

## Safety in Turkish Printing and Publishing Sector; Evaluation of Awareness Levels of the Workers on Health and Safety Issues

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### Abstract

*There are limited academic studies on the occupational health and safety conditions of Turkish printing and publishing sector. The aim of this study is to evaluate the risks of the sector, determine the awareness level of the workers on occupational safety and present the occupational health and safety conditions in the sector on the basis of the investigations and measures. Most of the workers included in this study found to be approving the occupational safety measures, which are provided by employees. However, it is found that the employees are lax and behave loosely to enforce and apply sanctions but the awareness of the workers on the occupational safety measures is high. It is determined that the workers, who are trained on printing and publishing processes, are aware and sensitive on occupational safety and measures. Nevertheless, one-third of the workers don't comply with the measures in an adequate level. Besides, the frequency of occupational accidents are two times higher than the European countries and it shows that the workers of the sector are not trained, informed, aware and sensitive on the occupational safety issues.*

**Keywords:** Printing and publishing, Occupational safety, Safety culture, Occupational accidents.

### 1. Introduction

A new concept of occupational life found place with the development of industrial society. However, occupational accidents and diseases began to increase, correspondingly. Production processes in factories and worksites also began to affect the workers physical and psychological manners. These negative effects first arose in countries in which industrial revolution began. The first measures for removing or minimizing these effects were taken by governments and healthcare representatives. This concept, which was born in European countries, began to come into prominence in developing countries with the industrialization process during recent years [1, 2].

Developments in mechanical and chemical industry onwards from the last decades of the 19th century have effects on printing and publishing sector. The letters, which are produced from lead before, are begun to produce faster by 'Entertype' and 'Linotype' machines. After the invention and mechanization of offset printing, the usage of several chemicals (alcohols, solvents, mould chemicals, ink chemicals etc.) increased. Offset printing technique began to seize the letterpress printing market onwards from the middle of the 20th century [3]. During the following years, letterpress printing left its place to

offset printing. Electronic technology, which affects all of the machines that are used in printing sector, is begun to use during the production of mechanical machines [4].

By the increasing usage of electronic technology, chemical consumption and emissions in printing and publishing sector decreases. Electronic technology also decreases human labor and thus, mechanization ratio increases. At the present time, mechanic machines, which are more dangerous, left their places to safer electronic machines and thus, workers expose to chemical consumables, less. On the other hand, this new technology results in a new range of accident probabilities. Accidents and injuries occur especially when the workers deactivate the protective measures of the machines [5].

There are numerous studies on occupational accidents and diseases that occur in printing-publishing sector on the world. However, these studies are lack of number and content. It is still not possible to reach reliable information about occupational accidents, diseases, risks, safety and working conditions in most, even developed countries. According to several studies and statistics, the main risk factors of printing and publishing sector are; manual handling works, moving machines, falling, being hit by object, hazardous chemicals, non-ergonomic working environment and stress [6, 7, 8, 9, 10].

According to the studies and statistics that are published by English Health and Safety Executive, two main reasons of accidents are manual handling and contact with moving machines with the ratios of 27% and 22%, respectively. Besides, while 8% of accidents result from being hit by moving or falling object, 7% and 4% of accidents occur as a result of falling from height and other handling works, respectively [11, 12, 13].

The researches on working conditions of Turkish printing and publishing sector are very limited. Besides, risk assessment studies on working conditions have been begun only 2 years ago. In spite of the legal obligations, deterministic studies on risk factors for small and medium sized enterprises aren't applied and the existing risk assessments are not in an adequate level. Some machines, equipment and production technologies are still old fashioned. There still occur considerable problems on quality and experience of experts and in terms of used risk analysis methods. Thus, the occupational safety risks of printing and publishing sector are still unknown and the sector is lack of adequate measures.

According to the statistics of Turkish Social Security Institution, approximately 300 occupational accidents occur in Turkish printing and publishing sector. Work processes, machines and chemicals, which are used in printing and publishing sector, are identified risky for workers in terms of health and safety. Printing and publishing enterprises are classified as 'dangerous works' in 'Hazardous Classification Statement for Workplaces' that is published after 'Occupational Health and Safety Act No. 6331' entered into force in 2012. These interventions led to a series of legal legislations that should be applied in printing and publishing enterprises.

It is indicated in the Act that training, inspection and risk assessment activities of the printing and publishing enterprises must be performed periodically. The OH&S Act brings strict obligations on basic worker health and occupational safety trainings, which must be practiced biennially, inspection activities, which must be practiced triennially and risk assessment studies, which must be applied quadrennially. At this point, basic health and occupational safety training of workers come into prominence. According to the relevant regulation, workers must be trained periodically. Thus, it is aimed to increase the awareness of the workers in order to prevent carelessness, which is the main reason for occupational accidents.

On the other hand, preventive studies for occupational safety are not in an adequate level in the sector. As a result of lack of statistics and risk analysis, which explain the current conditions, the risks in the sector are unknown. Besides, awareness and education level of the employees, managers and workers are low. This research is prepared on the purpose of presenting the occupational safety conditions of Turkish printing and publishing sector, determining and comparing the behavior and awareness level of the workers. A

questionnaire is prepared as a part of the research. The questionnaire is designed to include questions that can lead the research to outcomes such as awareness, knowledge, and evaluations of the workers on worker health, occupational safety and safety measures issues.

## 2. Materials and Methods

The research is performed in two phases. First, the questionnaire is developed after a comprehensive literature review and updated after expert opinions. Then, it is applied to 150 people who work in different enterprises in printing and publishing sector.

The population is formed by all of the employers in Turkish printing and publishing sector. The sample group is chosen with simple random sampling method. The questionnaire is applied to the sample group face to face. According to the statistics of Turkish Social Security Institution, there are 68,787 insured workers in the printing and publishing sector in 2012.

The data, which is used within the research, is formed as a result of questionnaire, which is prepared with the help of literature review. The questionnaire is formed by 18 questions. 5 about personal characteristics of workers (education, age, working hours etc.), 5 about personal experience of workers on worker health and occupational safety and 8 questions are about the thoughts of the workers on the regulations that are practiced in workplaces. The questions about the thoughts of the workers on the measures for occupational health and safety are prepared with 5 point Likert scale. In this scale, '1' refers to 'strongly disagree' and '5' refers to 'strongly agree'. In the next phase, the frequency and ratios of answers are calculated with SPSS packaged software and then, the answers are analyzed with Mann Whitney U-Test. This method was used in occupational health issues, frequently [14, 15, 16, 17, 18, 19].

The data is classified and interpreted in four titles as 'Behavior of the Employee on Preventive Measures for Worker Health and Occupational Safety', 'Behavior of the Employee on Using Personal Protective Equipment and Worker Health and Occupational Safety Training', 'Behavior of the Employee on Enforcing the Workers for Worker Health and Occupational Safety Applications', 'Behavior of the Workers for Applying Worker Health and Occupational Safety Measures'.

In consideration of previous international and national studies, occupational health and safety conditions in Turkish printing and publishing sector and awareness level of the workers are compared and evaluated together.

## 3. Results

### 3.1 Health and Safety Characteristics of Turkish Printing and Publishing Sector

Occupational accidents and safety issue is one of the social policies, which has been discussed for many years,

**Table 1** Number of Workplaces, Employees, Occupational Accidents and Diseases and Deaths in Printing and Publishing Sector in Turkey

Years	Number of Workplaces	Number of Employees	Occupational Accidents	Occupational Diseases	Permanently Disabled	Deaths
2012	9190	68787	266	0	8	0
2011	9036	68222	305	3	1	2
2010	8625	64376	277	10	6	1
2009	8805	65447	260	1	4	1
2008	9036	68978	223	2	7	0

in Turkey. According to statistics of 2012, 74,871 occupational accidents and 395 occupational diseases were occurred. As a result of these accidents and diseases, 745 workers died and 2,209 workers became permanently disable [20]. Turkish Social Security Institution's statistics for the last decade present that 64-80,000 occupational accidents, 750-1,000 deaths and 2,200-3,000 permanently disabilities occurred in Turkey. In the same period, employment rate and the number of insured workers increased by 15% and 90%, respectively. Nevertheless, occupational accidents ratio is above the acceptable limit and very high in compliance with developed countries.

It can be easily asserted that the technical, organizational and working condition measures are not taken into consider in an adequate level since a great amount of these accidents can be prevented despite the increase in employment rates. Besides, it is obvious that the number of accidents includes only declared ones by enterprises and it must be considered that most of the accidents are not recorded due to the informality and under-diagnosis of diseases. For instance, comparing the employment data with the results of Research for Occupational Accidents and Work-Related Health Problems, which is published by Turkish Statistical Institute in 2013, it is possible that the real numbers can be 3-4 times higher than the declared numbers [21].

According to the statistics of Turkish Social Security Institution, there are approximately 9,000 workplaces and 70,000 workers in the sector. 266 occupational accidents occurred in printing and publishing sector in 2012 and no occupational diseases are recorded. However, it is well known that there are occupational diseases as a result of chemicals and non-ergonomic working conditions in this sector. Recording the occupational diseases in printing and publishing sector is very low, even zero, just like the other sectors in Turkey.

8 workers became permanently disabled as a result of occupational accidents in 2012 and no deaths occurred. According to the statistics of last 5 years, 270 occupational accidents occur every year in average, but occupational diseases cannot be identified adequately (see Table 1). However, the ratio of the informal workers is around 36%. Most of the accidents results with injuries

and death rate as a result of accidents are low. There is no certain information about informality in the sector but it is known that there are small enterprises that employ informal workers. Besides, it must be considered that many minor injured accidents are not declared to Social Security Institution. It is also estimated that the real number of the accidents are much higher than the recorded accidents. Occupational accident ratio is around 4 in a thousand in the sector. This ratio is much lower than the other sectors such as mine, construction and metal manufacturing. However, a great improvement occurred in equipment, machines, raw materials and working methods that are used in printing and publishing sector. In case of working with safe methods and tools, it is possible to reduce the occupational accidents and diseases to a very low level.

There is a similar situation in many countries in printing and publishing sector. While injured accidents and diseases occurred intensely, deaths occur less. However, in developed countries such as the USA, the UK, Germany and France, safe methods and tools are generalized and thus, frequency of occupational accidents is decreased. For instance, frequency of accidents decreases by 50% and 23% for the USA and the UK, respectively between the period of 2000-2012 [7, 10, 23, 24, 25]. The frequency of accident is 386 for 100,000 workers in Turkey in 2012. This ratio is two times higher than Europe average. Besides, the frequency has a fluctuating course that, it can both decrease and increase in time. Frequency of accidents didn't decrease since the year of 2008. Briefly, occupational accidents cannot be controlled in printing and publishing sector.

The researches that investigate the working conditions in Turkish printing and publishing sector is limited and no statistics are published on the reasons of occupational accidents in Turkey. Thus, reasons, types and effects of the occupational accidents and diseases are not known well. Besides, risk assessment studies, assessing the working conditions in the sector, has begun just two years ago. Due to the lack of awareness, no risk analyses are prepared in small enterprises and the existing risk assessments are not in an adequate level.

**Table 2** Demographic and Identifying Characteristics of Participants

Demographic Findings		Number of Workers	% (Rate)
Age	20	2	1,3
	21 – 30	52	34,7
	31 – 40	78	52,0
	41 – 50	18	12,0
	<b>Total</b>	<b>150</b>	<b>100,0</b>
Department	Press	57	38,0
	Before press	9	6,0
	After press	22	14,7
	CTP	7	4,7
	Graphic	25	16,7
	Quality control	7	4,7
	Management	23	15,3
	<b>Total</b>	<b>150</b>	<b>100,0</b>
Education	Primary education	8	5,3
	Secondary education	60	40,0
	Associate's degree	41	27,3
	Undergraduate	40	26,7
	Master	1	,7
	<b>Total</b>	<b>150</b>	<b>100,0</b>
Demographic Findings		Number of Workers	% (Rate)
Graduation Field	Primary education	9	6,0
	General high school	37	24,7
	Printing vocational high school	27	18,0
	Printing teacher	23	15,3
	Printing and publishing technology	21	14,0
	Graphical design	12	8,0
	Undergraduate (Other)	16	10,7
	Associate's degree (Other)	5	3,3
	<b>Total</b>	<b>150</b>	<b>100,0</b>
Working Duration	0 – 3 Years	58	38,7
	4 – 6 Years	51	34,0
	7 – 10 Years	26	17,3
	11 – 13 Years	8	5,3
	14 – 17 Years	6	4,0
	Above 17 Years	1	,7
	<b>Total</b>	<b>150</b>	<b>100,0</b>

There are problems on methods and the quality and experience of experts. Thus, risk factors of the printing and publishing sector are uncertain.

On the other hand, it is known that there are informal workers in the sector but the informality ratio is uncertain. There are no accurate information about the exposure of informal workers to occupational accidents and diseases. Informality and unrecorded accidents

generally occur in small enterprises. Some machines and equipment, which are used in some enterprises, are outdated, non-protective and highly risky in terms of occupational safety. Production technologies are outdated in small enterprises in which a few people work especially. Despite the fact that some chemicals are dangerous for human health, they are bought on a very cheap price and they are used without strict controls.

Environmental plan is not effective in terms of occupational safety in most of the workplaces. Warning signs are lacking and inadequate. Thus, injuries caused by falling and being hit by an object occur frequently. Personal protective equipment (PPE) is not delivered to the workers or suitable PPE is not provided for risks that may occur in the workplace. Most of the PPE is not standards-compliant and they are produced by cheap materials that are not protective enough. Employees and managers are unaware and they don't allocate enough time and resources for occupational safety. Most of the workers are under-educated and they aren't trained or trainings are inadequate. Due to the lack of occupational safety culture of workers, occupational accidents and diseases occur as inevitable results.

In consideration of limited studies in Turkey, the main risks in printing and publishing sector are as follow; non-protective and defective machines of which some moving parts are open, falling from height or the same level, being hit by objects due to untidy working environment, hazardous chemicals that are used in printing process, accidents occurred during manual handling, falling, noise exposure, overworking, flexible working types, inadequate or defective protective equipment and lack of education. The most common injury types are hand injuries, eye injuries, loss of hearing and skin injuries [5, 26, 27, 28].

### 3.2 Demographic Characteristics of Participants

Considering the distribution of workers in terms of demographic characteristics (see Table 2), it can be seen that more than half of the participants are at 31-40 age group, which is identified as middle age. Majority of the workers (88%) are at young age group. Approximately 73% of the workers' working experience in the current workplace is under 6 months. The reason of this situation is that worker rotation rate is very high in the sector. Most of the workers in the printing sector are generally inexperienced and this situation is one of the main reasons of occupational accidents.

When the graduation fields of the workers are analyzed, it can be seen that 24.7% of the workers graduated from general high schools. This ratio is 6.7% more than the graduates of printing vocational high schools. Most of the workers, who are educated in printing, work on different jobs. Besides, secondary schools, whose expertise is on printing, are inadequate to train enough number of personnel. Only 47.3% of the workers are trained on printing (printing vocational high school, associate degree on printing and publishing, printing teacher). One of the most important principles to prevent the occupational accidents is to have adequate level of knowledge on the job. 38%, 16.7% and 15.3% of the participants work on press, graphic and management sections, respectively.

Participants were asked if they were exposed to an occupational accident and how long did they stay as

disable as a result of the accident during last year. According to the results, 22% of the participants exposed to minor accidents that did not result in workday loss. These accidents are generally minor incisions, burnt and traumas. % 6 of the participants stated that they were exposed to major accidents that resulted in workday loss. According to these results, it can be easily calculated that frequency of accidents is around 600 in 100,000 in Turkish printing and publishing sector. The formal statistics that are published by Turkish Social Security Institution includes only the officially declared accidents and most of the accidents are not recorded.

### 3.3 Behaviors and Evaluations of the Workers in terms of Worker Health and Safety in Workplaces

The questions of the questionnaire, which is performed in order to determine the awareness and thoughts of the workers on worker health and occupational safety, are classified into four categories. Table 3 presents the title of the categories, mean values of the groups and standard deviation.

**Table 3** Mean Values and Standard Deviations of the Questionnaire

	Mean Values	Std. Deviation
Behavior of the Employee on Preventive Measures for Worker Health and Occupational Safety	4,14	0,66
Behavior of the Employee on Using Personal Protective Equipment and Worker Health and Occupational Safety Training	4,27	0,69
Behavior of the Employee on Enforcing the Workers for Worker Health and Occupational Safety Applications	1,34	1,78
Behavior of the Workers for Applying Worker Health and Occupational Safety Measures	4,04	0,62

The mean value of the questions in which the workers were wanted to evaluate the protective-preventive studies of the employees is very high (4.14). According to this result, workers are generally satisfied with the studies of the employees on worker health and occupational safety. The behavior of employees on trainings and using PPE is another high mean value (4.27).

On the other hand, the 1.34 ratio, which identifies the behavior of the employees on enforcing the workers for worker health and occupational safety applications, show that the employees are lax and behave loosely about this issue. Inspection is one of the most important phases of occupational safety management systems and have a considerable effect on preventing the accidents. Performing inspections, as well as taking measures, on workers to determine whether they work properly is one

of the primary duties and responsibilities of the employees.

The sensitivity of the workers on applying the measures is relatively high (4.04). However, it must be considered that this research was performed in small and medium sized enterprises and this ratio may be less in big companies.

Considering the mean rank of graduation fields, it is concluded that workers who graduate from a different field tend to express more positive opinions for employees comparing with workers who graduated from printing field. Besides, when examining the opinions of workers who graduated from printing field, it is concluded that the workers who graduated from the department of printing and publishing technologies take a bright view of the studies on worker health and occupational safety. Printing teachers are generally finds the studies that are applied by employees as insufficient. Increase in academic education about printing sector results in increase of occupational safety awareness and the need for measures that should be applied.

The satisfaction level of workers about occupational safety measures increase by the age increase. This result can be interpreted as that workers tend to accept the dangers in the workplace as they grew older. Due to the lack of safety during their early life, old workers also have a positive look on new measures without questioning.

On the other hand, use of physical strength and physical production processes increase before, during and after printing, respectively. Thus, adequacy of the occupational safety measures is directly proportionate with these production processes. Department of prepress in which mental processes like design and preparing for printing are carried out is placed in an office environment. Therefore, material production processes are less than the other departments. Due to the rareness of risks, satisfaction of the workers for occupational safety activities is relatively higher in employers of prepress department than other departments.

Printing and after printing departments are the main production fields of printing industry. Thus, the risks for occupational accidents and diseases are more common in these departments. Workers of these departments generally think that worker health and occupational safety studies are not adequate. Printing and after printing machines work with high audio frequency and they also have potential threats for injury. Workers, who work at printing department, contact with chemicals such as alcohol, solvents, ink and paper dust, continuously.

Graduates from associate's degree and undergraduate programs are the two main subgroups of the study that find the worker health and occupational safety studies insufficient. The questionnaire values of these groups are less than other groups. According to these data, it is concluded that awareness level increase with professional knowledge and academic education level. The awareness level about health of workers and occupational safety

increases in parallel with the education level. Similarly, motivation for using PPE is found as insufficient by young workers and old workers tend to consider the motivations as adequate.

When the importance of occupational safety measures is evaluated according to the departments; workers of quality control department was the leading subgroup and followed by managers. These employers can view the production processes, holistically because of their profession. Thus, they can apprehend the importance of occupational safety, training and using PPE in production processes.

The most commonly used PPE's are hand and arm protections with a ratio of 34%. Ear protections are the second most commonly used PPE's (23%). The most important result of the research is to find that 18% of the workers, which corresponds 43 workers, don't use any PPE's in production processes. This ratio, which means one fifth of the workers work unsafe and without protection, is very high and important in terms of understanding the real situation.

Older workers tend to care about occupational safety more in printing sector. Worker, who are younger than age of 20, are the least experienced group and they care less about occupational safety measures than other age groups. Briefly, in printing sector, there is a direct proportion with age and caring measures. Since the employers in administrative departments found the occupational safety studies sufficient, their questionnaire values are high. In spite of that, the values of the employers of quality control department, who can view the whole production processes, are lowest.

## Conclusion and Recommendations

In Occupational Health and Safety Act, printing and publishing sector is identified as dangerous in terms of worker health and occupational safety. Several measures are identified in the literature and national legislation in order to protect the workers' health from chemicals, production machines and during production processes. These enforcements are begun to apply in printing and publishing sector, gradually. The first and most important enforcement is to determine the risks for worker health and occupational safety in printing workplaces. On the other hand, the number of academic studies are limited on worker health and occupational safety in printing and publishing sector. There are no enough studies and papers that can be cited for risk analyses in the sector.

The aim of this research is to determine the awareness levels of the workers in the printing and publishing sector and to evaluate the worker health and occupational safety conditions in workplaces.

Most of the employers have positive opinions on occupational safety studies that are performed by the employees. However, they generally believe that the employees are lax and behave loosely in order to enforce the employers to obey the measures. Employers also

indicate that their sensitivity to the occupational safety measures is at a high level.

On the other hand, it is concluded that the sensitivity and awareness level of educated employers are higher for applying the measures. In spite of that, it is determined that approximately one fifth of the workers ignore the measures by not using personal protective equipment.

According to the results of this research, employers are generally satisfied with the worker health and occupational safety practices of the employees. Another high value is observed on the behavior of employees in using personal protective equipment and occupational safety trainings and employers believe that the employees take care about these issues. However, the research was prepared and evaluated based on personal knowledge and interest of the employers.

In spite of that, the number of occupational accidents, deaths and injuries is high. The frequency of occupational accidents in Turkish printing and publishing sector is two times higher than European countries. Most of the workplaces are lack of occupational safety measures but majority of the employers are not aware of the safety requirements of their workplaces. Thus, training of the employers both in high school and/or university and workplaces has a crucial importance. The awareness of the workers on occupational safety is low. Besides, both employers and employees are lack of occupational safety culture and they are not sensitive on rules and requirement of occupational safety in an adequate level.

A research studied by European Agency for Safety and Health at Work, which was performed by discussions with workers in all member, candidate and potential candidate countries in order to determine perception level on worker health and occupational safety, pointed out a dramatic result. Except the workers in countries such as Norway, Austria, Denmark and Germany, whose occupational safety level is high, most of the employers in member, candidate and potential candidate countries, think that they are not informed enough about occupational safety. Similarly, 73 of 1004 workers in Turkey, who participate the questionnaire, indicated that they are not informed about occupational safety. According to the same research, 63% of the Turkish workers feel safe at workplace and this ratio is higher than the average of EU candidate countries [29]. In spite of that, frequency of occupational accidents that result in injury and death is 2-3 times higher than EU countries. Consequently, perception and awareness level is low in printing and publishing sector in Turkey. Most of the employers lack of knowledge about the meaning, importance and scope of occupational safety and measures. As a result, they generally satisfied with the limited and inadequate activities. Therefore, participation to the studies related with occupational safety is limited. Although Occupational Health and Safety Act, which came into force in 2012, brings new rules to enforce enterprises to employ OH&S representative, OH&S committee and

even OH&S support personnel, these enforcements are applied as perfunctory and aren't considered as important by employers and employees.

Widespread use of full automatic machines and less contact with chemicals may improve the worker health and occupational safety conditions. Nevertheless, it is known that the working conditions are still bad in small enterprises, at which old technology and intense labor force is used.

Printing and publishing sector is classified as dangerous work due to its production processes. Thus, worker health and occupational safety conditions must be determined by considering researches that are based on reliable observations. Besides, these conditions must be evaluated in detail by taking the opinions of employees and employers into account. New and comprehensive researches, which aim to determine the risks and measures, must be performed. Increasing the inspections are also important for resolving malfunctions and taking measures. Training activities must be improved and protective and preventive services must be provided by experienced experts. All technical, organizational and administrative measures that are indicated and mentioned in the laws must be considered by managers, primarily. Employees and the state are the primary responsible for taking measures and training employers. Determining the risks, taking the measures and preventing the accidents must be considered as a necessity rather than procedures that are forced by laws in order to achieve a better result. Therefore a systematic approach is needed. It is impossible to perform inspections, risk assessments, preventive services, education, internal control, maintenance and betterment in appropriate way without a systematic approach. Although some important legislative regulations are prepared for printing and publishing sector in Turkey in recent years, inspection, workplace organization and worker participation issues are still inadequate. As a result, it was inevitable to avoid deadly accidents especially in coal mining and construction sectors due to increased production and employment rate.

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