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The Impact of National Culture and Development Level of Countries on their Occupational Safety Performance

Ülkelerin Ulusal Kültür ve Gelişmişlik Düzeyinin İş Güvenliği Performanslarına Etkisi

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Ülkelerin Ulusal Kültür ve Gelişmişlik Düzeyinin İş Güvenliği Performanslarına Etkisi

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Abstract

National culture is considered as one of the factors affecting occupational safety performance. The present study investigated the effects of the national culture dimensions and development levels of countries on their occupational safety performance. The mean of the fatal occupational injuries (FOI) statistics of 60 countries, the scores of Hofstede's cultural dimensions, and mean schooling years, per capita income, and human development indices (HDI), which represent the countries' development level, were included in simple regression analysis. The results demonstrated that while national culture has no or a limited effect on occupational safety performance, development level has significant effect. When the countries were grouped as high (HHD) and medium human development (MHD), for HHD countries, a significant effect was determined for Individualism and Power Distance dimensions. The results are expected to make a significant contribution to the efforts aiming to include national culture aspects in the decision-making process related to occupational safety issues.

Keywords: National Culture, Development Level, Occupational Safety Performance, Hofstede

Öz

Ulusal kültür, iş güvenliği performansını etkileyen faktörlerden biri olarak kabul edilmektedir. Bu çalışmada, ülkelerin ulusal kültür boyutları ve gelişmişlik düzeylerinin iş güvenliği performanslarına etkileri araştırılmıştır. 60 ülkenin ölümcül iş kazası istatistiklerinin ortalaması, Hofstede'nin kültürel boyut puanları ve ülkelerin gelişmişlik düzeyini temsil eden ortalama okullaşma yılları, kişi başına gelir düzeyleri ve insani gelişme endeksleri basit regresyon analizine tabi tutulmuştur. Sonuçlar, ulusal kültürün iş güvenliği performansı üzerinde hiç etkisinin olmadığı veya sınırlı bir etkisinin olduğu,

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gelişmişlik düzeyinin ise önemli bir etkisinin olduğunu göstermiştir. Ülkeler, yüksek ve orta insani gelişmişlik düzeyindeki ülkeler olarak gruplandırıldığında, yüksek gelişmişlik düzeyindeki ülkeler için Bireysellik ve Güç Mesafesi boyutlarında anlamlı bir etki belirlenmiştir. Sonuçların, ulusal kültür unsurlarını iş güvenliği konularıyla ilgili karar alma sürecine dahil etmeyi hedefleyen uğraşlara önemli katkı sağlaması beklenmektedir.

Anahtar Kelimeler: Ulusal Kültür, Gelişmişlik Düzeyi, İş Güvenliği Performansı, Hofstede

INTRODUCTION

Since industrial revolution, occupational accidents have been regarded as one of the most critical problems of working life. Although many measures have been taken both in the field of engineering and from legal aspects, occupational accidents still exist as one of the biggest problems waiting for a solution. When the historical development of the measures taken to prevent accidents based on many social, economic, psychological, and environmental factors is considered, it is observed that the problem was perceived only as a technical issue from the 1800s to the mid-1900s. During this period, the measures taken are observed to aim only at improving the technical aspects from an engineering point of view and controlling physical hazards. As a result of the studies conducted to understand that these measures developed at the technical level were insufficient for preventing accidents, the fact that approximately 90% of the accidents were caused by the insecure behavior of employees was presented. Thus, the subsequent studies have focused on "human factor," and organizational factors have attracted considerable attention as possible implicit, causing agents behind large-scale accidents over the recent decade (Pidgeon and OLeary, 2000). For all these reasons, occupational safety has turned into a management philosophy that accepts the leading cause of accidents and incidents as human errors and failures in the period from the 1980s to the present day. Under the effect of this philosophy, researchers have focused on organizational conditions and the intra-organizational safety culture (Tomas et al., 1999; Antonsen, 2009). Organizational factors such as training, communication, hierarchy, experience, safety procedures, management commitment, leadership, and safety climate have been tried to be associated with employee safety behavior and losses (Oliver et al., 2002; Seo, 2005; Hunag et al., 2006) and have been shown to be valuable indicators of organizational safety (Takano et al., 2001). On the other hand, since organizational factors may be affected by various external factors such as the socio-economic status of the country, technological development level, and national culture, they may also be country-specific; thus, they may affect the safety performance of each country differently (Gharpuera et al., 2018).

Based on the argument that organizational culture is a part of national culture, there are various studies in the literature conducted to reveal the relationship between Hofstede's cultural dimensions representing the national culture and occupational safety. These studies have argued that individuals, independently of their status of a manager or employee in an organization, generally share common cultural values even if they go through different socialization processes. Therefore, national culture is a factor to be

taken into consideration in ensuring occupational safety in organizations. On the other hand, it is observed that these studies have employed different methods and they have not reached a definite consensus on which national culture dimensions have an impact on safety culture. Moreover, when the occupational accident statistics of countries are compared, it is observed that the number of accidents, deaths, and injuries differs significantly according to the development levels of countries.

This study was carried out by basing on this point-of-view and besides the impact of national culture and development level on safety performance; it was also aimed to examine the impact of national culture independently of the development level of the country. For this purpose, firstly, the cultural dimensions of Hofstede safety performance and development level indicator concepts were explained. The studies examining the relationship between national culture and safety culture, determined by the literature review, were also addressed in this section. At the second stage of the study, the relationship between national culture and development level, and occupational safety was investigated. At the final stage, various suggestions were made by discussing the results obtained both in this study and the literature. It is expected that this study will contribute to defining the possible role of national culture in occupational safety better and that the findings related to this role can make a significant contribution to the efforts aiming to include national culture aspects in the decision-making process on occupational safety issues.

1. Conceptual and Theoretical Framework

1.1. Cultural Dimensions of Hofstede

The theory of cultural dimensions is a framework developed by Geert Hofstede for intercultural communication. This theory shows the effects of a nation's culture on the values of its members and the relationship of these values with behaviour (Adeoye and Tomei, 2014). In the original theory, four dimensions were proposed, which are power distance, uncertainty avoidance, individualism/collectivism, and masculinity/femininity. Then the long-term orientation and indulgence versus restraint dimensions were added. Power distance index (PDI) dimension is defined as the degree of acceptance or awaiting of the unequal distribution of power by less powerful members of organizations and institutions. It explains how behaviours can change in line with the importance societies attach to the hierarchy. Individualism (IDV) versus collectivism dimension reveals the extent to which people in society are integrated into groups. Society is defined as an individualist society if individuals in that society think of their interests and see themselves as independent of society. In masculinity (MAS) and femininity dimension, masculinity is defined as the preference of material rewards for success, heroism, assertiveness, and success in society. In return, femininity represents the preference of attaching importance to collaboration, humility, weakness, and quality of life. Uncertainty Avoidance (UAI) dimension is defined as "a society's tolerance for ambiguity," in which people accept or oppose an event of something unexpected, unknown, or away from the status quo. Long-term orientation (LTO) and short-term orientation dimension associates the connection of the past with the current and future actions/challenges. It shows that low-grade traditions are honoured and preserved, and steadfastness is valued (Hofstede, 2001; Hofstede, 2011).

1.2. Development Level

The development level of countries, which is another concept dealt with in this study, remains a controversial concept since it is handled by different disciplines from different perspectives, and this situation causes many different indicators to be used to determine the development level of countries. For example, the World Bank made such a classification as high, middle, and low income according to per capita income level, the United Nations as very high, high, medium, and low human development according to human development. In the current study, countries' per capita gross domestic product, the average schooling years, and the human development index (HDI) values for 2010 were used to represent the development level. The HDI is a summary measure of average achievement in the key dimensions of human development: a long and healthy life, being knowledgeable, and having a decent standard of living. The health dimension is assessed by life expectancy at birth, the education dimension is measured by the mean of years of schooling for adults aged 25 years and above and expected years of schooling for children of school-entering age. The standard of living dimension is measured by gross national income per capita. The scores for these three HDI dimension indices are then aggregated into a composite index using geometric mean (UNDP).

1.3. Safety Performance

It is not possible to say that there is a standard definition of safety performance. For example, safety performance may include safety organization and management, safety equipment and measures, accident statistics, safety training and evaluation, accident investigations, and safety training practice (Wu et al., 2008). The International Civil Aviation Organization (ICAO) defines safety performance indicators as data-based safety parameters used for monitoring and assessing performance and safety performance targets as the planned or intended objective for safety performance indicators over a given period (SM-ICG, 2013). In this study, the countries' mean of fatal occupational injuries (FOI) statistics per 100,000 employees between 2000 and 2018 was used as the indicator of safety performance. FOI was selected as the indicator since it was observed that the standards of the countries in recording statistics such as injuries, days lost due to injuries were different, and that the statistics related to fatal occupational injuries were more reliable and more robust than other statistics. Here, data specifically for one year were not used, and the data for 2000-2018 were averaged. Thus, the problem of data deficiency for any year was solved, and the effect of possible leaps in any year was minimized.

1.4. Studies Examining the Relationship between Safety and National Culture

In the literature, there are limited number of studies examining the relationship between safety and national culture. In this study, we reviewed the studies in the literature, which investigated the relationship between national culture and safety culture based on Hofstede's model, and we accessed the full texts of 25 studies through various databases and examined them in detail. It is observed that the studies were carried out in different sectors and they examined the effects of some or all of the cultural dimensions on occupational safety.

In the study carried out by Okolie and Okoye (2012) in the construction sector, which is one of the sectors where occupational accidents are very frequent, the scores of employees regarding Hofstede's five cultural dimensions and their safe behaviour were achieved and it was determined that power distance, weak uncertainty avoidance, and short-term orientation cultures promote unsafe behaviours, perceptions, and attitudes of construction workers towards safety at the site, while collectivism and femininity promote their safe behaviours, perceptions, and attitudes towards safety. In their study, Fiestats et al. (2012) tried to explain how construction workers perceive their occupational hazards and to analyse how this is related to their national culture. They used a questionnaire comprised of sociodemographic, perceived-risk construct, and culture construct (based on Hofstede) questions and conducted research with a total of 514 individuals, including 204 Spanish, 213 Peruvian, and 97 Nicaraguan. They concluded that culture does not have a strong impact on the construction worker's risk perception. The aviation industry is another sector in which the number of such studies is high. In the study conducted by Noort et al. (2016), the researchers conducted a safety culture survey with 13,616 employees working in the Air Navigation Service Providers of 21 European countries by focussing on Hofstede's uncertainty avoidance (UA) index. They found a negative association between safety culture and national norm data for UA. Studies have also been carried out in the maritime sector, as one of the sectors in which employees come from many different cultures. Lu et al. (2012) examined the influence of national culture and leadership styles on safety attitudes and safety behaviours and concluded that national culture dimensions such as power distance, uncertainty avoidance, collectivism, and long-term orientation had a positive influence on safety behaviour. The oil sector is a sector in which the consequences of occupational accidents are severe and there is a multicultural working environment. Mearns and Yule [19] addressed the issue of occupational safety and how globalization can potentially influence the attitudes, beliefs, and behaviours of disparate 'national' workforces working across the globe for the same multi-national company serving in the oil sector. They concluded that the values of globalization are stronger than locally-held cultural values. Management and leadership have emerged as significant determinants of safety performance in most sectors, even those traditionally viewed as low risk (i.e. catering, government).

In the literature, three studies investigating the relationship between national culture and safety culture without focusing on a specified sector were detected. The study in which the impacts of Hofstede's dimensions of national culture were incorporated into fatal occupational injuries, the researchers found out that there was a positive correlation between the power distance and the number of FOI and a negative correlation between individualism and collectivism and the number of FOI (Keser et al., 2015). Burke et al. (2008) examined relationships between UAI and the level of engagement in safety training and concluded that the UAI dimension of national culture moderated the transfer of safety training with regard to reducing accidents and injuries. Powers et al. (2015) tested the moderating effect of the national cultural characteristics developed on the basis of the model of Hofstede on plant level investment in environment and safety practices. The results of the study demonstrated that UAI and performance orientation have positive and in-group collectivism and future orientation have a negative effect.

When the studies mentioned above are analysed in general, it is observed that the studies were mainly carried out in the construction, aviation, maritime, and petrochemical

sectors, that the survey method was used in the majority of the studies, that a few studies were carried out through a literature review and by using statistical data, and that different results were obtained in the studies.

Another issue investigated in this study is the effect of countries' development levels on occupational safety. In the literature, there are many studies on the relationship of different development level indicators of countries such as economic status and education level, with occupational safety. There were limited number of studies examining the relationship between development level and fatal occupational accidents. In the study in which Li et al. (2011) investigated the relationship between economic development and occupational accidents in China between 1953–2008, they detected that economic development was an indicator of occupational accidents between 1979–2008. Broszkiewicz (2016) investigated the relationship between the number of fatal occupational injuries (FOI) and the gross domestic product (GDP) of 30 countries and concluded that GDP was one of the major influencing factors. Gümüş and Gülsün (2017) concluded in their study that there was a significant negative relationship between FOI and literacy rate, GDP, and HDI.

Considering all the issues mentioned above, this study differentiates from similar studies in the literature in the following aspects:

- Except for the "Indulgence versus restraint" dimension, this study examines the effect of all of Hofstede's cultural dimensions,
- This study is one of the few studies conducted on real statistical data instead of survey research,
- This study was carried out on sectors in general without any sector restrictions,
- This study is one of the few studies based on FOI statistics that can be accepted as the most reliable occupational accident indicator,
- After examining the effect of the development level of countries on their occupational safety performance, this study examined also the national culture's effect independently of the development level.

2. Materials and Methods

In this study, first of all, using Hofstede's national culture dimensions, the effect of national culture on occupational safety performance was analysed by the simple regression method (SRM). This method was preferred because it is aimed to reveal the relationship between national culture and occupational safety performance in the simplest and most understandable way through analyses to be made over as many countries as possible. In most cases, the authorities associate unsafe behaviours of workers with national culture. SRM was evaluated as the simplest and most appropriate model that can be used to show all stakeholders related to occupational safety whether such a situation really exists or not.

The mean of the fatal occupational injuries (FOI) statistics of countries for 2000-2018 were selected as the criterion of safety performance. Likewise, the average of schooling years, per capita national income, and human development indices were accepted as the criteria of development level, and their effect on safety performance was investigated with SRM. At this stage, countries were finally grouped according to their development

level, and the relationship between national culture and safety performance according to these groups was examined.

This study was carried out using the data of 60 countries, which were included in Hofstede's cultural dimension scoring and analysis and where statistical data on this subject were produced. All of the study data were taken from the data made available by the ILO, United Nations, World Bank and Hofstede official websites in order to ensure reliability and standardization.

The International Labour Organization (ILO) provides comprehensive statistics with various databases regarding employees, including occupational safety and health. The mean of FOI injuries per 100 thousand employees in 60 countries published by the ILO between 2000-2018 was included in the analyses as the measure of occupational safety performance. Fatal accident statistics were selected because they are much more standard and reliable than statistics such as non-fatal accidents or days lost due to injuries. In this study, both due to the possibility that the statistics for any year are significantly different from the others and to prevent keeping any country out since it does not have related statistics for a particular year, instead of data for a single year, the mean of data covering an extended period was used.

Gerard Hendrik Hofstede, played a significant role in the application of employee opinion surveys in over 70 national subsidiaries of IBM around the world. The results of IBM's surveys, with over 100,000 questionnaires, constitute one of the largest cross-national databases (Schreuder, 2016; Hoppe and Hoppe, 2004). In this study, the scores of the cultural dimensions of PDI, IDV, MAS, UAI, and LTO were obtained from the official website of Hofstede and included in the analyses to represent national culture. As is seen in Table 1, Hofstede did not determine an LTO score for three countries.
As it was mentioned earlier, very different indicators are used in different areas to represent the development level of countries. Since the development level is not the main subject of this study, GDP per-capita data were obtained from the World Bank data, and the mean of schooling data and the human development index were obtained from the United Nations data, and they were included in the simple regression analyses to represent the development level of countries. These data are presented in Table 1.

Table 1: Country Scores Regarding Cultural Dimension and Development Level [27, 31]

No	Country	FOI[1]	Cultural Dimension Scores[2]					Data indicating development (2010)			
			PDI	IDV	MAS	UAI	LTO	GDP per capita[3]	HDI[4]	HDI Class	School[5]
1	Argentina	10.32	49	46	56	86	20	18525	0.818	HHD	10.3
2	Australia	2.04	38	90	61	51	21	39324	0.926	HHD	12.6
3	Austria	3.95	11	55	79	70	60	42006	0.895	HHD	11.8
4	Belgium	2.40	65	75	54	94	82	39837	0.903	HHD	11.1
5	Brazil	9.45	69	38	49	76	69	14320	0.726	MHD	6.9
6	Bulgaria	5.12	70	30	40	85	36	14934	0.779	MHD	10.6
7	Canada	3.93	39	80	52	48	31	40012	0.895	HHD	12.6
8	Chile	7.68	63	23	28	86	13	18162	0.8	HHD	9
9	Colombia	6.40	67	13	64	80	13	10733	0.729	MHD	7.4
10	Costa Rica	8.35	35	15	21	86		12645	0.754	MHD	8.3
11	Croatia	3.26	73	33	43	80	58	19761	0.811	HHD	10.8
12	Czechia	3.49	57	58	57	74	70	27667	0.862	HHD	12.4
13	Denmark	1.57	18	74	16	23	35	43000	0.91	HHD	12.7
14	Dominican R.	17.90	65	30	65	45	13	10068	0.701	MHD	7.3
15	Egypt	9.25	70	25	45	80	7	9814	0.666	MHD	6.5
16	El Salvador	26.78	66	19	40	94	20	6152	0.659	MHD	7.1
17	Estonia	4.03	40	60	30	60	82	21797	0.844	HHD	12.5
18	Finland	1.73	33	63	26	59	38	38953	0.903	HHD	12.3
19	France	3.03	68	71	43	86	63	35900	0.872	HHD	10.9
20	Germany	1.11	35	67	66	65	83	38950	0.92	HHD	13.8
21	Greece	2.31	60	35	57	112	45	28148	0.857	HHD	10.3
22	Hungary	2.85	46	80	88	82	58	21570	0.826	HHD	12.2
23	Iceland	0.00	30	60	10	50	28	39577	0.892	HHD	10.6
24	India	92.13	77	48	56	40	51	4360	0.581	MHD	5.4
25	Ireland	2.74	28	70	68	35	24	43295	0.89	HHD	11.1
26	Israel	2.62	13	54	47	81	38	28862	0.887	HHD	12.6
27	Italy	4.02	50	76	70	75	61	35156	0.871	HHD	9.7
28	Japan	2.00	54	46	95	92	88	34987	0.885	HHD	11.5
29	Jordan	11.63	70	30	45	65	16	9306	0.728	MHD	9.8
30	Korea Rep	8.97	60	18	39	85	100	30365	0.882	HHD	11.6
31	Latvia	4.84	44	70	9	63	69	17587	0.817	HHD	12.5
32	Lithuania	6.86	42	60	19	65	82	20039	0.824	HHD	11.6
33	Malaysia	7.73	100	26	50	36	41	20605	0.773	MHD	9.8
34	Malta	3.94	56	59	47	96	47	27809	0.847	HHD	10.3

Table 1: Country Scores Regarding Cultural Dimension and Development Level (Continued)

No	Country	FOI[1]	Cultural Dimension Scores[2]					Data indicating development (2010)			
			PDI	IDV	MAS	UAI	LTO	GDP per capita[3]	HDI[4]	HDI Class	School[5]
35	Mexico	9.98	81	30	69	82	24	15261	0.739	MHD	8
36	Moldova	5.79	38	80	14	53		4638	0.681	MHD	11.1
37	Namibia	6.00	65	30	40	45	35	8500	0.588	MHD	6.2
38	Netherlands	0.73	31	69	8	50	67	45040	0,911	HHD	12
39	New Zealand	2,40	22	79	58	49	33	31253	0.899	HHD	12
40	Norway	1.79	60	60	64	93	35	57915	0.942	HHD	12.7
41	Pakistan	50.00	55	14	50	70	50	3989	0.524	MHD	4.7
42	Panama	4.95	95	11	44	86		15311	0.758	MHD	9.3
43	Philippines	6.36	94	32	64	44	27	5468	0.672	MHD	8.9
44	Poland	3.81	63	27	31	99	38	21048	0.835	HHD	12.2
45	Portugal	5.84	90	30	42	90	28	27260	0.822	HHD	8.1
46	Romania	6.59	90	30	42	90	52	16966	0.797	MHD	10.7
47	Russian Fed.	10.00	93	39	36	95	81	20490	0.78	MHD	11.5
48	Singapore	4.43	74	20	48	8	72	71566	0.909	HHD	11.2
49	Slovakia	3.24	100	52	100	51	77	25153	0.829	HHD	11.6
50	Slovenia	3.33	71	27	19	88	49	27825	0.881	HHD	12.1
51	Spain	3.94	57	51	42	86	48	31680	0.865	HHD	9.4
52	Sri Lanka	1.76	80	35	10	45	45	8329	0.75	MHD	10.8
53	Sweden	1.24	31	71	5	29	53	42179	0.906	HHD	12.3
54	Switzerland	1.60	34	68	70	58	74	53068	0.932	HHD	13.3
55	Thailand	9.63	64	20	34	64	32	13213	0.721	MHD	7.3
56	Trinidad Tob	1.07	47	16	58	55	13	30620	0.788	MHD	10.8
57	Turkey	13.24	66	37	45	85	46	17426	0.743	MHD	7.2
58	Ukraine	6.85	92	25	27	95	86	7664	0.732	MHD	11.3
59	U. Kingdom	0.70	35	89	66	35	51	36341	0.905	HHD	13.2
60	United States	4.52	40	91	62	46	26	48467	0.911	HHD	13.3

[1] Fatal occupational injuries (FOI) per 100000 workers (mean 2000-2018). [27]
[2] Cultural Dimensions PDI: power distance, IDV: individualism, MAS: masculinity, UAI: uncertainty avoidance, LTO: long-term orientation. [28]
[3] GDP Gross Domestic Product [29]
[4] HDI Human Development: 'low human development' HDI scores between 0.0 and 0.5, 'medium human development' (MHD) Scores between 0.5 and 0.8, and 'high human development' (HHD) scores between 0.8 and 1.0. [30]
[5] Mean years of schooling of countries. [31]

Using the data presented in Table 1, three different hypothesis groups were tested with the analyses performed. These hypothesis groups are as follows:

- Group 1: H1-H5 The cultural dimensions (PDI, IDV, MAS, UAI, LTO) determined by Hofstede have a significant effect on FOI.
- Group 2: H6-H8 The development levels of countries (according to GDP, mean year of schooling, HDI index) have a significant effect on FOI.
- Group 3: H9-H14 and H15-H19 When countries are grouped in terms of their development levels according to HDI (HHD and MHD), cultural dimensions (PDI, IDV, MAS, UAI, LTO) have a significant effect on FOI.

These hypotheses were tested via the SRM using the SPSS program. Simple linear regression is a statistical method that allows summarizing and studying relationships between two variables and represented by the following equation:

$y = \beta 0 + \beta 1x + \varepsilon$ where $\beta 0$ is the y-intercept of the regression line, $\beta 1$ is the slope and ε is the error term and used to account for the variability in y that cannot be explained by the linear relationship between x and y.

3. Results

Normality is one of the assumptions of the simple regression model. The skewness and kurtosis values were examined for a normality test. Since all skewness and kurtosis values ranged between -1.5 and +1.5 (Table 2), the data were accepted to be normally distributed (Tabachnick and Fidell, 2013).

Table 2: Normality Test Results of the Independent Variables

Variable		Statistic	Std. Error
PDI	Mean	57.2105	2.91813
	Skewness	-.049	.316
	Kurtosis	-.536	.623
IDV	Mean	47.7895	2.96225
	Skewness	.236	.316
	Kurtosis	-1.188	.623
MAS	Mean	47.4386	2.80909
	Skewness	.034	.316
	Kurtosis	.062	.623
UAI	Mean	67.9123	2.99438
	Skewness	-.425	.316
	Kurtosis	-.512	.623
LTO	Mean	47.4386	3.10156
	Skewness	.266	.316
	Kurtosis	-.869	.623
GDP	Mean	26636.8772	1953.75985
	Skewness	.565	.316
	Kurtosis	.188	.623
HDI	Mean	.8168	.01273
	Skewness	-1.067	.316
	Kurtosis	.763	.623
EDC	Mean	10.4982	.29446
	Skewness	-.864	.316
	Kurtosis	-.140	.623

The results of the simple regression analysis of H1-H5 hypotheses arguing that the cultural dimensions (PDI, IDV, MAS, UAI, LTO) determined by Hofstede have a significant effect on FOI were presented in the table as a whole. When the results given in Table 3 are examined, it is observed that none of the regression models is significant at the α = 0.05 level, but it is significant only at the α = 0.1 level for PDI and IDV.

Table 3: **Model Summary for the Cultural Dimension Effect for All Countries ***

						Change Statistics				
Model	Indep. Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	PDI	.215	.046	.030	13.08217	.046	2.804	1	58	.099
2	IND	.243	.059	.043	12.99388	.059	3.633	1	58	.062
3	MAS	.052	.003	-.015	13.37668	.003	.156	1	58	.695
4	UAI	.057	.003	-.014	13.37282	.003	.189	1	58	.665
5	LTO	.064	.004	-.014	13.71934	.004	.229	1	55	.634

* Dependent Variable FOI

The simple regression analysis results of H6-H8 hypotheses arguing that the development levels of countries have a significant effect on FOI were presented in Table 4 as a whole. When these results are examined, it is observed that the regression models are significant at the α = 0.001 level. Accordingly, H6, H7, and H8 hypotheses, stating that per capita GDP, human development index, and mean years of schooling, which represented the development level of countries in the analyses, have a significant effect on FOI, were accepted. To examine this effect in detail, the coefficients presented in Table 5 were addressed. Accordingly, every 1000-dollar increase in per capita GDP causes a decrease of 0.38 units in mortal accident statistics. Likewise, an increase of 0.01 units in the level of HDI leads to a decrease of 0.87 units in FOI, and an increase of 0.1 years in mean years of schooling causes a decrease of 0.36 units in FOI.

Table 4: **Model Summary for the Effect of Development Level for All Countries ***

						Change Statistics				
Model	Indep. Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	GDP	.429[a]	.184	.170	12.09758	.184	13.103	1	58	.001
2	HDI	.630[a]	.397	.387	10.40201	.397	38.173	1	58	.000
3	SCH	.600[a]	.360	.349	10.71945	.360	32.561	1	58	.000

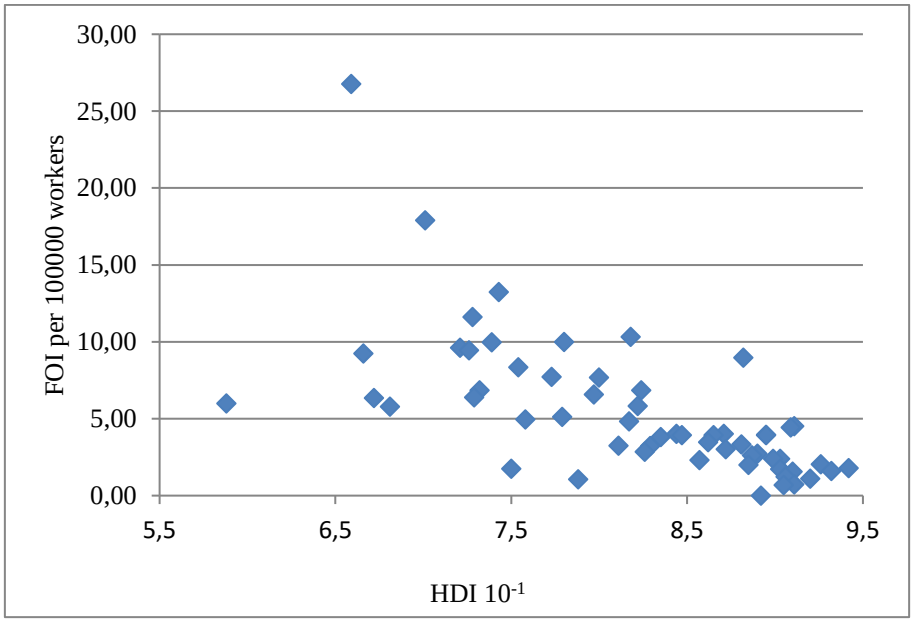
* Dependent Variable FOI

Table 5: Coefficients Regarding the Development Level Effect

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	17.515	3.160		5.542	.000
	GDP	-.385	.000	-.429	-3.620	.001
2	(Constant)	78.494	11.558		6.792	.000
	HDI	-87.285	14.127	-.630	-6.178	.000
3	(Constant)	45.555	6.799		6.700	.000
	SCHL	-3.634	.637	-.600	-5.706	.000

It is also possible to see the FOI-HDI relationship clearly in Figure 1. In the graph, while the mean of FOI for one million employees is under 5 for almost all of the countries with HDI above 0.85, it is above 5 for almost all of the countries with HDI below 0.75.

Figure 1: Graph of HDI-FOI relationship



The results of the simple regression analysis performed for third group hypotheses after the classification of countries as high and medium according to the human development index are presented in Table 6 and Table 7. According to the results given in Table 6, there is statistical significance at the $\alpha = 0.05$ level for the PDI and IDV cultural dimensions and at the $\alpha = 0.1$ level for UAI. When the coefficients given in Table 8 for these dimensions are examined, it appears that one-unit change in PDI caused a 0.036-unit change in the same direction in FOI and that one-unit change in IDV caused a 0.05-unit change in the opposite direction in FOI. The simple regression analysis results for

MHD countries presented in Table 7 display that there is no significant relationship between the cultural dimensions and FOI for those countries.

Table 6: **Model Summary for the Cultural Dimension Effect for HHD Countries***

Model	Indep. Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
						R Square Change	F Change	df1	df2	Sig. F Change
1	PDI	.330[a]	.109	.084	2.12866	.109	4.283	1	35	.046
2	IDV	.479[a]	.229	.207	1.98008	.229	10.400	1	35	.003
3	MAS	.053[a]	.003	-.026	2.25201	.003	.098	1	35	.757
4	UAI	.297[a]	.088	.062	2.15324	.088	3.392	1	35	.074
5	LTO	.018[a]	.000	-.028	2.25478	.000	.012	1	35	.915

* Dependent Variable FOI

Table 7: Model Summary for the Cultural Dimension Effect for MHD Countries*

Model	Indep. Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
						R Square Change	F Change	df1	df2	Sig. F Change
1	PDI	.050[a]	.002	-.045	20.18960	.002	.052	1	21	.823
2	IDV	.130[a]	.017	-.030	20.04163	.017	.364	1	21	.553
3	MAS	.236[a]	.055	.010	19.64566	.055	1.233	1	21	.279
4	UAI	.213[a]	.046	.000	19.74884	.046	1.002	1	21	.328
5	LTO	.130[a]	.017	-.038	21.37051	.017	.310	1	18	.585

* Dependent Variable FOI

Table 8: **Coefficients for HHD Countries**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.693	.913		1.854	.072
	PDI	.036	.018	.330	2.070	.046
2	(Constant)	6.495	1.002		6.483	.000
	IDV	-.052	.016	-.479	-3.225	.003
3	(Constant)	3,671	.828		4.436	.000
	MAS	-.005	.015	-.053	-.312	.757
4	(Constant)	1.577	1.071		1.472	.150
	UAI	.028	.015	.297	1.842	.074
5	(Constant)	3.535	.956		3.696	.001
	LTO	-.002	.017	-.018	-.108	.915

4. Discussion

The study results show that there is a tight connection between countries' occupational safety performance and development level, while the impact of national culture is more limited. As the country's GDP per capita increases and the mean years of schooling increase, it is observed that FOI statistics decrease significantly. Considering the coefficients, the development level-FOI relationship is most clearly observed in the analyses in which HDI is taken as the indicator. It was demonstrated that HDI, which is formed from life expectancy, schooling year, and per capita national income indices, has a highly significant effect on FOI. As is expected, many studies in the literature have also revealed that the level of development has a significant effect on FOI (Kahraman et al., 2019; Li et al., 2011; Broszkiewicz, 2016; Gümüş and Gülsün, 2017).

When countries are not classified in any way, analyses related to the effect of cultural dimensions on occupational safety performance reveal that there is only a significant positive effect for the PDI dimension only at the $\alpha = 0.1$ level and that there is a significant negative effect for the IDV dimension again at the $\alpha = 0.1$ level. When the analyses were performed by classifying the countries as HHD and MHD, the relationship between national culture and occupational safety performance became clearer for HHD countries. For these countries, while there was a significant effect at the $\alpha = 0.05$ level for PDI (positive) and IDV (negative) and at the $\alpha = 0.1$ level for UAI (positive), no significant effect was observed for MHD countries.

Similar to our study, studies in the literature revealed that there were positive, negative relationships, or no relationship between certain dimensions of national culture and safety. For the PDI dimension, there are studies stating that large power distance promotes unsafe behaviours (Okolie & Okoye, 2012; Lu et al., 2012; Okolie & Okoye, 2013), while some studies reported the opposite of this (Lu et al., 2016; Havold, 2007; Özkan and Lajunen, 2007). The study, which examined the relationship between power distance and FOI, indicated that there is a positive relationship between PDI and FOI (B= 0.329 sig=0.000) (Keser et al., 2015). In our study, coefficients are small, and significance values are higher than these values. The low power distance indicates a

loose superior-subordinate relationship, while the higher power distance indicates a tighter superior-subordinate relationship. While a certain power distance is valuable in terms of teaching-doing and fulfilling the rules, excessive power distance can produce results, such as the loss of initiative, stress, and error. Probably, since both situations have positive and negative effects in terms of occupational safety, different results were also obtained in the studies conducted on this subject. On the other hand, although it is possible that factors such as the sector in which the study is conducted and the level of education of employees will affect the result, it is possible to say that the power distance generally has a positive effect on safety performance, considering that this study was based on fatal accident statistics.

Most of the studies reported that low individualism was in favour of safety performance (Okolie & Okoye, 2012; Habibnezhad & Esmaeili, 2016; Lu et al., 2016; Alshahrani et al., 2014; Gharpurea et al., 2018; Özkan & Lajunen, 2007; Lu et al., 2012; Keser et al., 2015), while some of them advocated that high individualism was positive for safety (Havold, 2007), and some found no relationship between them (Shen, 2015; Bardakçı, 2016). In our study, we also concluded that low individualism supports safety performance. Individualism describes the situation in which individuals focus on their interests, and collectivism describes the situation in which individuals do not pursue an interest independently of the interests of society. Collectivism, not individualism, may contribute to ensuring occupational safety in a working environment, which requires organization and order.

Some studies found a negative association between safety culture and UAI (Noort et al., 2016; Gharpurea et al., 2018), while some other revealed the opposite of this (Okolie & Okoye, 2012; Habibnezhad & Esmaeili, 2016; Lu et al., 2016; Lu et al., 2012; Okolie & Okoye, 2013; Alshahrani et al., 2014; Burke et al., 2008; Havold, 2007; Mohamed, 2009; Özkan & Lajunen, 2007; Powers et al., 2015). In our study, as in most of the studies in the literature, a positive relationship was found between UAI and safety performance. While high uncertainty avoidance means that people are in favour of strict codes of conduct, guidelines, and laws, low uncertainty avoidance suggests less regulation. Considering that rules and principles are the most important factors for ensuring occupational safety, it is expected that avoiding uncertainty will contribute to occupational safety.
In our study, no effect of masculinity on FOI was observed. Some studies in the literature stated that masculinity had a negative effect on safety attitudes (Okolie & Okoye, 2012; Habibnezhad & Esmaeili 2016; Lu et al., 2016; Okolie & Okoye, 2013; Nielsen et al., 2015), while many studies stated that masculinity had no effect (Gharpurea et al., 2018; Nielsen et al., 2015; Lu et al., 2012; Bardakçı, 2016; Keser et al., 2015; Anicich et al., 2015). Likewise, while the LTO was not observed to have any effect on FOI in our study, a few studies reported that long-term orientation cultures promote safe behaviours (Okolie & Okoye, 2012; Lu et al., 2016, Özkan & Lajunen, 2007). Considering the definitions of MAS and LTO, it is clear that to associate these cultural dimensions with occupational safety is not as easy as in other dimensions.

CONCLUSION

Nowadays, occupational accidents continue to be one of the most critical problems of working life with their consequences, such as labour loss, injury, and death. Understanding that occupational accidents are directly related to the human factor

beyond technical problems has revealed the safety culture as a concept that should be addressed with all its dimensions, and national culture is one of these dimensions. Although a lot of people in the working environment frequently associate national culture and occupational accidents with each other, it is observed that occupational accident statistics differ significantly according to the development levels of countries, while this situation is not valid for national culture. On the other hand, different results are obtained in the studies conducted on this subject. Based on this point of view, this study aimed to achieve more generalizable results on the subject by examining the national culture occupational safety relationship using FOI statistics, which can be evaluated as the most reliable occupational accident statistics.

According to the results obtained in the study, national culture was observed to have a limited effect on occupational safety performance. As a matter of fact, in the study conducted by Bardakçı (2016), managers of the international construction companies stated that they had employees from all over the world, but that they did not see any effect of cultural differences in terms of occupational safety. Likewise, Mearns and Yule (2009) demonstrated in their study that the values of globalization, embodied by management practices that are broadly uniform across national contexts are stronger than locally-held cultural values in determining behaviour within a prescribed environment.

While there is a limited effect of PDI, IDV, and UAI national culture dimensions in developed countries, such an effect was not observed for any dimension in developing countries. This situation can be evaluated as that the national culture effect manifests itself in developed countries due to regulations laid down in the scope of occupational safety and due to the proper implementation, follow-up, and control of these regulations, but in developing countries, the inadequacies in this area are big enough to prevent the emergence of the national culture effect.

This situation demonstrates that national culture is a factor that should be taken into consideration to improve occupational safety performance in developed countries. On the other hand, it is possible to say that in developing countries, the overall development of the country is more significant in terms of achieving a general improvement in occupational safety. Nevertheless, the study reveals that in developing countries, it is not right for people, in particular, for those who are responsible from occupational safety applications to use culture as an excuse for occupational accidents (our workers do not listen, it does not fit us, etc.). Moreover, it should not be forgotten that this does not mean that national culture can be neglected in these countries and that there is a possibility of observing the effect of national culture in the analyses to be made in a particular sector, among more educated people or for a more developed region within the country. As a result, it appears that despite its limited effect, national culture should be taken into consideration as a factor in the activities of determining, implementing, and developing measures for occupational safety. From this point of view, this study is expected to contribute to better defining the possible role of national culture in occupational safety by explaining the differences between the results of studies in the literature. Moreover, another practical benefit of this study could be that it makes a contribution to formulating behavioural modification strategies consistent with the observed cultural dependencies, which will contribute to improving safety performance.

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