

EFFECT OF ECONOMIC CRISIS ON INCIDENTS OF OCCUPATIONAL INJURIES

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Abstract

The economic crisis of 2008 brought about many changes in the global economy, deteriorating almost all aspects of human activity. The impact on the Health and Safety of employees - due to these rearrangements - is potentially great. A large section of Occupational Health and Safety concerns occupational injuries. This paper presents the results of a quantitative survey - using the Kruskal Wallis nonparametric test - which examines the increase or decrease of occupational injuries due to the economic crisis. At the same time, a linear Bivariate Correlation was carried out among data samples of nonfatal - fatal accidents to identify a negative, positive or no relationship between them. The results of the survey showed that the economic crisis did not differentiate the number of occupational injuries, as they continue their downward trend and that there is no linear correlation between the values of fatal and nonfatal accidents.

Keywords: Occupational injuries, workplace accidents, economic crisis, occupational health and safety, work environment

INTRODUCTION

The banking crisis of 2008 nearly destroyed the international financial system. It has harshly affected the economies of many developed countries and has had a negative economic impact on almost all countries (International Labour Organization, 2013). The problems of the EU, international money markets and foreign exchange markets increased the problem, resulting in

an international, global crisis that lasts to this day. Austerity policies implemented or enforced to reduce public debt as a percentage of GDP, as well as the effort to reduce lending did not have the anticipated results. On the contrary, it has led to a decline in demand for goods and products, a decline in public investment, a reduction in bank credit and, consequently, an increase in unemployment and loss of jobs through the deregulation of labour institutions. The impact on the Health and Safety of employees - due to these rearrangements - could be major. For example, said report (International Labour Organization, 2013), refers to the extension of working hours, the partial neglect of personal protection measures, the existing and new risks due to work load or due to the assumption of new work duties, psychosocial loads due to job loss. More specifically - according to the same report - the most likely risks to Occupational Health and Safety (OSH) due to the economic crisis are:

- Increased focus on increasing productivity and development and the consequent reduction in the interest for OSH issues
- Restructuring of business organisational structure, resulting in increased psychosocial risks
- Increase of workload, without any reward for employees

This situation in general also leads to a further weakening of the conditions for Occupational Health and Safety. In a survey carried out by the European Agency for Safety and Health at Work (2009) in the 27 Member States of the EU, the majority of answers to the question *“Do you expect or not that safety and health conditions at work in [your country] might deteriorate due to the economic crisis?”* was *“very much”* and *“quite”* to a percentage of 61%, while only 34% answered *“not much”* or *“not at all”*

The effects of the economic crisis and its possible consequence in the downgrading of OHS conditions had not been the same in all Member States. According to Walters and Wadsworth (2016), Greece and Spain were most affected. Specifically in Spain, emphasis was placed on increasing productivity and reducing production costs, while OSH conditions were marginalised, in the reasoning that if the production terms and profitability of companies increases, part of this profit will be channelled to improving OSH conditions. Similarly in Greece, the reduction of jobs and the precariousness of maintaining employee status, even in large state organisations, such as Hospitals and Municipalities, made the interest of workers' unions to shift from OSH issues to the abovementioned problems.

Naturally, not all employee categories run the same occurrence risk of occupational diseases and injuries. De La Fuentes et al (2014) conducted a survey on occupational injuries during the economic crisis in Spain and concluded that employees who tend to have fewer occupational injuries belong to the following categories: employees of older age, with more work experience, women employees, employees in large companies and employees with permanent

jobs. As regards employment under temporary contracts, Bena and Giraudo (2013) also agree that they are a major factor in increasing occupational injuries. Employment insecurity, according to Loerbroks et al (2014) has an increasing impact on the risk of developing diseases, such as asthma.

The increase of unemployment, in particular, which leads to a sense of employment insecurity, has taken huge proportions in recent years. In particular, according to data from the United Nations (2016) and the International Labour Organisation (2015), in the period from 2007 to 2015, unemployment has risen from 170 million to 204 million people, and this figure will reach 470 million by 2030.

According to Barling and Kelloway (1996), insecurity of maintaining jobs and especially when associated with extended periods in this situation can be very damaging to the health of the individual. Sverke et al. (2002) argue that employment insecurity is a factor affecting the physical and mental health of employees, while Probst and Brubaker (2001) argue that workers who experience employment insecurity, do not fully comply with Occupational Health and Safety standards, are injured more often, and ultimately, employment insecurity has a negative impact on the concept of occupational safety.

Naturally, employment insecurity is not the only cause of occupational diseases and injuries. According to Pouliakas and Theodosiou (2013), there seems to be a correlation between occupational diseases and accidents with factors such as low educational attainment, low family income, long-term unemployment, long hours at work, monotony and non-creative work in general, as well as employees' lack of satisfaction from work.

According to Chaid et al (2015), during work all employees may either be victims of an occupational injury or suffer from an occupational disease, with the following consequences: Temporary inability to work - Permanent partial disability - Death

However, what happens in terms of actual numbers for occupational injuries? Are they increased or reduced in the years of the economic crisis we experience?

According to Constantinides, (2015) literature review shows that during periods of prolonged economic downturn and of poor economic performance of national economies in general, there is an increase in the frequency of occupational injuries. He argues that the causes are to be found in the increased workload, pressing working conditions, employment insecurity, reduced investment for the decrease and elimination of occupational hazards, work-related stress, increased age average of employees, as well as the increased participation of migrants in the final product. Naturally, the decline of employment as a result of the economic downturn can also have opposite effects. Especially in economy sectors that are most affected,

this decline plays a key role, as does the increase of uninsured employment, which affects the “distortion” of specific accident rates that appear fictitiously smaller.

There is, of course, the opposite view too. Terres de Ercilla et al., (2004) argue that occupational injuries in times of economic crisis have a downward trend. According to them, the traditional approach to the analysis of occupational injuries is that in recession periods they are decreasing. The factors of the economic cycle that affect the frequency of occupational injuries have been studied by many researchers. Some claim that this decrease is mainly due to the under-reporting of occupational injuries in crisis periods and not to an actual reduction in their frequency. Thus, Koukoulaki (2015) considers that the possible reduction of occupational injuries in crisis periods is due to their under-reporting and that as the service sector grows, accidents will be reduced due to low risk. Working hours are also an important factor in the occurrence of occupational injuries. Mouza and Targoutzidis (2012) believe that a slight increase in working hours could cause a large increase in fatal accidents.

Other researchers (Nichols, 1986) argue that in times of development there is demand for jobs and employees are in a better position to claim good working conditions. The opposite is true in times of recession. In general, there is a reduction of occupational injuries in Europe, as the service sector grows.

The main objective of this research is to determine whether the economic crisis increases or decreases the number of occupational injuries. The secondary objective is to investigate whether there is a relationship between the two categories of occupational injuries (nonfatal - fatal) and whether this relationship is positive or negative.

The paper is structured as follows: The first part presents the introduction, the second part contains the methodology and methods used to examine and investigate the questions set. The third part presents the results and the subject is discussed, while the fourth and final part provides the results and suggestions.

METHODOLOGY

A survey was conducted, subsequently its data was analyzed using the Kruskal-Wallis Anova test for two independent samples through SPSS ver. 20 statistical package. The reason of selection of a non-parametric statistical criterion is our potentially unknown distribution of data (such as regularity or equality of variance). This error probability is neutralised by the use of non-parametric statistical criteria. At the same time, a linear Bivariate Correlation was conducted among the data samples in order to investigate the existence of a positive, negative or no correlation between them. The data is derived from the information available on the International Labour Organisation website and specifically by ILOSTAT database (2017), in the

section Occupational Injuries; said data was retrieved on 23 January 2017. For this survey, the data of both tables was used, namely on fatal and nonfatal occupational injuries. The data retrieved came from 74 states which are listed in table 1. The total cases were 673 and data from 74 states was used, for which there was a record for the years 2000-2007 (pre-crisis) and 2009-2015 (during the crisis). Year 2008 was excluded from the analysis, as the year of onset of the economic crisis.

Table 1. States from which data were retrieved

1. Algeria	20. Denmark	39. Lithuania	58. San Marino
2. Argentina	21. Egypt	40. Macau (China)	59. Singapore
3. Australia	22. El Salvador	41. Malaysia	60. Slovakia
4. Austria	23. Estonia	42. Malta	61. Slovenia
5. Azerbaijan	24. Ethiopia	43. Mauritius	62. Spain
6. Bahrain	25. Finland	44. Mexico	63. Sweden
7. Belarus	26. France	45. Moldova Rep.	64. Switzerland
8. Belize	27. Germany	46. Myanmar	65. Taiwan (China)
9. Brazil	28. Greece	47. Namibia	66. Thailand
10. Bulgaria	29. Hong Kong (China)	48. Netherland	67. Togo
11. Burkina Faso	30. Hungary	49. Nicaragua	68. Trinidad and Tobago
12. Canada	31. India	50. Norway	69. Tunisia
13. Chile	32. Ireland	51. Panama	70. Turkey
14. Colombia	33. Isle of Man	52. Poland	71. Ukraine
15. Costa Rica	34. Israel	53. Portugal	72. United Kingdom
16. Croatia	35. Italy	54. Puerto Rico	73. United States
17. Cuba	36. Kazakhstan	55. Qatar	74. Zimbabwe
18. Cyprus	37. Kyrgyzstan	56. Romania	
19. Czech Rep.	38. Latvia	57. Russian Fed.	

RESULTS AND DISCUSSION

Table 2. Kruskal Wallis Test
Ranks mi thanatifora (nonfatal injuries)

Examined period		N	Mean Rank
Non fatal	prekrisis	411	318,07
	during krisis	202	284,48
Total		613	

Table 2 shows that, as regards the first data examined, i.e. nonfatal injuries, the mean average for the pre-crisis period was 318.07 and 284.48 for the period during crisis.

At this point we have to formulate the null hypothesis and our alternative hypothesis:

H_0 : There is no difference between the two periods examined with regard to nonfatal injuries

H_1 : There is a difference between the two periods examined with regard to nonfatal injuries

According to table 3 and the asymptotic method, to investigate whether there is a statistically significant difference between them at 95%, we observe that because the level of statistical significance is Asymp. Sig = 2.7% <5% the null hypothesis is rejected in favour of the alternative hypothesis. Therefore the two mean averages differ to a statistical significance level of 5%.

Table 3. Test Statistics nonfatal injuries

		Non fatal
Chi-Square		4,874
Df		1
Asymp. Sig.		,027
Monte Carlo	Sig.	,027(a)
Sig.	95% Confidence	Lower Bound
	Interval	Upper Bound
		,024
		,030

Notes: a. Based on 10000 sampled tables with starting seed 299883525.

b. Kruskal Wallis Test

c. Grouping Variable: examined period

Based on the Monte Carlo simulation method with the same confidence level of 95% and even with a number of 10,000 samples, we obtain an observed level of statistical significance (Monte Carlo sign. = 27 ‰ (0.027), which is less than 0.05. We therefore conclude, as with the above method, that the two periods are not equivalent as regards nonfatal occupational injuries. For the second parameter examined, i.e. fatal injuries, we should refer to table 4.

Table 4. Ranks fatal injuries

examined period	N	Mean Rank
Fatal pre-crisis	425	346.28
during crisis	197	236.46
Total	622	

Table 4 shows that, as regards fatal injuries, there are 425 observations with a mean average of 346.28 before the crisis, while during crisis there are less observations (197) and a lower mean average (236.46).

Table 5. Test Statistics fatal injuries

		Fatal
Chi-Square		50.295
Df		1
Asymp. Sig.		.000
Monte Carlo	Sig.	.000(a)
Sig.	95% Confidence	.000
	Interval	
	Lower Bound	.000
	Upper Bound	.000

Notes: a. Based on 10000 sampled tables with starting seed 1314643744.

b. Kruskal Wallis Test

c. Grouping Variable: examined period

As regards the statistically significant difference between the two periods, the same null and alternative hypothesis applies. Studying table 5 for both statistical criteria, i.e. the asymptotic method and Monte Carlo method, we observe that the level of significance is 0.0001 ‰ - much less than 5% - leading to a similar conclusion with the parameter previously examined; namely, the two periods examined (pre-crisis and during the crisis) are not equivalent in terms of statistical significance 5% as regards fatal occupational injuries.

Therefore, for both data samples we conclude that the diversifying variable, which is time (pre-crisis - during crisis) did not play an important role in the number of occupational injuries; instead, these continue to decrease despite the economic crisis, as implied by the two mean averages of the respective periods.

In the context of this research, a linear Bivariate Correlation was carried out among the nonfatal-fatal injury data samples, aided by the SPSS ver.20 statistical package.

Table 6. Nonparametric Correlations

		Mithanatifore	thanatifora
Spearman's rho	<i>Non fatal Correlation Coefficient</i>	1,000	-,046
	Sig (2-tailed)		,278
	N	613	562
	<i>Fatal Correlation Coefficient</i>	-,046	1,000
	Sig (2-tailed)	,278	
	N	562	622

It was attempted to investigate whether the two independent samples (nonfatal - fatal injuries) were related to the number of observations 613 and 562 respectively and if said relationship is positive or negative (the higher the value of a sample the higher the value of the other respectively and vice versa). For this reason it was decided to perform the correlation analysis using Spearman's ρ coefficient, because the sample values are strongly asymmetrical, i.e. distorted.

The null and alternative hypothesis were formulated as follows:

H_0 = The fatal and nonfatal variables have no linear correlation

H_1 = The fatal and nonfatal variables have linear correlation

In Table 6, where the results of the linear Bivariate Correlation are presented, the observed level of statistical significance for a double direction is 0.278 and therefore much higher than that set as a threshold for judging our null hypothesis, namely 1⁰/₀₀. Therefore, our null hypothesis is valid. This means that the values of one variable do not follow the values of the other, neither incrementally nor reductively, namely there is no linear correlation between the two variables.

CONCLUSIONS AND SUGGESTIONS

The main objective of this research is to determine whether the economic crisis increases or decreases the number of occupational injuries. The secondary objective is to investigate whether there is a relationship between the two categories of occupational injuries (nonfatal - fatal) and whether this relationship is positive or negative.

The main objective of this research was to investigate whether the economic crisis affected the number of occupational injuries (fatal and nonfatal). Upon examination of previous studies and researchers' views, conflicting results were found. In order to reach my current research conclusion and to avoid data regularity problems, I used the Kruskal Wallis non-parametric test. Findings have shown that occupational injuries are not differentiated depending on the period which is diversified by the economic crisis.

The secondary objective of this research is to investigate whether there is a relationship between the two categories of occupational injuries (nonfatal - fatal) and whether this potential correlation is positive or negative. Through the Bivariate Correlation Analysis and the Spearman coefficient, I have noticed the complete lack of correlation between the two variables - fatal - nonfatal occupational injuries.

It should be clarified that although research findings serve the purposes of this paper, they cannot be generalised due to the relatively small sample caused by lack of data for more

states and for more periods, and therefore for more cases. Consequently, a broader research is required, using data from other international organisations. However, despite the decrease of occupational injuries - in a period of shortage of resources - even greater effort must be made to eradicate fatal and nonfatal occupational injuries.

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