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Establishing Occupational Health & Safety Management System at the University of Tripoli According to the German Universities

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ABSTRACT

This study aims to examine the possibility of implementing and establishing the Occupational Health & Safety Management System (OHSMS) program that contributes significantly to improving the level of services provided by universities in Libya. This purpose relied on a quantitative and descriptive analytical approach, which is based on describing the phenomenon and then providing explanations related to the implementation of OHSMS. Several statistical analysis tools were used to analyze the questionnaire in this paper using SPSS. The target respondents are students, faculty, and administration employees at the University of Tripoli in Libya. The results of the study revealed a set of results, the most important of which are: there is currently no effective system or effective measures for occupational health and safety at the university, as well as the absence of any health services at the university, as there is no private doctor at the university. The study also recommended the necessity of establishing a special department for occupational health and safety at the university as well as the necessity of paying attention to training university employees on occupational health and safety to enhance their awareness and the formation of specialized cadres in this field.

Keywords: Occupational health and safety management system, accidents, diseases, University of Tripoli.

INTRODUCTION

One of the best times of your life is studying at colleges or university, but the occurrence of accidents or injuries may have negative impact. There are many types of risk in the universities, and among these risks are natural hazards, fire risks, chemical hazards, physical risks, health risks, engineering risks, and so on. Despite all these risks, the largest university in Libya, which is the University of Tripoli, has more than 75,000 students and 3,000-faculty member, according to the university's website [1]. However, the University of Tripoli does not have an occupational health and safety management system.

In addition, one of the main problems in the University of Tripoli is that Libya has erupted in many civil wars in recent years in which some of the fighters were students. After the end of the war there was no rehabilitation plan by the University of Tripoli, so it was more appropriate to develop a psychological rehabilitation plan for students who participated in the war. Also, one of the current problems we are dealing with today is the Corona pandemic. Because of the

University of Tripoli's lack of an occupational health and safety management system, there were no plans or measures to deal with safety issues or pandemic issues. Therefore, this study tries to address the OHSMS system in the University of Tripoli and examine the causes and challenges.

The general research question in this paper is: "What are the challenges toward the establishment of occupational health & safety management system at the University of Tripoli? However, there are also few specific questions which will be addressed consequently. Among those are, (i) What is the impact of the increase in the number of accidents on the establishment of OHSMS in the University of Tripoli? (ii) What is the impact of various diseases on the establishment of OHSMS at the University of Tripoli? (iii) Will OHSMS implementation improve the efficiency and productivity of the services at the University of Tripoli? (iv) What are the main challenges towards the implementation of OHSMS at the University of Tripoli?

The rest of this paper is organized as follow: section 2 covers the recent literature review, section 3 discusses the applied methodology, section 4 summarizes the findings while section 5 concludes with recommendations.

LITERATURE REVIEW

This study is based on the literature review, and references have been searched on the internet through universities' websites, ResearchGate, Google Scholar, etc. and the research is linked to the establishment of an occupational health and safety management system at the University of Tripoli. And of course, there are some studies that are related to the current study, including the study of OHSMS in the context of universities and especially in the case of the University of Gävle [2]. This study was based on interviews with other universities that have an OHSMS and use the use of ideas for the possibilities of implementing OHSMS in the universities, for example the study of the University of Gävle [2].

In view of the variation in the methods of providing occupational safety and health system services in Arab universities, a study was conducted with aim of identifying the organizational structures for OHS in Arab universities and comparing them with international universities and reviewing international standards in this regard. And it is relationship to concept of social responsibility, along with presenting a case study of a university to know better approaches to effective management of occupational health and safety system in the universities. To achieve this, 70 Arab and non-Arab universities were selected, and their activities and administrative structure examined on how they manage OHSMS issues [3]. The result of this study indicated that there is a great weakness that many Arab universities have lagged in catching up with global systems for OHS, and that the concept of OHS services is unknown in most Arab universities [3]. OHS is found only in 27% of Arab universities; despite it is presence in all international universities, the study also recommended that Arab universities adopt international standards for OHSMS such as OHSAS 18001, 2007. Now it has updated with the standard ISO 45001 and OSH-ILO 2001.

For what they represent on the occupational safety and health requirements and ensuring the establishment of integrated management system, universities should take the initiative to

establishing centers of excellence in the field of occupational health and safety to serve students, professors, employees, and workers at the university [3]. And working on adopting educational programs in the fields of OHSMS and spreading the culture of OHS on the universities websites to show the suffers that this matter is part of the university's policy and the core of its obligations and social responsibilities.

In another study in the United States, the aspects of OHSMS were investigated in about 75 colleges [4]. The study showed that 89% of the participants reported exposure to natural, chemical, and biological hazards, and that 70% were exposed to radiation risks due to their work at the university. Moreover, to indicate the extent of the risks in the university laboratories, it suffices to say that the last death accident due to smallpox infection in the world was recorded as result of transmitting the infection from laboratory at the University of Birmingham in England in 1978 [5].

METHODOLOGY

The methodology of this study is based on the quantitative approach. The research was done by: using the Internet and searching in the official websites of universities & ResearchGate, Google Scholar & Libraries to collect information. In addition, as it is known, the German university's website displays the activities of any administrative system and its specific tasks [6].

A self-administrated questionnaire was prepared. The questionnaire consists of 4 demographic questions and 17 questions related to the selected variables (OHSMS, accidents, and disease). The questionnaire was distributed to faculty members, employees, and students of the university. The statistical analysis program of SPSS will be used to generate the results [7]. Moreover, to identify the management point of view, and their experiences about the occupational health and safety management system at the University of Tripoli, a separate small scale interview was conducted.

German University

Most German universities have occupational health and safety systems. The Technical University of Berlin was chosen for its great and wide interest in the field of occupational health and safety. For this reason, Technical University of Berlin was chosen to be taken as an exemplary model.

Technical University of Berlin

The Technical University of Berlin is one of the most important universities in Germany in terms of scientific specialization. The Technical University of Berlin was founded in 1879[8]. It is in the capital of Germany, Berlin. It is also one of the largest technical universities in Germany, where many of the most prestigious scientific figures who have received the Nobel Prize and are known internationally with different specializations have graduated from it.

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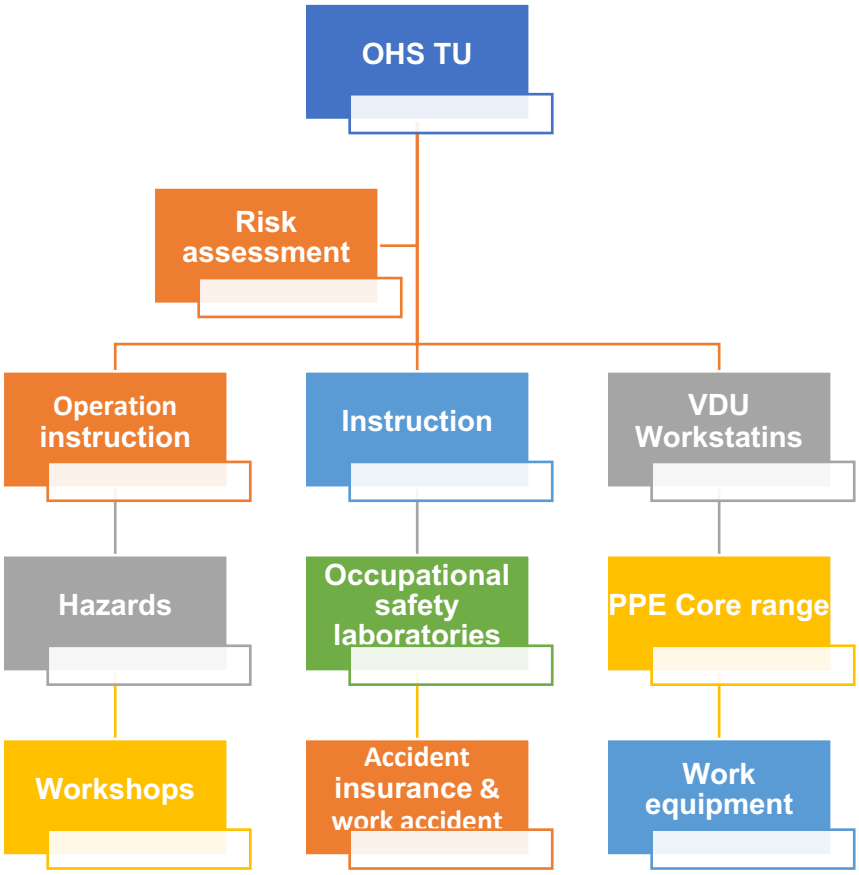

Figure: 1 OHS measures Technical University of Berlin (adopted by researcher)

Risk assessment

The OHSMS at the Technical University of Berlin takes initial measures which are identifying and assessing risks before starting in the workplace and taking preventive measures according to the latest techniques to maintain the safety and health of students, staff, and faculty members [8]. It includes the risk assessment process for each of the laboratories, workshops and offices even teleworking places and other places, and after the risk assessment, the result of the risk assessment must be documented [8].

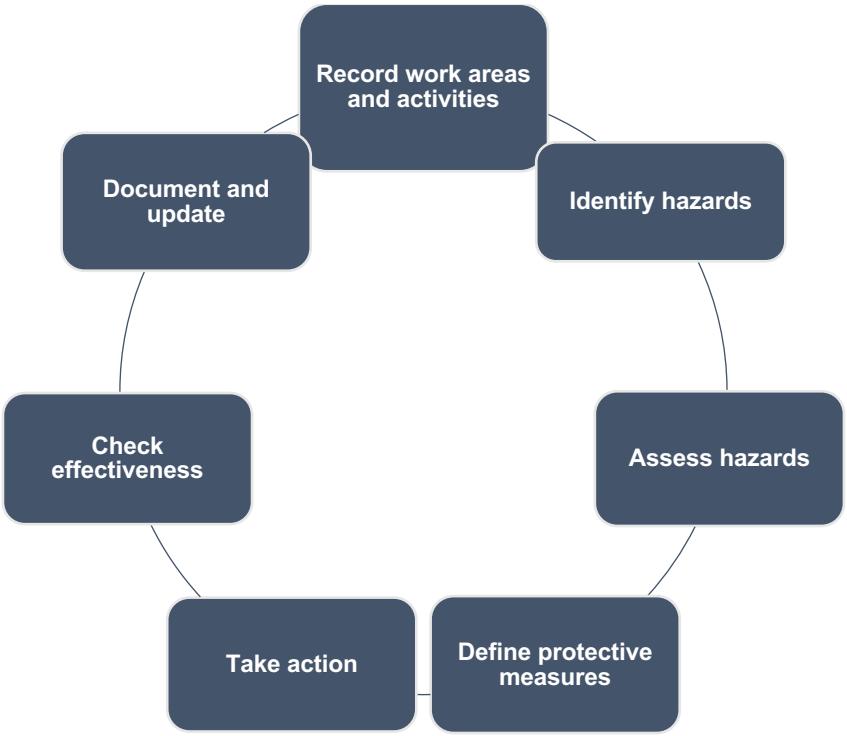

Figure: 2 Seven Steps to risk assessment in TU Berlin

Research framework (OHSMS, Accidents and Diseases)

The relationships of the variables with each other depend on the existence of a dependent variable and two independent variables in this paper. It means that the accidents (X1) related to the university and its relationship to the OHSMS (Y) as well as the diseases (X2) related to the university and its relationship to the OHSMS (Y). Figure 3 shows the interaction between the variables.

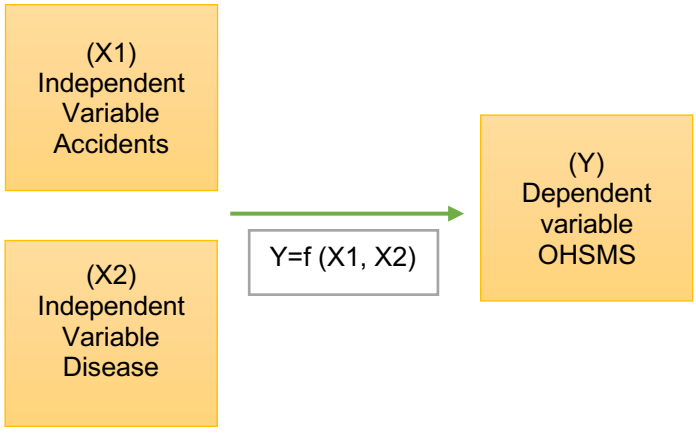

Figure 3, dependent and independent variables in the present study

EMPIRICAL FINDINGS

The respondents of this paper are students, faculty, and administration employees at the University of Tripoli in most of the colleges and departments. A total of 150 questionnaires

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were distributed to a random sample and the retrieved filled forms were 140 questionnaires. As for the valid ones for statistical analysis, it amounted to only 129 forms, meaning that the proportion of the retrieved forms valid for statistical analysis amounted to 92.1% of the total number of the retrieved questionnaires distributed to the research sample at the university. The questionnaire of this study is depicted in Appendix A.

Table 1 shows the descriptive statistics of the three variables. The table contains the frequencies, Minimum, Maximum, Mean and Std. Deviation.

Table 1: Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
OHSMS (dependent variable)	129	1.90	6.00	3.2465	.50421
Accidents (independent variable)	129	1.67	5.00	4.0698	.78911
Disease (independent variable)	129	1.00	5.00	3.3256	.75558

The dependent variable of OHSMS

Table (2) shows the frequency distributions, percentages, standard deviations, and majorities for questions 1 - 10 related to the dependent variable (OHSMS), where the standard deviation ranged between (0.845 - 2.801).

This variable is in fact about the "Current Occupational Health and Safety at the university". The lowest standard deviation is for question 8 with 0.845, with a percentage of 48.8%, and at a level that agrees definitely.

Table 2: Dependent variable of OHSMS

Occupational Health and Safety at the university OHSMS												
Questions	**Most likely**		**Definitely**		**Moderately**		**Slightly**		**Not at all**		**std Deviation**	**Majority**
Q1	7	5.43 %	5	3.9%	10	7.8%	53	41.1 %	54	41.9%	1.067	Not at all
Q2	9	7.0%	5	3.9%	15	11.6 %	43	33.3 %	56	43.3%	2.801	Not at all
Q3	35	27.1 %	56	43.4 %	19	14.7 %	14	10.9 %	5	3.9%	1.080	Definitely
Q4	5	3.9%	9	7.0%	36	27.9 %	57	44.2 %	22	17.1%	0.975	Slightly
Q5	3	2.3%	5	3.9%	19	14.7 %	47	36.4 %	55	42.6%	0.963	Not at all
Q6	30	23.3 %	48	37.2 %	17	13.2 %	19	14.7 %	15	11.6%	1.311	Definitely
Q7	35	27.1 %	53	41.1 %	20	15.5 %	17	13.2 %	4	3.1%	1.088	Definitely
Q8	46	35.7 %	63	48.8 %	14	10.9 %	4	3.1%	2	1.6%	0.845	Definitely
Q9	6	4.7%	39	30.2 %	17	13.2 %	42	32.6 %	25	19.4%	1.224	Slightly
Q10	4	3.1%	9	7.0%	9	7.0%	46	35.7 %	61	47.3%	1.039	Not at all

The first independent variable of accidents

Table (3) shows the frequency distributions, percentages, standard deviations, and the majorities of questions 11-13 related to the independent variable (accidents), as its standard deviations ranged between (1.165-1.215) and the highest standard deviation and highest percentage was found to be 53.5% for question 13 with the majority of "Not at all".

Table 3 Independent variable of accidents

Accidents and relation with OHSMS												
Questions	**Most likely**		**Definitely**		**Moderately**		**Slightly**		**Not at all**		**std Deviation**	**Majority**
Q11	9	7.0 %	5	3.9 %	**14**	10.9 **%**	40	**31.1 %**	61	47.3 **%**	1.170	Not at all
Q12	8	6.2 %	9	7.0 %	11	8.5%	46	35.7 %	55	42.6 %	1.165	Not at all
Q13	8	6.2 %	10	7.8 %	10	7.8%	32	24.8 %	69	53.5 %	1.215	Not at all

The second independent variable of Disease

Also, this table (4) shows the frequency distributions, percentages, standard and major deviations for questions 14-17 which are related to the independent variable (diseases), where its standard deviations ranged between (0.82 - 1.368) and the most positive for this variable was between 53.5% for question 17 which is associated with the lowest standard deviation.

Table 4: Independent variable of Disease

Disease and its relation to OHSMS												
Questions	**Most likely**		**Definitely**		**Moderately**		**Slightly**		**Not at all**		**std Deviation**	**Majority**
Q14	13	10.1 %	10	7.8 %	10	7.8 %	23	17.8 %	73	56.6 %	1.368	Not at all
Q15	15	11.6 %	7	5.4 %	8	6.2 %	22	17.1 %	77	59.7 %	1.389	Not at all
Q16	20	15.5 %	15	11.6 %	13	10.1 %	35	27.1 %	46	35.7 %	1.462	Not at all
Q17	69	53.5 %	43	33.3 %	14	10.9 %	1	0.8%	2	1.6 %	0.828	Most Likely

Reliability Statistics

Table 5 shows the reliability analysis using Cronbach Alpha. The result shows a good rate of 0.747. The Cronbach alpha performance method for measuring reliability is as follows: $\alpha \geq 0.8$ is excellent, $0.7 \leq \alpha < 0.8$ is good, $0.6 \leq \alpha < 0.7$ is acceptable, $0.5 \leq \alpha < 0.6$ questionable, $\alpha < 0.5$ is not acceptable.

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Table 5: Reliability statistic (Cronbach's Alpha)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.720	0.747	17

Pearson correlation analysis

The Pearson correlation coefficient is used to calculate the relationship between the variables of the continuous numerical type [10]. The Pearson's correlation coefficient between the variables of OHSMS, accidents and diseases. The correlation value obtained to be 0.443 for accidents and is found to be significant as it has been marked with a sign of **. To denote that it is a statistical function at a significant level, as this has been written below the table. Likewise, the variable (diseases) came with a value of 0.300 with a significance value (0.001) and was also distinguished by a sign ** indicating that it is a statistical function at a significant level, and we conclude from this result that there is a strong direct relationship between the variables [11].

Table 6: Pearson correlation coefficient

		OHSMS	Accidents	Disease
OHSMS	Pearson Correlation	1	.443**	.300**
	Sig. (2-tailed)		.003	.001
	Nr of respondents	129	129	129

**. Correlation is significant at the 0.01 level (2-tailed)

Linear regression analysis results

Linear regression analysis is one of the statistical methods that guarantees the accuracy of the inference to improve the results of the study by optimizing the use of data. The regression findings show the causal relationships between the dependent quantitative variable and the independent quantitative variables. The most common level of significance in the linear regression estimation is 95% which corresponds to the 0.05 level of error. This value is important especially for the hypothesis testing.

Table 7 shows the model summary where the relationship between the dependent variable and the independent variables are concerned. The mean value was 0.312, with the value of the determination coefficient of 0.097, and the value of the modified coefficient of determination 0.083, meaning that the independent variables explain 8.3% of the variation in occupational health and safety.

Table 7: model summary

				Change Statistics				
R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
.312[a]	.097	.083	.75562	.097	6.800	2	126	.002

a. Predictors: (Constant), Disease, Accidents

Table 8 shows the results of the *Analysis of Variance* (ANOVA) analysis to test the significance of the regression, and we note the value of the significance to be is (0.002), which is less than (0.05) therefore we reject the null hypothesis and accept the alternative hypothesis in which the regression model is significant and therefore there is an effect of the independent variables on the dependent variable, and we can predict the dependent variable through these variables.

Table: 8 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	**Regression**	7.765	2	3.883	6.800	.002[b]
	Residual	71.940	126	.571		
	Total	79.705	128			

Table 9 shows the unstandardized coefficients, Std error, standardized coefficients Beta , t-test value with the probability value (statistical significance), Tolerance, and the VIF (Variance Inflation Factor). The VIF values for all three variables show that there is no problem with multicollinearity between variables as the VIF value is less than 3.

The results shown in the coefficients table 9, the linear regression can be written as follows:
$Y = \beta 0 + \beta x1 + \beta x2$
OHSMS = 3.462 constant -0.134 accidents + 0.314 diseases

The results indicate that the accidents coefficient is negative (-0.134), which means that when the result is negative, there is a negative linear relationship with OHSMS, meaning that the need for OHSMS decreases. While the results in diseases were positive (0.314), which means that when the result is positive, and there is a strong direct linear relationship with an increased need for OHSMS.

To determine which of the parameters is significant and a cause of the significance of the analysis of variance regression we look at the third column from the right which gives the value of Sig. To test the significance of each parameter separately, we find that in the case of accidents the value of Sig is greater than 0.05, so the coefficient of accidents is not significant, but in this case of disease, the sig= 0.001 which is less than 0.05. Therefore, the disease coefficient is significant, which is the reason for the significance of the regression analysis of variance. The last column provides the interval estimate for the regression line coefficients and the static individually [12].

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Table 9: Coefficient's regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		Beta	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.462	.524		6.609	.000		
	Accidents	-.134	.132	-.086	-1.014	.313	1.000	1.000
	Diseases	.314	.088	.301	3.551	.001	1.000	1.000

Interpretation of the open question

There is currently no effective system or effective procedures for occupational health and safety at the University of Tripoli by describing and analyzing the questions related to both variables and depending on the responses of the respondents. From the research sample and the answers contained in the interviews with faculty members and administrative staff, there is no management or department concerned with health and safety professionalism at the University of Tripoli. Also, the absence of any health services at the university was evident.

The results of the study showed that the influence of the higher management constitutes a low degree of influence on the effectiveness of occupational safety and health procedures within the university. Moreover, this effect resulted in the lack of a clear vision among the faculty, staff, and students of what the administration is doing about occupational safety and health procedures.

There are no plans and programs related to occupational health and safety and work to follow them up within the university also there is no coordination and continuous follow-up by the University of Tripoli with governmental and private institutions regarding the implementation of occupational safety and health measures.

It became clear through the results of the study that the responses from students, professors, and employees clarified that there are occupational and health risks in the university.

Most of the results showed that there is no knowledge or background about occupational health and safety management systems, and there is a lack of awareness of their responsibilities towards health and safety at the university and this shortcoming is due to the lack of an effective occupational health and safety management system at the University of Tripoli.

There is no system by the university that records and documents accidents and makes reports on work accidents and injuries, whether for workers, faculty members, or students, although there are few injuries and accidents, but they are not documented or recorded.

The results showed that the university did not spread the culture of the occupational health and safety system, meaning that there are no training and awareness courses or participation for workers in international seminars and conferences related to occupational health and safety. Whereas the awareness and little knowledge of the Staff and faculty members stems from their

personal experience. Despite there are not many accidents and injuries, there are some answers regarding accidents and diseases and most of them were psychological and behavioral diseases. There is a great interest on the part of students and employees, according to the results of the questionnaire, regarding allocating a special doctor to university employees and students. The positive thing from the results is that a large percentage are interested in the need to have an occupational health and safety management system in accordance with international standards at the university.

CONCLUSION

Occupational health and safety must be promoted in Libya at this time. The starting point should be to develop a clear national policy and strategy. The establishment of a successful occupational health and safety management system depends on the consensus of all social parties in the country.

The aim of this study was to shed light on the establishment of an occupational health and safety management system to develop and improve the quality of operations and services provided by the University of Tripoli to its members, student professors, employees, and visitors. Identify the effect of reducing the number of accidents and injuries within the university to create a healthy work environment for faculty members, students, and everyone in it, to improve efficiency at the university.

The summary of the results was as follows: There is currently no effective system or procedures for occupational health and safety at the University of Tripoli, as there is no department or department concerned with occupational health and safety at the University of Tripoli. In addition, there are no plans and programs related to occupational health and safety and work to follow them up within the university, as there is no coordination and continuous follow-up by the University of Tripoli with governmental and private institutions.

There is no knowledge or background on occupational health and safety management systems, and there is a lack of awareness of its responsibilities towards health and safety at the university and the positive thing from the results is that a large percentage of those interested in the need to establish an occupational health and safety management system.

RECOMMENDATIONS

1. Establishing the University's Occupational Safety and Health Administration and the corresponding departments and units to achieve a healthy and safe work environment and improve performance and employee efficiency.
2. Shedding light more and more on the issue of occupational safety and health and that it be researched in several studies to identify the administrative issues most related to it,
3. Initiate a comprehensive evaluation process for the tools, equipment and activities of the university's occupational health and safety.
4. The necessity to realize the importance of health and safety measures in general, as this concept is of great importance in maintaining the health and safety of individuals inside the university, whether they are students or employees, as well as to ensure that its property is protected from damage and loss due to accidents and dangers.

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5. Conducting awareness-raising training courses to spread the concept of occupational health and safety for students and all people working at the university to prevent accidents, or at least to learn how to deal with them when they happen.
6. The necessity to provide clear procedures to be adopted in crises and disasters and must include *first aid* and evacuation in emergency situations such as fire and earthquakes and all necessary preparations inside the university buildings.

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APPENDIX A

Questionnaire of the study

This section A captures data on basic information. Please tick ☑ in the box of your chosen answer.

1. Gender of the respondent

Male ☐ Female ☐

2. What is your age?

18-28 ☐ 29-39 ☐ 40-50 ☐ over 50 ☐

3. Highest level of education

None ☐ Secondary ☐ College ☐ Master ☐ PhD ☐

4. Duration of work / duration of study

3 – 7yrs ☐ 7 – 10yrs ☐ 10 – 17yrs ☐ 17 – 24yrs ☐ 24 – 31yrs ☐

Section B: Current Occupational Health and Safety at the university OHSMS					
Statement	Definitely	Most likely	Moderately	Slightly	Not at all
1. To what extent an effective occupational safety and health system exist in the university.	1	2	3	4	5
2. To what extent specialized committees exist within the university to monitor occupational safety and health work.	1	2	3	4	5
3. To what extent do you think your workplace at the university needs occupational health and safety procedures and methods?	1	2	3	4	5
4. To what degree do you have the knowledge (background) about global occupational health and safety management systems?	1	2	3	4	5
5. To what degree, does the university implemented an occupational health and safety management system?	1	2	3	4	5
6. What do you think about the extent of which the plans and programs exist in the university to implement an occupational health and safety management system?	1	2	3	4	5
7. To what extent do you think that there are occupational and health risks in the university?	1	2	3	4	5
8. To what degree do you think it is necessary to have an occupational health and safety system in accordance with international standards at the university?	1	2	3	4	5

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9. Do you know the degree of your responsibilities towards the health and safety at the university?	1	2	3	4	5
10. To what extent, has the university spread the culture of occupational safety and health system and informed the university staff about it?	1	2	3	4	5
Section C: Accidents and relation with OHSMS					
Statement	Definitely	Most likely	Moderately	Slightly	Not at all
1. To what extent accidents (general accidents and work accidents) that occur at the university recorded and documented?	1	2	3	4	5
2. How frequent, did you notice any accidents and injuries during your work/studies at the university.	1	2	3	4	5
3. In your personal experience, have you ever had any accidents and injuries at the university?	1	2	3	4	5
Section D: Disease and its relation to OHSMS					
Statement	Definitely	Most likely	Moderately	Slightly	Not at all
1. Have you exposed at the university during your work with any infectious disease?	1	2	3	4	5
2. Have you exposed at the university during your work to a respiratory disease through gases, fumes, or other causes?	1	2	3	4	5
3. Have you exposed at the university during your work to psychological and behavioral diseases?	1	2	3	4	5
4. To what extent a special doctor dedicated for the university' employees and students?	1	2	3	4	5

In your opinion and given your expertise, what are the main challenges in regard to the OHSMS implementation in the Tripoli University? Please only list **<u>two</u>** challenges.

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