Araştırma

Makale Başvuru/Kabul Tarihleri
Received/Accepted Dates
28.10.2020/20.12.2020

Journal of Social Research and Behavioral Sciences
Sosyal Araştırmalar ve Davranış Bilimleri Dergisi
ISSN:2149-178X

DOI: 10.52096/jsrbs.6.12.26 Volume: 6 Issue: 12 Year: 2020

Determining the Critical Success Factors of Occupational Health and Safety Using Structural Equation Modeling: A Sample of Turkey

Öğr. Gör. Dr. Atakan GERGER

Ege Üniversitesi, Ege Meslek Yüksekokulu

atakangerger@gmail.com

ORCID ID: 0000-0002-3782-7613

Abstract

The intensely competitive environment which is increasing its effect day by day, technological developments, and rapid changes in customer demands force today's companies to use fewer resources, to produce better quality products in a shorter time at a lower cost, and to provide high service standards. Since to achieve this requires effective use of the workforce, which is the most valuable resource for companies; It is necessary to take various protection measures against occupational accidents and diseases, with the human factor in mind.

This research aims to measure the effectiveness of Occupational Health and Safety (OHS) in Turkey using Structural Equation Modeling (SEM), which is a statistical technique. Participants of the questionnaire used in the study include OHS officers, occupational physicians, relevant health personnel, human resources employees, etc. Critical success factors for OHS subjects were determined using the Exploratory Factor Analysis (EFA) and Structural Equation Modeling. The most important goal is to reduce the number of work accidents and occupational diseases in Turkey by comparing the success factors in this study to those in the literature.

Keywords: Occupational Health and Care; Statistical Evaluation for OHS; Statistical Analyze for OHS; Structural equation modelling; Critical success factors for OHS

Subject classification codes: C3, J2, M1

Yapısal Eşitlik Modellemesi Kullanılarak Türkiye'de İş Sağlığı ve Güvenliği Başarı Faktörlerinin Belirlenmesi

Özet

Her geçen gün etkisini daha da artıran yoğun rekabet ortamı, teknolojide elde edilen gelişmeler ve müşteri taleplerindeki hızlı değişimler günümüz firmalarını daha az kaynak kullanmaya, daha kısa zamanda, daha düşük maliyetle, daha kaliteli ürünler üretmeye ve yüksek standartlarda hizmet sunmaya zorlamaktadır. Bunu başarmanın yolu işgücünden etkin bir şekilde yararlanmayı gerektirdiğinden; firmaların en önemli kaynağı olan insan faktörünü göz önünde bulundurarak iş kazası ve meslek hastalıklarına karşı çeşitli koruma tedbirlerinin alınmasını gerektirmektedir. İş Sağlığı ve Güvenliği Yönetim Sistemleri (İSG) bu amaçla dünyada sayısız alanda uygulanmaktadır.

Bu araştırmada; bir istatistiksel teknik olan Yapısal Eşitlik Modeli (YEM) kullanılarak Türkiye'de İş Sağlığı ve Güvenliği çalışmalarının etkinliğinin ölçülmesi için; aralarında iş güvenliği uzmanlarının, işyeri hekimlerinin, ilgili sağlık personellerinin, insan kaynakları çalışanlarının, vb. katılımcı grubunun yer aldığı katılımcı grubuna bir anket düzenlenmiştir. Açıklayıcı faktör analizi (EFA) ve yapısal eşitlik modellemesi kullanılarak OHS konuları için kritik başarı faktörleri belirlenmiştir. Bu başarı faktörleri literatürdeki diğer çalışmalarla kıyaslanması yapılarak Türkiye'deki OHS kazalarının ve meslek hastalıklarının sayısının azaltılması amaçlanmıştır.

Anahtar Kelimeler: İş Sağlığı ve Güvenliği; İSG'nin İstatistiksel Değerlendirilmesi; İSG'nin İstatistiksel Analizi; Yapısal Eşitlik Modeli; İSG için Kritik Başarı Faktörleri

JEL Kodu Sınıflaması: C3, J2, M1

1. Introduction

The human resource of an organization act as the backbone for its sustainability, efficiency, quality, and competitiveness (Tambay, 2018). It is very important for countries to increase employee productivity and job security. Therefore, it is aimed to improve such factors as improper design of workplace, inefficient job structure, limited employability, adverse work setting, human-machine incompatibility in system design, and ineffective management programs, etc., which adversely affect employee productivity and job security. These contributing factors to

environmental risks in workplace, poor well-being of employees, industrial accidents involving personal injury, and disability may cause low job performances, poor quality work/product, and cost inefficiency (Shikdar & Sawaqed, 2003).

Today, the majority of employees can distribute their time to working (1/3) and leisure activities (2/3). Globally, the annual statistics of occupational accidents and diseases are 337 million and 160 million laborers respectively, and more than two million employees are estimated to have lost their lives due to them. Furthermore; millions of hours of labor lost each year due to occupational accidents and occupational diseases (Pillay, 2014). International Labor Organization (ILO) estimates an annual loss of $1.25 trillion due to compensation for work-related accidents and occupational diseases, discontinuation of production, and medical expenses related to OHS, etc. (Reid, Lenguerrand, Santos, & Read, 2014). It is very important to identify the causes of accident rates and low industrial safety records, and to take the necessary actions (Perez-Floriano & Gonzalez, 2007), to prevent similar losses, and to achieve success in OHS applications. Because health is a fundamental right for every human being (Demirbilek, 2005), and as one of the basic characteristics of a social state, it has great part in the achievement of this goal for citizenry to live and become healthy (Süzek, 1985), and the avoidance from financial losses.

Achieving success in OHS applications is extremely important for companies and countries. Unfortunately, many applications cannot be successful whether due to a company's location, the country's labor legislation, or insufficient importance given to such studies by the firm, and many other similar factors. Our study is based on these factors varying from country to country. In this study we examined the determining factors for the performance of the OHS studies conducted in Turkey. EFA of the responses to the prepared questionnaire was used to identify the factors affecting the achievement levels of OHS practices in Turkey. Later, SEM was applied to interpret the factor weights. We compared the present study results for Turkey to the relevant studies from other countries including the European Union (EU) members.

The OHS concept is discussed in the second section in this paper. The third section also examines the success factors of OHS projects. The fourth section presents the analytical interpretations of the questionnaire data in order to describe the success factors of the OHS projects from Turkey, using SEM. The final section provides some suggestions for interpreting all the obtained results

and increasing the success rates of the projects.

2. Materials and Methods

Although the occupational health and safety in Turkey is guaranteed by law, studies in this field are still not on the desired level of success. A survey is designed to identify the critical success factors for the OHS practices in Turkey. Companies are excluded from the scope since the survey could be biased, and only OHS-conscious companies would participate in the survey when other companies would avoid it for various reasons. Therefore, the questionnaire was prepared for OHS Officers who work on field with Class A, B, or C Certificates, occupational physicians, occupational nurses, and so on, with the aim of reaching more participants.

This survey was conducted at İzmir 3rd OHS Summit. Approximately 1,352 people visited the summit. The interviewers handed out the questionnaires to all participants at the survey stands located in front of the entrance of the exhibition hall. The questionnaire was answered only by 178 participants, namely its response rate remained at 13.2%.

In the questionnaire form, there are eight items for demographic attributes (age, gender, level of education, task, OHS certification level, company industry, experience of OHS, and quality certificate of company) and 21 questions in accordance with a Likert scale (1= Very Poor to 5= Very Good) to measure the success factors for the OHS studies. The questions were prepared with the help of OHS Experts and Statistics Department academics, and via literature review and brainstorming.

For data analysis, the statistical programs, IBM SPSS Statistics v. 20 and IBM SPSS AMOS 23 were run.

3. Occupational Health and Safety

From the beginning of the industrial age, people have increasingly migrated from rural to industrial

areas, and new cities have in time formed around these industrial zones. With the transition from the agricultural community to the industrial community and the use of steam in the industry, machinery use became more widespread. Thus; the need for coal in the beginning, and for petroleum and other mineral ores in the following periods increased for the industry to continue its activities. Thus; starting with coal, the need for petroleum and other mineral ores increased for the sustainability of the industry. To meet these demands, people started working in more difficult conditions in the pursuit of these substances. The reasons for the increase in occupational accidents were such mining activities, construction works, and developments in the machinery industry.

Today in this complicated business world, hard competition and globalization make companies vulnerable to find goods and services in high quality, at low cost, and in a short time for sustainability purpose (Kuvvetli, Firuzan, Alpaykut, & Gerger, 2016). In doing this, various protection measures should be taken against occupational accidents and diseases, taking into consideration the human factor, which is the most important resource of the companies. For this purpose, employers should systematically identify hazards, assess and control risks, and ensure the sustainability of safe working conditions effectively (Zanko & Dawson, 2012). Risk management is extremely important in OHS studies. Risk management aims to increase safety and reliability, and minimize losses. The use of risk management techniques, which aim to identify, evaluate, and control risks, is increasing in all industries (Cox & Tait, 1998). For effective risk management; the necessary preventive measures should be determined by the persons concerned, the competencies and resources for implementation should be determined by law, the employees should be actively involved in the process, and the procedures should be written (Bluff, 2003). This way, it becomes systematic to analyze and take the necessary measures for risks (Thacker, Stroup, Parrish, & Anderson, 1996) classified into three levels: hazard, exposure, and outcome.

OHS practices have two objectives for higher productivity: the first is to avoid industrial accidents and diseases, and the second is to provide workplace safety (Karakavuz & Gerede, 2017). OHS is a universal concept and is not only guaranteed by national regulations, but also by international organizations; such as the International Labour Organization, founded in 1919 by Part XIII of the Versailles Peace Treaty signed at the end of World War I (ILO, 2007), and the World Health Organization (WHO), established in 1948 within the United Nations (WHO, 2020) OHS systems are designed particularly by OHSAS 18001 and ILO-ISG-2001 and other national and

international directives. OHSAS 18001 is a critical document because it helps to evaluate the security management procedures for corporations on individual basis (Granerud & Rocha, 2011).

WHO lists the main components of the OHS management system as follows (World Health Organization (WHO) and International Labour Organization (ILO), 2018):

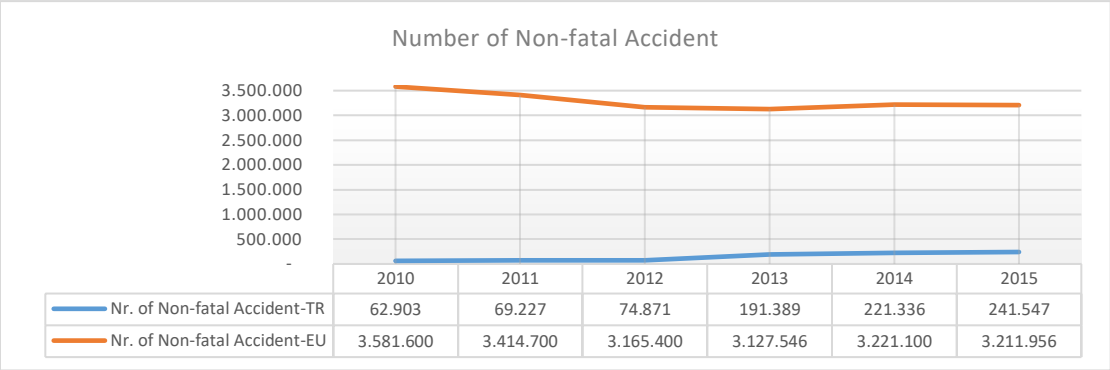
- OHS policy of the workplace
- Organizational structure, roles and responsibilities for OHS (the Incident Command System-ICS)
- Planning, including resource mobilization (e.g., human resources, personal protective equipment - PPE, monitoring equipment, medicines and vaccines, and relevant procedures and guidelines to OHS practices)
- Monitoring and audit processes (e.g., indicators and checklists)

To realize OHS projects public or private companies must define their critical success factors. Furthermore, as each country has its own characteristics, quality approaches, cultural backgrounds and different industrial structures; it should be noted that the success factors of OHS projects vary between countries (Kuvvetli, Firuzan, Alpaykut, & Gerger, 2016).

3.1. Critical Success Factors (CSFs) for OHS

There are many publications such as articles, books, etc. written about in OHS literature, majorly from the last quarter century. The main reason for this is the progress achieved in the industry and the increasing importance given to human beings. Particularly with Industry 4.0, important steps were taken to reduce the risks of occupational accidents and occupational diseases by ensuring that machinery performed the heavy and dangerous works of human beings (Gerger, 2019). Despite this and similar steps, success in all OHS studies cannot be achieved. There are many reasons for this and according to Takala, ILO's program manager for safe work (Takala, 2005); lack of experience and education, especially in developing countries, are among the most important factors affecting the success of OHS studies.

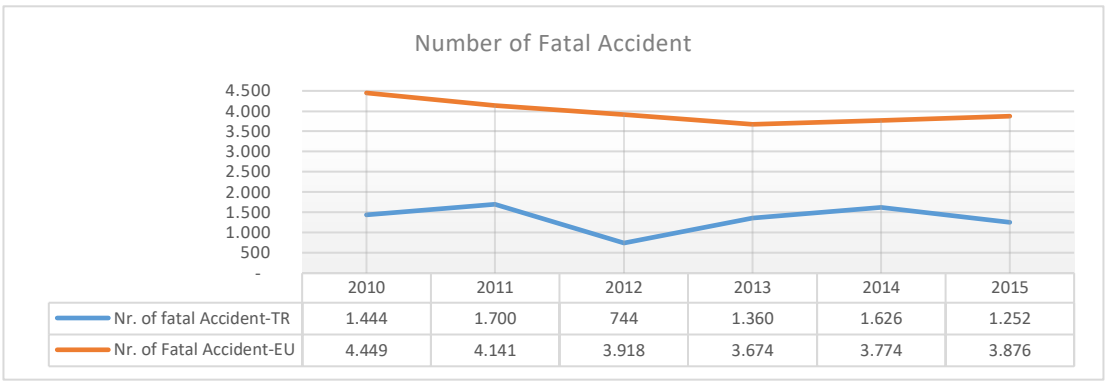
When we look at the statistics of occupational accidents that similarly end in death, the European Union's graphics show a decline, while Turkey's graphic shows a steady trend. Figure 1 shows non-fatal accidents that happened between 2010 and 2015, while Figure 2 shows fatal accidents of the same period (Eurostat, 2018; SGK, 2018).



	2010	2011	2012	2013	2014	2015
Nr. of Non-fatal Accident-TR	62.903	69.227	74.871	191.389	221.336	241.547
Nr. of Non-fatal Accident-EU	3.581.600	3.414.700	3.165.400	3.127.546	3.221.100	3.211.956

Figure 1. Comparison of occupational accidents involving only injury in the European Union and Turkey

When we look at the statistics of occupational accidents that similarly end in death, the European Union's graphic shows a decline, while Turkey's graphic shows a steady trend.



	2010	2011	2012	2013	2014	2015
Nr. of fatal Accident-TR	1.444	1.700	744	1.360	1.626	1.252
Nr. of Fatal Accident-EU	4.449	4.141	3.918	3.674	3.774	3.876

Figure 2. Comparison of occupational accidents involving death in the European Union and Turkey

In 2011, the European Agency for Safety and Health at Work reported an organizational requirement for OHS management to invest and protect human capital (employees). Therefore, corporations have to prioritize behavioral aspects and social and cultural processes for a safer and

healthier workplace and to improve the overall performance in the organization (European Agency for Safety and Health at Work, 2011).

In OHS applications; critical success factors should be identified to minimize workplace accidents. There are many studies on OHS applications and success factors in the literature. Some of these studies deal with success factors in specific areas, while others address OHS studies in a broader context. Table 1 summarizes several studies related to the success factors in OHS studies item by item.

Table 1. Critical success factors for OHS studies

Author	**Success Factors**
Australian National Occupational Health and Safety Commission (NOHSC) (Gallagher, 2001)	Critical role played by senior managers Employee involvement Effective communication Consultation
Gallagher (2003)	Critical role played by senior managers Effective communication Employee involvement Consultation Integration of OHS into general workplace systems
Windholz (2013)	Employer representatives
Wurzelbacher (2006)	Management support Employee involvement
Hart & Aryan (2007)	Senior management support Employee involvement Proactive risk management

	Integration of organizational factors with other management systems Comprehensive inspections
Mohammad, Osman, Rosnah & İsmail, 2007	Senior management support Quality and quantity of training Continuous improvement Performance measurement Systems and processes
Alli (2008)	Senior management and OHS funding Quality and quantity of training Employee involvement Organization's view on OHS
Chen, Wu, Chuang & Ma, 2009)	Senior management's support and commitment Constant improvement of PDCA (Plan-Do-Check-Act) cycle Employee involvement in the system
Hussain (2009)	Organization's attitude towards OHS practices Positive safety culture Employee involvement
Haadir & Panuwatwanich (2011)	Senior management support Clear and achievable goals Employee attitude Teamwork Effective implementation of OHS practices

	Safety education Appropriate guidance
Saifujllah & Ismail (2012)	Education and training Health and safety performance of the contractors Short, concise and clear OHS practices

The success factors of OHS projects were investigated in literature research. The majority of these studies shows that one of the key factors is senior management support. This factor is followed by employee participation. The section below presents further information about the success factors of OHS projects in Turkey.

3.2. Success factors for OHS projects in Turkey

The economic globalization had a great impact on companies in Turkey. Turkish companies use statistical and industrial techniques as well as new technologies, to increase their competitiveness and productivity, and to maintain their competitiveness against domestic and foreign competitors. When using these techniques, they must comply with the principles specified in the Occupational Health and Safety Law numbered 6331 as it is stated "This Law is to be applied to all public and private businesses and workplaces, their employers and employers' representatives, all employees including apprentices and trainees regardless of their field of activity" (ÇSGB, 2012).

In this study we designed a questionnaire to investigate the level of achievement of the OHS projects implemented in Turkey and obtained useful data to analysis. In this section, structural equation modeling is briefly summarized, which aims to identify the effects of the success factors, and then the study results are analyzed.

4. Structural Equation Modeling

A comprehensive statistical analysis is used in testing hypotheses regarding the association between the potential and the actual parameters, called structural equation modeling (Hoyle, 1995). This approach represents, predicts and tests the logical network of linearity's between the parameters (Rigdon, 1998). There is an assumption here that a causality can be constructed between the set of potential parameters to evaluate these factors using the actual ones (Yılmaz, 2004).

SEM is a second-generation data analysis technique (Bagozzi & Fornell, 1982), to offer a systematic and comprehensive model for alternative solutions of a complex research question and models the association between two or more potential parameters, dependent and independent, in a process, differently from the first-generation statistical techniques including regression (Anderson & Gerbin, 1988). SEM considers the diversity and variability of the measured parameters. It has two main objectives as below (Kline, 1998):

- To understand the correlation/covariance patterns between several variables
- To explain the variability of the model as much as possible.

SEM is a method that can be used to test any theory and develop new models. Its performance in testing complex models directly allows for many analyses (Dursun & Kocagöz, 2010). One of the reasons for the widespread adoption of this method is its ability to take measurement errors and the relationships between errors in observed variables into consideration (Civelek, 2018).

Inter-related variables are evaluated in design phase to determine using this method as well as the obtained data in the study. This statistical approach makes difference in analyzing the associations between multiple parameters through different models, compared to conventional techniques including variance analysis, multivariate analysis, factor analysis, and regression. The researcher simply establishes a logic model to describe the relevant parameters and form their interactions. The scales to collect data should be appropriate for the potential variables to analyze in consistent with the model designed (Ayyıldız & Cengiz, 2006).

SEM is a statistical analysis method that become popular in the recent years (Meydan, 2011; Ayyıldız & Cengiz, 2006). There are many studies about SEM in the literature and the number of these studies, and the areas SEM is applied to are increasing every passing day. These areas include; Industrial statistics (Kuvvetli, Firuzan, Alpaykut, & Gerger, 2016), quality (Yıldız & Aytekin, 2019), education (Karakaya-Özyer & Aksu-Dünya, 2018; Kocakaya & Kocakaya, 2014; Alpaykut, 2017; Yellice-Yüksel, Kaner, & Güzeller, 2011; Kandemir, 2015), psychology (Agho, Price, & Mueller, 1992; Shen, Bentler, & Comrey, 1995), public (Emhan, Kula, & Töngür, 2013), sociology (Kenny, 1996), economy (Yorulmaz, 2017; Huang, 1991), criminology (Junger, 1992), intercultural and intercultural research (Mullen, 1995; Singh, 1995) (Riordan & Vandenberg, 1994), health care (Babakus & Mangold, 1992; Taylor, 1994; Taylor & Cronin, 1994), occupational health and safety (Tepekule & Gümüşoğlu, 2017), human resource management (Medsker, Williams, & Holahan, 1994), environmental studies (Okur-Berberoğlu & Uygun, 2012; Nevitte & Kanji, 1995), energy (Şenol & Akman, 2019), family studies (Fu & Heaton, 1995), religious studies (Legge, 1995), migration studies (Sandu & Dejong, 1996), zoology (Crouch & Mason-Gamer, 2018), agriculture (Şahin, Cankurt, Günden, & Miran, 2008), and finance (Çetin Gerger, Bakar & Gerçek, 2016; Gerçek , Çetin Gerger, Taşkın, Bakar & Güzel, 2015).

5. Results and Discussion

5.1 Results

The internal consistency of the test was evaluated by Cronbach α in a scale from 0 to 1 developed by Lee Cronbach in 1951 (Cronbach, 1951). The acceptable values of α within a range of 0.70 to 0.95 have been considered differently (Bland & Altman, 1997; DeVellis, 2016; Nunnally & Bernstein, 1994). For the reliability of the questionnaire conducted in this study, Cronbach α was measured as 0.911 (Cronbach's α based on standardized items is 0.914), which indicates that the questionnaire is highly reliable. Deleting questions from the questionnaire increases Cronbach's α coefficient, but in this study, it was decided that these questions should remain in the questionnaire since the exclusion of any question would not provide any significant increase in the Cronbach's α value.

Out of the respondents 57% was males, and 43% females. Their overall average age was computed as 35.1 (36.45 for males and 33.20 for females). The fact that the average age of women is lower than that of men indicates that there will be an increase in the number of women as women gain more experience.

Concerning the age variable, the highest participation rate is in the 31-40 age group with 42.05% and the lowest participation rate is in the 51-60 age group with 6.3%.

The population rates by level of education were as follows; associate degree 7.39%, bachelor's 61.36%, master's 26.14% and doctorate 5.11%.

The OHS work experiences of the respondents were as follows: 5% less than one year, 70.9% 1-3 years, 12.8% 4-6 years, 4.3% 7-9 years and 7.1% ten years and over. As can be understood from the experiences of the participants, there is a growing interest in the OHS subjects in Turkey. The occupations of the survey participants were mostly OHS Specialists (69.1%) and Workplace Physicians (8.4%).

Table 2. OHS certificate distribution according to gender variable

			What is your OHS certification level?				Total
			A	B	C	Neither of them	
What is your gender?	Female	Count	13	10	33	20	76
		% within What is your gender?	17.1%	13.2%	43.4%	26.3%	100.0%
	Man	Count	26	18	30	28	102
		% within What is your gender?	25.5%	17.6%	29.4%	27.5%	100.0%
Total		Count	39	28	63	48	178
		% within What is your gender?	21.9%	15.7%	35.4%	27.0%	100.0%

Table 2 shows that 73% of the overall participants (73.7% of females, 72.5% of males) have an OHS certificate. 43.4% of female participants have a Class C (Beginner Level) certificate, while only 29.4% of males have it. This leads us to conclude that female participation in the OHS is increasing.

Table 3. Gender-OHS work experience comparison

			What is your experience?					Total
			Less than 1 year	1-3	4-6	7-9	More than 10 years	
What is your gender?	Female	Count	5	50	4	4	2	65
		% within What is your gender?	7.7%	76.9%	6.2%	6.2%	3.1%	100.0%
	Man	Count	2	50	14	2	8	76
		% within What is your gender?	2.6%	65.8%	18.4%	2.6%	10.5%	100.0%
Total		Count	7	100	18	6	10	141
		% within What is your gender?	5.0%	70.9%	12.8%	4.3%	7.1%	100.0%

When the work experience and gender are compared (Table 3), it is seen that the participants are concentrated in 1-3 years of experience category. Again, in this experience category, the participation of women (76.9%) in OHS studies is higher than that of men (65.8%). The descriptive statistics are summarized in Table 4. The sectors to which each participant belongs to is not in the table as there is a statistically significant difference.

Table 4. Descriptive statistics

Average Age	35.09	(female: 33.20, male: 36.45)
Gender	43 %	female, 57 % male
Educational Level	7.4 %	associate degree
	61.4 %	bachelor degree
	26.1 %	master degree
	5.1 %	doctorate
Task	69.1 %	OHS specialist
	8.4 %	on-site doctor
	22.5 %	others
Experience	4.96 %	less than 1 year
	70.92 %	1-3 years
	12.77 %	4-6 years

	4.26 %	7-9 years
	7.09 %	more than 10 years
Quality Certification	24 %	ISO 9100
	0.7 %	ISO 14001
	3.4 %	OHSAS 18001
	36.3 %	ISO 9001. ISO 14001, OHSAS 18001
	8.2 %	ISO 9001, ISO 14001
	3.4 %	ISO 9001, OHSAS 18001
	1.4 %	ISO 14001, OHSAS 18001
	0.7 %	ISO 9100
	21.9 %	N/A

The question 'notification of the occupational accident to the SSI' (Q12) has the highest score (mean: 4.36; std dev.: 0.942) in the survey. The questions 'transportation to the health institution in case of emergency and occupational accident' (Q13) (mean: 4.29; std dev.: 0.804) and 'principles of employment of children and young workers' (Q20) (mean: 4.25; std dev.: 0.972) are the others that have high scores.

‘The participants gave the lowest score (mean: 2.81; std dev.: 1.055) to the 'MOLLS Audit Efficiency' question (Q3). The participants gave the second-lowest score (mean: 3.39; std dev.: 1.043) to the 'Adequacy of ergonomic risk factors measure' question (Q18). This situation shows that the participants find MOLLS audits inefficient, and ergonomic risk factors measures inadequate. Table 5 presents a summary of descriptive statistics of the dataset used in the study.

Table 5. Means, standard deviations, skewness and kurtosis values by item.

Question No	Question	Mean	Std. Dev.	Kurtosis	Skewness
1	ectoral suitability of OHS equipment	4,17	0,785	3,142	-1,372
2	ompliance with the training of heavy and dangerous works	3,86	1,018	0,397	-0,916
3	IOLLS audit efficiency	2,81	1,055	-0,785	0,115
4	HS measures cover all employees	3,73	1,087	-0,500	-0,647
5	sking their opinion about OHS activities to employees	4,24	1,016	1,927	-1,548
6	isk analysis and immediate action plan sharing	4,20	0,998	0,863	-1,268
7	articipation of occupational physician in OHS activities	3,83	1,266	-0,387	-0,884
8	mployee medical screening	3,71	1,095	-0,658	-0,636
9	he importance given to occupational diseases	3,50	1,151	-0,873	-0,438
10	ccess to company representative when a work accident	3,99	0,948	1,288	-1,157
11	ompetence of emergency measures	3,76	1,010	0,527	-0,996
12	otification of the occupational accident to the SSI	4,36	0,942	2,811	-1,721
13	eaching the health facility when an emergency	4,29	0,804	2,880	-1,424
14	ompetence of social facilities for employee	3,54	1,165	-0,546	-0,617

15	)ccupational safety of visitors	3,58	1,066	-0,290	-0,633
16	.ccess to emergency equipment	3,80	0,975	0,731	-1,003
17	mergency performance of the company	3,53	0,946	-0,305	-0,443
18	.dequacy of ergonomic risk factors measures	3,39	1,043	-0,474	-0,513
19	.pplicability of national/international standards	3,90	0,927	0,720	-0,915
20	rinciples of employment of children and young workers	4,25	0,972	2,598	-1,598
21	.dequacy of health and safety signs	4,10	0,900	1,353	-1,177

As shown in Table 4, the answer value of the first question is left-skewed (skewness '$\propto_3 = -1.372' < 0$) and the responses are in Leptocurtic form (kurtosis '$\propto_4 = 3.142' > 3$). Additionally, the answer values of the 12th and 13th questions are left-skewed ($\propto_3 < 0$), and the answers are in Leptocurtic form ($\propto_4 > 3$).

21 questions in the 5-point Likert scale were grouped into several factors using EFA to make it easier to interpret and understand the relationships between them, and to determine the critical factors. Kaiser-Meyer-Olkin (KMO) describes whether the sample is sufficient (Keiser, 970) in a scale ranging from 0 to 1 (Tabachnick & Fidell , 2001). KMO values between 0.60 and 0.70 are considered sufficient for EFA [85], and the closer values to 1 refer to higher suitability for factor analysis. For a statistical analysis of the correlation between variables, the Bartlett test of sphericity is useful to determine whether the data matrix is a unit matrix, and whether the correlation between the variables is significant; p-value should be <0.05 (Tabachnick & Fidell , 2001; Hair, Black, Babin, & Anderson, 2014). The factor analyses indicated the appropriateness of our model (Kaiser-Meyer-Olkin value 0.914 and Bartlett's test p: 0.00). Table 6 shows the factor analysis results.

There was no constraint on the number of factors in the principal component analysis (PCA) of the OHS Applications' Success Performance Scale. The was analysis was performed according to

the Varimax rotation method using 21 items, and the scale was collected under four factors. The number of factors was determined by choosing the factors with eigenvalues greater than 1.

The success of OHS studies is expressed by minimum work accident and occupational disease data. Various indicators such as increased employee satisfaction, and decreases in the number of occupational accidents and diseases, are used to evaluate the performance of OHS projects. As a result of EFA, the adequacy of the variables that affect the success levels of OHS studies is gathered under the factor titled "Organization's attitude towards the OHS practice (OHS Success)". Furthermore, parallel to other studies in literature, "OHS Success" was used as an endogenous latent variable as it was influenced by other factors.

OHS Applications' Success Performance Scale's first factor's eigenvalue is 8.200, and it explains 39.048% of the total variance. The first factor comprises ten propositions, named Organization's Attitude Towards the OHS Practice. The eigenvalue of the second factor is 1.794, and it explains 8.544% of the total variance. The second factor consisting of four propositions is named Occupational Accident Processes and Emergency Action Plan. The eigenvalue of the third factor is 1.253, and it explains 5.967% of the total variance. The third factor, consisting of four propositions, is named Risk Management Applications and Employees Participation. The eigenvalue of the fourth factor is 1.088, and it explains 5.183% of the total variance. The fourth factor, consisting of three propositions, is named Occupational Health and Processes Audit.

Table 5. Factor analysis results (rotated component matrix)

Rotated component matrix[a]				
	Component			
	1	2	3	4
Q1-Sectoral suitability of OHS equipment	**.751**	.068	.056	-.064
Q21-Adequacy of health and safety signs	**.717**	.150	-.038	.096

Q2-Compliance with the training of heavy and dangerous works	**.690**	.261	.119	.163
Q16-Access to emergency equipment	**.660**	.457	.228	.039
Q11-Competence of emergency measures	**.648**	.457	.259	.146
Q18-Adequacy of ergonomic risk factors measures	**.646**	.139	.157	.332
Q15-Occupational safety of visitors	**.604**	.337	.248	.198
Q14-Competence of social facilities for employee	**.597**	.341	.252	.120
Q17-Emergency performance of the company	**.580**	.265	.266	.236
Q19-Applicability of national/international standards	**.532**	.441	.148	.181
Q12-Notification of the occupational accident to the SSI	.115	**.796**	-.044	.114
Q20-Principles of employment of children and young workers	.320	**.638**	-.024	-.015
Q13-Reaching the health facility when an emergency	.341	**.630**	.240	.125
Q10-Access to company representative when a work accident	.396	**.629**	.191	.190
Q5-Asking their opinion about OHS activities to employees	.081	.053	**.834**	-.063
Q6-Risk analysis and immediate action plan sharing	.229	-.041	**.790**	.090
Q4-OHS measures cover all employees	.126	.330	**.633**	-.005

Q7- Participation of occupational physician in OHS activities	.095	.013	**.555**	.339
Q8-Employee medical screening	-.023	.169	-.034	**.788**
Q9-The importance given to occupational diseases	.423	.339	.148	**.591**
Q3-MOLLS audit efficiency	.229	-.029	.111	**.574**

These four factors are shown in Table 7 and explain 58.7% of the total variance. After factor analysis, following the naming of factors, SEM was initiated using IBM SPSS AMOS 23. The model offers the change value in the variance of dependent potential parameters via independent potential parameters:

$$\begin{aligned} &OHS\ Success \\ &= 0.74 * Occupational\ Accident\ Process\ and\ Emergency\ Action\ Plan \\ &+ 0.28 \\ &* Risk\ Management\ Applications\ and\ Employees\ Participation \\ &+ 0.36 * Occupational\ Health\ and\ Process\ Audit\ (R^2 = 0.747) \end{aligned} \quad (1)$$

Table 6. Factors and their questions, means and Cronbach's α values.

Factor	Questions	Mean	Cronbach's α
Organization's attitude towards the OHS practice (OHS Success)	Q1, Q2, Q11, Q14, Q15, Q16, Q17, Q18, Q19, Q21	3,7635	.910
Occupational Accident Processes and	Q10, Q12, Q13, Q20	4,2219	.766

Emergency Action Plan			
Risk Management Applications and Employees Participation	Q4, Q5, Q6, Q7	3,9986	.709
Occupational Health and Processes Audit	Q3, Q8, Q9	3,3427	.569

Table 7 shows Cronbach's α values and mean scores of each factor. We analyzed Cronbach α values for each potential parameter and calculated over 0.70 for all of them except for Occupational Health and Processes Audit. Therefore, the scale is found as 'quite reliable' for those parameters, and the other as 'reliable'.

Figure 3 shows SEM results and the relationships between the success factors of the OHS studies in Turkey. For ‘t’ values of path coefficients in this model; the factors of Occupational Accident Processes and Emergency Action Plan (5.379), Risk Management Applications and Employees Participation (3.306), and Occupational Health and Processes Audit (3.318) are found to be statistically significant ($p<0.05$). The R-value of the model is 0.747. The independent variables explain 74.7% of the change in the dependent variable.

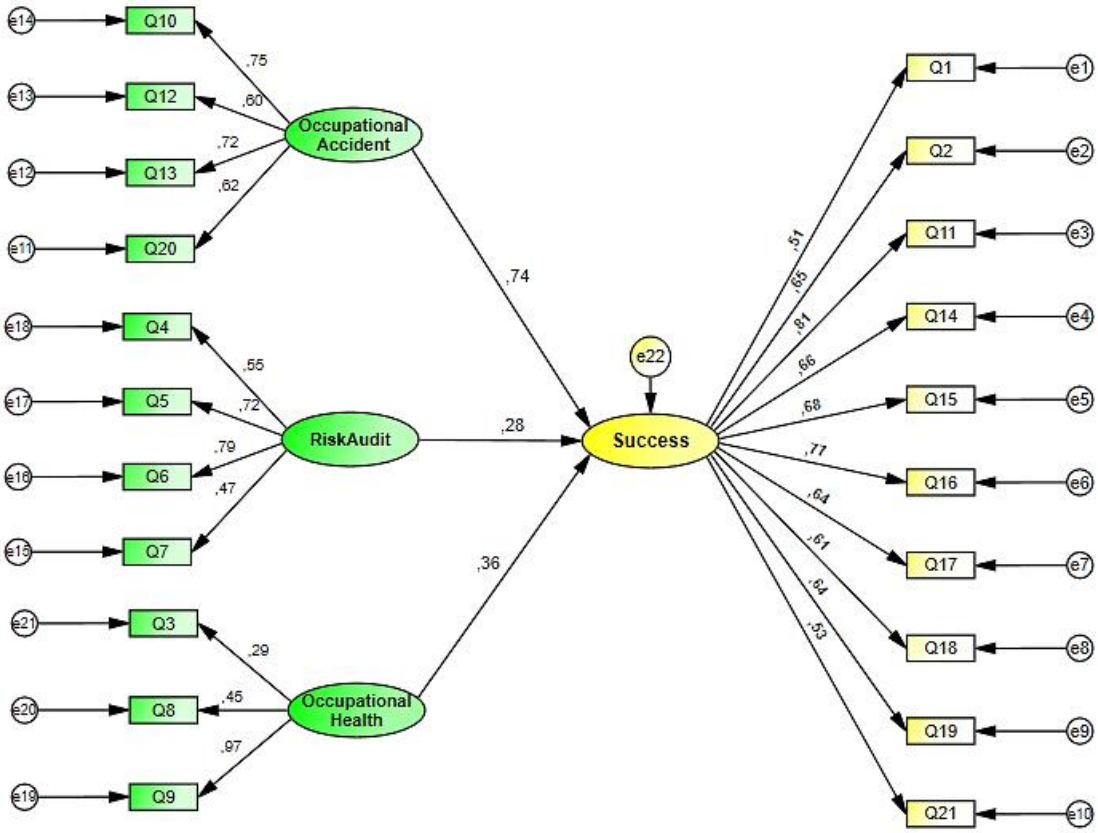


Figure 3. Path diagram.

According to the model, the Occupational Accident Processes and Emergency Action Plan was the most influential factor in OHS success while the Risk Management Applications and Employee Participation was the least influential. When the model is examined in general, the factors have a positive effect on the success factor. A 1-unit increase in Occupational Accident Process and Emergency Action Plan factor will result in a 0.74-unit increase in OHS success factor, a 1-unit increase in the Risk Management Applications and Employees Participation factor (abbreviated as Risk Audit) will result in a 0.28-unit increase in the OHS Success factor, and a 1-unit increase in the Occupational Health and Processes Audit factor (abbreviated as Occupational Accident) will result in a 0.36-unit increase in the OHS Success factor. Our analysis of the SEM results indicates that Occupational Accident Processes and Emergency Action Plans (Occupational Accident) is more important for OHS Success than other factors. Occupational Health and Risk Audit factors are other important factors.

χ2 test result is an indication of the harmony between the data and the model. χ2 test is used to test the hypothesis whether the proposed model is different from the model that emerges in the structure of the covariance of the actual parameters. Although the χ2 Test is a common method used for SEM, Jöreskog and Sörbom suggested that there was a handicap to utilize this technique as a formal test due to different limitations regarding hypothetical validity and model complexity depending on the number of parameters in the model. They proposed an approach of comparing the expected value of the sample distribution and the χ2 density (e.g., degree of freedom), based on the sample size (Jöreskog & Sörbom, 1993). For a good model, the value of $\chi^2/_{df}$ should be low. If this value is less than 2, the model fitness is good. A value between 2 and 3 refers to an acceptable fit (Bollen, 1989) (Schermelleh-Engel, Moosbrugger , & Müller, 2003). The $\chi^2/_{df}$ value for this study is 1.906, meaning a good fit. In addition, the sensitivity of χ2 statistics to the sample size has been the basic factor to develop a variety of suitability criteria for the model. Other factors could be eligibility indices including the mean error square root approximation (RMSEA), the Comparative Fit Index (CFI), and the Goodness-of-fit statistics (GFI) (Jöreskog & Sörbom, 1993; Kuvvetli, Firuzan, Alpaykut, & Gerger, 2016; Alpaykut, 2017).

The CFI index compares the covariance matrices of alternative and null hypothesis predicted by the model, ranging from 0 and 1. Model fit is considered acceptable when a CFI value is greater than or equal to 0.90 (Hu & Bentler, 1999). The CFI value was measured as 0.90 in this study, which means the model fit is acceptable.

The RMSEA value is about residuals and takes a value between 0 and 1. An RMSEA value of <0.06 refers to excellent fit [90], ≤.08 to acceptable fit [91], ≥.10 to poor fit of the model (Browne & Cudeck, 1993). The RMSEA value was calculated as 0.072, and fit index was found acceptable.

Model fitness can be measured with GFI comparing of the hypothesized and observed covariance matrices, ranging from 0 and 1. A value of ≥0.9 typically refers to a good fit, and that of ≥0.85 to an acceptable fit (Mulaik, ve diğerleri, 1989). The GFI value was measured as 0.852 in this study, which means the model fit is acceptable.

5.2 Discussion

This study aims to identify the critical success factors of the OHS practices in Turkey through SEM approach. In the study 178 respondents of the questionnaire consist of certificated OHS Officers, Occupational Physicians, and Occupational Health Nurses.

The results obtained in this study were compared with other studies related to the success factors of OHS applications performed in the world. Similarities and differences between practices were identified to assist both OHS practitioners and academics.

Because the survey is directly applied to the participants who have an OHS certificate instead of the firms; a lack of questions such as the number of company personnel, the firm size, and the business products constitutes a limitation in the present study. Thus, other factors need to be also included and the model's R^2 value should be increased in future studies.

Table 8 (SGK, 2018) clearly shows that there is a need for an intensive effort to prevent work accidents in Turkey. It can be seen that the number of industrial accidents involving death or injury has dramatically increased. The same situation applies to occupational diseases. In this direction, it would be beneficial for researchers to make similar studies using different statistical models to identify the success factors of OHS applications in other countries.

Table 7. Number of accident fatal and non-fatal in Turkey

Years	Nr. of Non-fatal Accident-TR	Nr. of fatal Accident-TR	Nr. of Non-fatal Occupational Diseases-TR	Nr. of Fatal Occupational Diseases-TR
2010	62.903	1.444	533	10
2011	69.227	1.700	697	10
2012	74.871	744	395	1
2013	191.389	1.360	351	
2014	221.336	1.626	494	
2015	241.547	1.252	510	
2016	286.068	1.405	597	
2017	359.068	6.636	693	

In future studies, the R^2 value can be increased by adding new factors to the model, including the number of company personnel, firm size, and business products to improve the achievement levels of OHS practices in Turkey.

6. Conclusion

The number of studies on OHS in the literature is increasing in recent years, with additions from various sectors and different countries. Due to the unique characteristics of the countries, there are differences in the success factors of the projects. Therefore, researchers working within the scope of OHS or conducting academic studies should consider the country profile to apply the model.

The factors that are determined to be critical, in this study, to the success of OHS studies in Turkey are as follows:

- Organization's attitude towards the OHS practice
- Occupational accident processes and emergency action plan
- Risk management applications and employee's participation
- Occupational health and processes audit

The question regarding the adequacy of the inspections conducted by the Ministry of Labour, Social Services and Family (MOLLS) labor inspectors included in the questionnaire has the lowest score (mean: 2.81; std.dev.: 1.055). This inadequacy could be the reason behind the increasing number of work accidents in Turkey. Additionally, the participants stated that the penalties in Turkey are not deterrent. Therefore; those other than large-scale companies do not want to employ a certified OHS specialist or fulfill their similar obligations. The reasons for this include the continuous stretching of the law by the state and the failure to introduce dissuasive penalties. To exemplify, 05/21/2018 dated Turkish Official Gazette stated that "The phrase 'from 10' in the first paragraph has been changed to 'from 50' in Article 1 of the Regulation on Occupational Health and Safety Services to be Carried Out by the Employer or the Deputy Employer at Workplaces published in the Official Gazette No. 5" (ÇSGB, 2018). Similarly, in Law No. 7033 dated

6/18/2017, and Article 38 of the Occupational Health and Safety Law no. 6331, the wording "It comes into force on 7/1/2020 for public institutions and workplaces with less than 50 employees and in the less dangerous class." (İş Sağlığı ve Güvenliği Genel Müdürlüğü, 2018) was added, and the law was stretched again.

References

Agho, A., Price, J., & Mueller, C. (1992). Discriminant validity of measures of job satisfaction, positive affectivity and negative affectivity. *Journal of Occupational and Organizational Psychology, 65*(3), 185-196.

Alli, O. B. (2008). *Fundamental Principles of Occupational Health and Safety* (2nd ed.). Geneva: International Labour Office.

Alpaykut, S. (2017). Öğrenci Velilerinin Özel Okullardan Memnuniyet Düzeylerinin Yapısal Eşitlik Modeli ile Değerlendirilmesi. *Dokuz Eylül Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 32*(2), 55-368.

Anderson, J. C., & Gerbin, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychol. Bull., 103*(3), 411–423. doi:10.1037/0033-2909.103.3.411

Ayyıldız, H., & Cengiz, E. (2006). A conceptual investigation of structural equation models (SEM) on testing marketing models. *Süleyman Demirel Univ.J. Fac. Econ. Admin. Sci. , 11*(1), 63-84.

Babakus, E., & Mangold, G. (1992). Adapting the SERVQUAL scale to hospital services. *Health Services Research, 26*(6), 767-786.

Bagozzi, R. P., & Fornell, C. (1982). *Theoretical concepts, measurement, and meaning, in A Second Generation of Multivariate Analysis* (Claes Fornell, ed. ed.). NY: Praeger.

Bland, J., & Altman, D. (1997). Statistics notes: Cronbach's alpha. *BMJ, 314*(1997), 572. doi:10.1136/bmj.314.7080.572

Bluff, L. (2003). *Systematic Management of Occupational Health and Safety : Working Paper 20.* Canberra: Australian National University.

Bollen, K. A. (1989). *Structural Equations with Latent Variables.* New York, NY: John Wiley & Sons.

Browne, M. W., & Cudeck, R. (1993). *Alternative ways of assessing model fit In K. A. Bollen & J. S. Long (Eds.), Testing structural equation models.* Newbury Park, CA: Sage.

Chen, C., Wu, G., Chuang, K., & Ma, C. (2009). A comparative analysis of the factors affecting the implementation of occupational health and safety management systems in the printed circuit board industry in Taiwan. *Journal of Loss Prevention in the Process Industries, 22*(2), 210–215. doi::10.1016/j.jlp.2009.01.004

Civelek, M. E. (2018). *Essentials of Structural Equation Modeling.* Lincoln: Zea Books. doi:10.13014/K2SJ1HR5

Cox , S., & Tait , R. (1998). *Safety, Reliability and Risk Management: an integrated approach* (2nd ed.). Oxford: Butterworth-Heinemann.

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(1951), 297–334.

Crouch, N. M., & Mason-Gamer, R. J. (2018). Structural equation modeling as a tool to investigate correlates of extra-pair paternity in birds. *PLoS ONE, 13*(2), 1-14. doi:https://doi.org/

Çetin Gerger, G., Bakar, F., & Gerçek, A. (2016). Türkiye'de Mali Müşavirlerin Mükellef Haklarına ve Gelir İdaresine Bakışını Etkileyen Faktörlerin Belirlenmesi. *Sosyoekonomi, 24*(29), 45-71. doi:10.17233/se.2016.06.002

ÇSGB. (2012, Haziran 30). *İŞ SAĞLIĞI VE GÜVENLİĞİ KANUNU - MEVZUAT.* Retrieved Ağustos 30, 2019, from https://www.mevzuat.gov.tr/MevzuatMetin/1.5.6331.pdf

ÇSGB. (2018, Mayıs 21). *İŞYERLERİNDE İŞVEREN VEYA İŞVEREN VEKİLİ TARAFINDAN YÜRÜTÜLECEK İŞ SAĞLIĞI VE GÜVENLİĞİ HİZMETLERİNE İLİŞKİN YÖNETMELİKTE DEĞİŞİKLİK YAPILMASINA DAİR YÖNETMELİK.* Retrieved Eylül 1, 2019, from http://www.resmigazete.gov.tr/eskiler/2018/05/20180521-1.htm

Demirbilek, T. (2005). *İş Güvenliği Kültürü* (Birinci ed.). İstanbul: Legal Yayıncılık.

DeVellis, R. F. (2016). *Scale Development: Theory and Applications: Theory and Application.* Thousand Oaks, CA: Sage.

Dursun, Y., & Kocagöz, E. (2010). Structural equation modeling and regression: A comparative analysis. *Erciyes Univ. Fac. Econ. Admin. Sci. J., 35*(2010), 1-17.

Emhan, A., Kula, S., & Töngür, A. (2013). Yapısal Eşitlik Modeli kullanılarak yönetici desteği, örgütsel bağlılık, örgütsel performans ve tükenmişlik, kavramları arasındaki ilişkilerin analizi: kamu sektöründe bir uygulama. *H.Ü. İktisadi ve İdari Bilimler Fakültesi Dergisi, 31*(1), 53-59.

European Agency for Safety and Health at Work. (2011). *Occupational safety and health. Culture assessment - A review of main approaches and selected tools.* Luxembourg: Publications Office of the European Union.

Eurostat. (2018, Ağustos 21). *File:Fatal accidents at work, by economic activity, EU-28, 2010-2015.png.* Retrieved Ağustos 30, 2019, from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Fatal_accidents_at_work,_by_economic_activity,_EU-28,_2010-2015.png

Eurostat. (2018, Ağustos 21). *File:Non-fatal accidents at work, by economic activity, EU-28, 2010-2015.png.* Retrieved Ağustos 30, 2019, from https://ec.europa.eu/eurostat/statistics-

explained/index.php?title=File:Non-fatal_accidents_at_work,_by_economic_activity,_EU-28,_2010-2015.png

Fu, X., & Heaton, T. (1995). A cross-national analysis of family and household structure. *International Journal of Sociology of the Family, 25*(2), 1-32.

Gallagher, C., Underhill, E., & Rimmer, M. (2001). *Occupational Health and Safety Management Systems: A Review of their Effectiveness in Securing Healthy and Safe Workplaces.* Sydney: National Occupational Health and Safety Commission.

Gallagher, C., Underhill, E., & Rimmer, M. (2003). Occupational safety and health management systems in Australia: barriers to success. *Policy and Practice in Health, 1*(2), 67-81. doi:10.1080/14774003.2003.11667637

Gerçek , A., Çetin Gerger, G., Taşkın, Ç., Bakar , F., & Güzel, S. (2015). *Mükellef Hakları, Türkiye Perspektifi ve Geliştirilmesi.* Ankara: Seçkin Yayıncılık.

Gerger, A. (2019). ENDÜSTRİ 4.0 ÜRETİM SÜRECİNDE SÜREÇ DEĞİŞKENLİĞİNİN OPTİMİZASYONUNDA HEIJUNKA YÖNTEMİ. *IZMIR DEMOCRACY UNIVERSITY SOCIAL SCIENCES JOURNAL, 2*(1), 1-17.

Granerud, L., & Rocha, R. S. (2011). Organisational learning and continuous improvement of health and safety in certified manufacturers. *Safety Science, 49*(7), 1030-1039. doi:http://dx.doi.org/10.1016/j.ssci.2011.01.009

Haadir, A. S., & Panuwatwanich, K. (2011). Critical Success Factors for Safety Program Implementation among Construction Companies in Saudi Arabia. *Procedia Engineering, 14*(2011), 148-155. doi:10.1016/j.proeng.2011.07.017

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate Data Analysis* (7th ed.). Londın: Pearson Education Limited.

Hart, S., & Aryan, M. (2007). OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEMS:. *Administrative Sciences Association of Canada (ASAC)*, 120-136.

Hoyle, R. H. (1995). *The structural equation modeling approach: Basic concepts and fundamental issues. In Structural equation modeling: Concepts, issues, and applications.* (R. H. Hoyle, Ed.) CA: CA: Sage Publications, Inc.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55.

Huang, J. (1991). *The dimensionality and Measurement of economic dependency.* Columbus: American Sociological Association, Department of Sociology, Ohio State University.

Hussain, H. N. (2009). *The Critical Success Factor In Implementing Occupational Safety And Health (OSHA), Degree of Master Dissertation.* Universiti Utara Malaysia.

ILO. (2007, December 01). *History of the ILO*. (ILO) Retrieved Ağustos 30, 2019, from https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---inform/documents/genericdocument/wcms_185146.pdf

İş Sağlığı ve Güvenliği Genel Müdürlüğü. (2018, Eylül 1). *SIKÇA SORULAN SORULAR.* Retrieved Eylül 3, 2019, from https://birim.ailevecalisma.gov.tr/media/10731/isggm_sss.pdf

Jöreskog, K., & Sörbom, D. (1993). *LISREL 8 User's Reference Guide; PRELIS 2 User's Reference Guide*. Chicago, IL: Scientific Software International.

Junger, J. (1992). An empirical test of social control theory. *Journal of Quantitative Criminology, 8*(1), 19-28.

Kandemir, H. (2015). ÖĞRENCİ MEMNUNİYETİNİ ETKİLEYEN FAKTÖRLERİN YAPISAL EŞİTLİK MODELİ İLE ARAŞTIRILMASI. *Mehmet Akif Ersoy Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 7*(13), 447-461.

Karakavuz, H., & Gerede, E. (2017). A Qualitative Study to Identify the Success Factors of Occupational Health and Safety Management Systems implemented in Ground Handling Companies throughout Turkey. *"IS, GUC" Industrial Relations and Human Resources Journal, 19*(3), 1-30.

Karakaya-Özyer, K., & Aksu-Dünya, B. (2018). A Review of Structural Equation Modeling Applications in Turkish Educational Science Literature, 2010-2015. *International Journal of Research in Education and Science (IJRES), 4*(1), 279-291. doi:10.21890/ijres.383

Keiser, H. F. (970). A second generation little jiffy. *Psychometrika, 35*(4), 401–415.

Kenny, D. (1996). The design and analysis of social-interaction research. *Annual Review of Psychology, 47*(59), 59-86. doi:10.1146/annurev.psych.47.1.59

Kline, R. B. (1998). *Principles and Practice of Structural Equation Modeling.* New York: The Guilford Press.

Kocakaya, S., & Kocakaya, F. (2014). A Structural Equation Modeling on Factors of How Experienced Teachers Affect the Students' Science and Mathematics Achievements. *Education Research International, 2014*, 1-8. doi:http://dx.doi.org/10.1155/2014/490371

Kuvvetli, Ü., Firuzan, A. R., Alpaykut, S., & Gerger, A. (2016). Determining Six Sigma success factors in Turkey by using structural equation modeling. *Journal of Applied Statistics, 43*(4), 738-753. doi:10.1080/02664763.2015.1077375

Legge, J. (1995). Explaining Jewish liberalism in the United States: an exploration of socio-economic, religious, and communal living variables. *Social Science Quarterly, 76*(1), 124-141.

Medsker, G., Williams, L., & Holahan, P. (1994). A review of current practices for evaluating causal models in organizational behavior and human resources management research. *Journal of Management, 20*(2), 439-464. doi:doi.org/10.1016/0149-2063(94)90022-1

Meydan, C. H. (2011). *Yapısal Eşitlik Modellemesi AMOS Uygulamaları.* Ankara: Detay Yayıncılık.

Mohammad, M., Osman, R. M., Rosnah, M. Y., & İsmail, N. (2007). Critical Success Factors For Implementıng Integrated Management System (IMS): Survey And Case Studies Results. *World Engineering Congress, Penang, Malaysia, 5 – 9 August*, 17-24.

Mulaik, S. A., James, L. R., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of Goodness-of-Fit Indices for Structural Equation Models . *Ps3~hological Bulletin, 105*(3), 430-445.

Mullen, M. (1995). Diagnosing measurement equivalence in cross-national research. *Journal of International Business Studies, 26*(4), 573-595.

Nevitte, N., & Kanji, M. (1995). Explaining environmental concern and action in Canada. *Applied Behavioral Science Review, 3*(1), 85-102.

Nunnally, J., & Bernstein, L. (1994). *Psychometric Theory.* New York, NY: McGraw-Hill Higher, Inc.

Okur-Berberoğlu, E., & Uygun, S. (2012). Çevre Farkındalığı- Çevre Tutumu Arasındaki İlişkinin Yapısal Eşitlik Modeli İle Sınanması . *Eğitim Fakültesi Dergisi, 25*(2), 459-473.

Perez-Floriano, L. R., & Gonzalez, J. A. (2007). Risk, safety and culture in Brazil and Argentina: The case of TransInc Corporation. *International Journal of Manpower, 28*(5), 403-417. doi:http://dx.doi.org/10.1108/01437720710778394

Pillay, K. R. (2014). *The costs of construction accidents. Construction management and quantity surveying. Master's dissertation.* Bellville: Cape Peninsula University of Technology.

Reid, A., Lenguerrand, E., Santos, I., & Read, U. L. (2014). Taking risks and survival jobs: foreign-born workers and work-related injuries in Australia. *Safety Science, 70*, 378-386.

Rigdon, E. E. (1998). *Structural equation modeling. In Modern methods for business research.* (G. A. Marcoulides, Ed.) , G. A. Marcoulides (editor). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers, pp. 251-294.

Riordan, C., & Vandenberg, R. (1994). A central question in cross cultural research: do employees of different cultures interpret work related measures in an equivalent manner? *Journal of Management, 20*(3), 643-671.

Saifullah, M. N., & İsmail, F. (2012). Integration of Occupational Safety and Health during Precons truction Stage in Malaysia. *Procedia -Social and Behavioral Science, 35*(2012), 603 – 610. doi:10.1016/j.sbspro.2012.02.127

Sandu , D., & Dejong, G. (1996). Migration in Market and democracy transition: Migration intentions and behavior in Romania. *American Sociological Association, 15*(5-6), 437–457.

Schermelleh-Engel, K., Moosbrugger , H., & Müller, H. (2003). Evaluating the fit of structural equation models: Test of significance and descriptive goodness-of-fit measures. *Methods Psychol. Res.Online , 2*(23–74), 8.

SGK. (n.d.). *SGK İstatistik Yıllıkları.* Retrieved Ağustos 30, 2019, from http://www.sgk.gov.tr/wps/portal/sgk/tr/kurumsal/istatistik/sgk_istatistik_yilliklari

Shen, H., Bentler, P., & Comrey, A. (1995). A comparison of models of medical school student selection. *Structural Equation Modeling, 2*(2), 93-100.

Shikdar, A. A., & Sawaqed, N. M. (2003). Worker productivity, and occupational health and safety issues in. *Computers & Industrial Engineering, 45*, 563-572. doi:http://dx.doi.org/10.1016/S0360-8352(03)00074-3

Singh, J. (1995). Measurement issues in cross-national research. *Journal of International Business Studies, 26*(4), 597-619. doi: 10.1057/palgrave.jibs.8490188

Süzek, S. (1985). *İş Güvenliği Hukuku.* Ankara: Savaş Yayınları.

Şahin, A., Cankurt, M., Günden, C., & Miran, B. (2008). ÇİFTÇİLERİN RİSK DAVRANIŞLARI: BİR YAPISAL EŞİTLİK MODELİ UYGULAMASI . *Dokuz Eylül Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 23*(2), 153-172.

Şenol, L., & Akman, G. (2019). İmalat İşletmelerinde Enerji Verimliliğinin Yapısal Eşitlik Modeli İle İncelenmesi. *Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi, 7*(2), 205-215.

Tabachnick, B. G., & Fidell , L. S. (2001). *Using multivariate statistics.* MA: Allyn & Bacon.

Takala, J. (2005). Introductory report: Decent work - Safe work. *XVIIth World Congress on Safety and Health at Work.* Orlando.

Tambay, A. (2018). *İŞ SAĞLIĞI VE GÜVENLİĞİ UYGULAMALARININ ÖRGÜTSEL BAĞLILIĞA ETKİSİNDE PSİKOLOJİK SÖZLEŞMENİN ARACILIK ROLÜ: ÇİMENTO SEKTÖRÜNDE BİR ARAŞTIRMA. Doktora Tezi.* Konya: SELÇUK ÜNİVERSİTESİ SOSYAL BİLİMLER ENSTİTÜSÜ.

Taylor, S. (1994). Distinguishing service quality from patient satisfac tion in developing healthcare marketing strategies. *Hospital and Health Services Administration, 39*(2), 221-236.

Taylor, S., & Cronin, J. (1994). Modeling patient satisfaction and service quality: healthcare industry. *Journal of Health Care Marketing, 14*(1), 34-44.

Tepekule, E. T., & Gümüşoğlu, Ş. (2017). Dünya Klasmanında Üretim Kapsamında İş Sağlığı ve Güvenliği Çalışmalarına Yönelik Bir Model Önerisi ve Uygulama Yönetim ve Ekonomi. *Dünya Klasmanında Üretim Kapsamında İş Sağlığı ve Güvenliği Çalışmalarına Yönelik Bir Model Önerisi ve Uygulama Yönetim ve Ekonomi, 24*(1), 115-136.

Thacker, S. B., Stroup, D. F., Parrish, R. G., & Anderson, H. A. (1996). Surveillance in environmental public health: issues, systems, and sources. *American Journal of Public Health, 86*(5), 633–638. doi:10.2105/AJPH.86.5.633

WHO. (n.d.). *History of WHO*. (World Health Organization) Retrieved Ağustos 30, 2019, from https://www.who.int/about/who-we-are/history

Windholz, E. L. (2013). Revisiting the COAG Case. *JOURNAL OF HEALTH AND SAFETY, RESEARCH AND PRACTICE, 5*(1), 9-16.

World Health Organization (WHO) and International Labour Organization (ILO). (2018). *Occupational safety and health in public health emergencies: A manual for protecting health workers and responders.* Geneva: International Labour Office.

Wurzelbacher, J. S. (2006). *Criteria for Evaluating an Occupational Safety and Health Program, Degree of Doctor Dissertation.* University of Cincinnati.

Yellice-Yüksel, B., Kaner, S., & Güzeller, C. O. (2011). Öğretmenlerin Mesleki Yetkinlik, Mesleki Sosyal Destek ve Tükenmişlik İlişkisinin Yapısal Eşitlik Modeli ile İncelenmesi. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, 11*(21), 1-25.

Yıldız, B., & Aytekin, M. (2019). Tedarikçi Kalite Yönetiminin Performans Üzerindeki Etkisinin Yapısal Eşitlik Modeli İle Analizi. *Gaziantep University Journal of Social Sciences, 18*(1), 413-439.

Yılmaz, V. (2004). Consumer behaviour of shopping center choice. *Social Behaviour and Personality*, *32*(8), 783-790.

Yorulmaz, Ö. (2017). The Relationship between Socio-Economic Development, Corruption and Health Indicators: Application of Partial Least Squares Structural Equation Modeling. *Alphanumeric journal (The Journal of Operations Research, Statistics, Econometrics and Management Information Systems), 5*(2), 191-206. doi:10.17093/alphanumeric.323277

Zanko, M., & Dawson, P. (2012). Occupational health and safety management in organizations: A review. *International Journal of Management Reviews, 14*(3), 328-344.