td>Safety Training and Competence</td>
</tr>
<tr>
<td>STC1</td>
<td>To what degree are your employees competent in what to do in the face of dangerous, risky, and emergency situations</td>
</tr>
<tr>
<td>STC2</td>
<td>To what degree are your employees trained on occupational safety issues about themselves</td>
</tr>
<tr>
<td>STC3</td>
<td>To what degree your safety management system personnel are knowledgeable about the hazards, risks and precautions to be taken</td>
</tr>
<tr>
<td>STC4</td>
<td>To what degree new entrants are informed about the dangers and risks in the workplace and the rules to be followed</td>
</tr>
<tr>
<td>EPI</td>
<td>Employee Participation and Involvement</td>
</tr>
<tr>
<td>EPI1</td>
<td>To what degree the opinions of affected employees and workplace representatives are asked when there is a change in production processes and works</td>
</tr>
<tr>
<td>EPI2</td>
<td>To what degree decisions made based on the recommendations of employees and OHS professionals</td>
</tr>
<tr>
<td>EPI3</td>
<td>To what degree your employees (including subcontractors) actively participate in occupational safety practices</td>
</tr>
<tr>
<td>EPI4</td>
<td>To what degree employees contributing to the improvement of occupational safety appreciated and awarded</td>
</tr>
<tr>
<td>SAT</td>
<td>Employee Satisfaction</td>
</tr>
<tr>
<td>SAT1</td>
<td>Employee performance improved</td>
</tr>
<tr>
<td>SAT2</td>
<td>Employee absenteeism reduced</td>
</tr>
<tr>
<td>SAT3</td>
<td>Employee harming the enterprise reduced</td>
</tr>
<tr>
<td>SAT4</td>
<td>Employees' physical and mental health statuses improved</td>
</tr>
<tr>
<td>SAT5</td>
<td>Employee turnover rate improved</td>
</tr>
<tr>
<td>PER</td>
<td>Safety Performance</td>
</tr>
<tr>
<td>PER1</td>
<td>Accident frequency rate reduced</td>
</tr>
<tr>
<td>PER2</td>
<td>Accident severity rate reduced</td>
</tr>
<tr>
<td>PER3</td>
<td>Accidents involving death and/or loss of limb reduced</td>
</tr>
</tbody>
</table>
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 SmartPLS3 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 & Larcker, 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 and 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.
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.

![Figure 2. Construct reliability and validity](image)

<table>
<thead>
<tr>
<th>Construct</th>
<th>EPI</th>
<th>PER</th>
<th>SAT</th>
<th>STC</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPI</td>
<td>0.883</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PER</td>
<td>0.320</td>
<td>0.889</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAT</td>
<td>0.420</td>
<td>0.320</td>
<td>0.831</td>
<td></td>
</tr>
<tr>
<td>STC</td>
<td>0.600</td>
<td>0.345</td>
<td>0.369</td>
<td>0.800</td>
</tr>
</tbody>
</table>

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 ($\beta$ 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 and CV-redundancy.

<table>
<thead>
<tr>
<th></th>
<th>CV-communality</th>
<th>CV-redundancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPI</td>
<td>0.467</td>
<td>0.229</td>
</tr>
<tr>
<td>PER</td>
<td>0.601</td>
<td>0.096</td>
</tr>
<tr>
<td>SAT</td>
<td>0.465</td>
<td>0.128</td>
</tr>
<tr>
<td>STC</td>
<td>0.296</td>
<td></td>
</tr>
</tbody>
</table>

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 $f^2$ 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 $f^2$ 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).

<table>
<thead>
<tr>
<th>f2 value</th>
<th>Total Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>STC -&gt; EPI</td>
<td>0.757</td>
</tr>
<tr>
<td>EPI -&gt; SAT</td>
<td>0.190</td>
</tr>
<tr>
<td>EPI -&gt; PER</td>
<td>0.087</td>
</tr>
<tr>
<td>PER -&gt; SAT</td>
<td>0.128</td>
</tr>
</tbody>
</table>

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 SRMR 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).

<table>
<thead>
<tr>
<th>Variables</th>
<th>VIF</th>
<th>Variables</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPI1</td>
<td>2.163</td>
<td>SAT1</td>
<td>1.747</td>
</tr>
<tr>
<td>EPI2</td>
<td>2.261</td>
<td>SAT3</td>
<td>1.750</td>
</tr>
<tr>
<td>EPI3</td>
<td>1.688</td>
<td>SAT4</td>
<td>2.219</td>
</tr>
<tr>
<td>EPI4</td>
<td>1.844</td>
<td>SAT5</td>
<td>2.199</td>
</tr>
<tr>
<td>PER1</td>
<td>4.116</td>
<td>STC2</td>
<td>1.698</td>
</tr>
<tr>
<td>PER2</td>
<td>3.788</td>
<td>STC3</td>
<td>1.284</td>
</tr>
<tr>
<td>PER3</td>
<td>2.248</td>
<td>STC4</td>
<td>1.503</td>
</tr>
<tr>
<td>PER4</td>
<td>3.368</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. VIF of all items.

The significance of the hypothesis was assessed through the $\beta$ value. Through the T-statistics the $\beta$ 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.

<table>
<thead>
<tr>
<th>Hip.</th>
<th>Link</th>
<th>$\beta$</th>
<th>$t$-value</th>
<th>$p$ Values</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_1$</td>
<td>STC-EPI</td>
<td>0.600**</td>
<td>9.557</td>
<td>0.000</td>
<td>S</td>
</tr>
<tr>
<td>$H_2$</td>
<td>STC-PER</td>
<td>0.239*</td>
<td>2.316</td>
<td>0.021</td>
<td>S</td>
</tr>
<tr>
<td>$H_3$</td>
<td>EPI-PER</td>
<td>0.177</td>
<td>1.601</td>
<td>0.110</td>
<td>NS</td>
</tr>
<tr>
<td>$H_4$</td>
<td>EPI-SAT</td>
<td>0.354**</td>
<td>4.674</td>
<td>0.000</td>
<td>S</td>
</tr>
<tr>
<td>$H_5$</td>
<td>PER-SAT</td>
<td>0.206*</td>
<td>2.207</td>
<td>0.028</td>
<td>S</td>
</tr>
</tbody>
</table>

The results of indirect effects

<table>
<thead>
<tr>
<th>Link</th>
<th>$\beta$</th>
<th>$t$-value</th>
<th>$p$ Values</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>STC-EPI-PER</td>
<td>0.106</td>
<td>1.582</td>
<td>0.114</td>
<td>NS</td>
</tr>
<tr>
<td>STC-EPI-SAT</td>
<td>0.212**</td>
<td>3.908</td>
<td>0.000</td>
<td>S</td>
</tr>
<tr>
<td>EPI-PER-SAT</td>
<td>0.036</td>
<td>1.361</td>
<td>0.174</td>
<td>NS</td>
</tr>
<tr>
<td>STC-EPI-PER-SAT</td>
<td>0.022</td>
<td>1.308</td>
<td>0.191</td>
<td>NS</td>
</tr>
<tr>
<td>STC-PER-SAT</td>
<td>0.049</td>
<td>1.429</td>
<td>0.154</td>
<td>NS</td>
</tr>
</tbody>
</table>

The results of total effects

<table>
<thead>
<tr>
<th>Hip.</th>
<th>Link</th>
<th>$\beta$</th>
<th>$t$-value</th>
<th>$p$ Values</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_1$</td>
<td>STC-EPI</td>
<td>0.600**</td>
<td>9.557</td>
<td>0.000</td>
<td>S</td>
</tr>
<tr>
<td>$H_2$</td>
<td>STC-PER</td>
<td>0.345**</td>
<td>4.873</td>
<td>0.000</td>
<td>S</td>
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<tr>
<td>$H_3$</td>
<td>EPI-PER</td>
<td>0.177</td>
<td>1.601</td>
<td>0.110</td>
<td>NS</td>
</tr>
<tr>
<td>$H_4$</td>
<td>EPI-SAT</td>
<td>0.391**</td>
<td>5.312</td>
<td>0.000</td>
<td>S</td>
</tr>
<tr>
<td>$H_5$</td>
<td>PER-SAT</td>
<td>0.206*</td>
<td>2.207</td>
<td>0.028</td>
<td>S</td>
</tr>
<tr>
<td>STC-SAT</td>
<td>0.284**</td>
<td>5.511</td>
<td>0.000</td>
<td>S</td>
<td></td>
</tr>
</tbody>
</table>

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 workplace 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


Bayram


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Bayram

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


