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STATISTICAL INDICATORS FOR ACCIDENTS AT WORK IN CONSTRUCTION SECTOR

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Abstract: In this paper the statistical indicators concerning non-fatal and fatal accidents at work in the European Union (EU-28) and in the Republic of North Macedonia from 2012 to 2018 in construction sector were presented. The performed statistical analysis shows that the number of non-fatal and fatal accidents at work in EU-28 in 2018 was decreased in comparison with 2012. In the Republic of North Macedonia in 2018 there was an increase in the number of non-fatal and fatal accidents at work in construction sector in comparison to the number of accidents at work in 2012. Nevertheless, in the Republic North of Macedonia the value of incidence rate for fatal accidents at work in construction sector in 2018 is much lower compared to the average value in EU-28.

Keywords: construction sector, non-fatal accidents, fatal accidents, incidence rate

1. INTRODUCTION

Construction is one of the most risk activities in terms of accidents at work. Construction workers are exposed to a number of accidents at work, especially serious and fatal injuries, which is a sufficient cause for concern for the tripartite stakeholders of the International Labor Organization (ILO). Despite the existence of law of safety at work, accidents at work in this activity are increasing every year. Increasing the quality of safety at work and health of employees in construction sector, and in the workplace in general, should be the primary goal of every employer. Given the difficult working conditions, as well as the hazards and harmfulness at faced by construction workers, relevant activities should be taken by project holders, contractors, supervisors and all parties involved, for successful completion of project. The process of building and constructing facilities includes activities on temporary and mobile construction sites that include the flow of materials, workers as well as machinery and mechanical equipment. The workers on the construction site work in difficult and dynamic conditions.

A complete classification of the hazards and harmfulness of a mobile construction site is given by Ferrett, [3]:

- hazards when working at height,
- hazards during excavation,
- hazards during demolition,
- hazards due to the movement of vehicles (internal transport),
- hazards when using equipment on a construction site,
- dangers of electricity,
- fire hazards,
- chemical and biological harmfulness, and
- physical hazards and mental health hazards.

In this paper, some statistical indicators for non-fatal and fatal accidents at work in construction sector in the European Union and in the Republic of North Macedonia were presented.

2. MATERIAL AND METHODS

In this paper two main types of statistical indicators on accidents at work in construction activity are used: number of non-fatal and fatal accidents at work and incidence rate. The databases of Eurostat for the values of the number of accidents at work (non-fatal or fatal) in the EU-28 were used, while for the Republic of North Macedonia data from relevant institutions were used. For the calculation of the values of the incidence rate the methodology of the European Statistics on Accidents at Work (ESAW) was used [1].

3. RESULTS AND DISCISSION

— Statistical indicators for non-fatal and fatal accidents at work in the European Union

In construction sector in 2018 there were over 385249 non-fatal accidents that resulted in at least four calendar days of absence from work and 716 fatal accidents (Table 1) [3]. In the total number of non-fatal accidents at work in the EU-28 between 2012 and 2018 there was decrease for 423000 accidents i.e. equivalent to a decrease of 8.61 % (Figure1). During on 2018, in the Member State on EU-28 there were 153 fatal accidents at work fewer when compared with 2012 i.e. equivalent to on decrease of 21.37 % (Figure2). From Table 1 it is evident that the smallest number of non-fatal accidents at work in construction sector was recorded in 2016 (371737), while the smallest number fatal accidents at work were recorded in 2018 (716 persons).

Table 1. Total number of non-fatal and fatal accidents at work in construction sector, EU-28, 2012-2018 (persons)

Construction (F)	2012	2013	2014	2015	2016	2017	2018
Non-fatal accidents	418414	378018	376551	372284	371737	376008	385249
Fatal accidents	869	784	791	815	717	733	716

Source of data: Eurostat, update: 06/08/2021

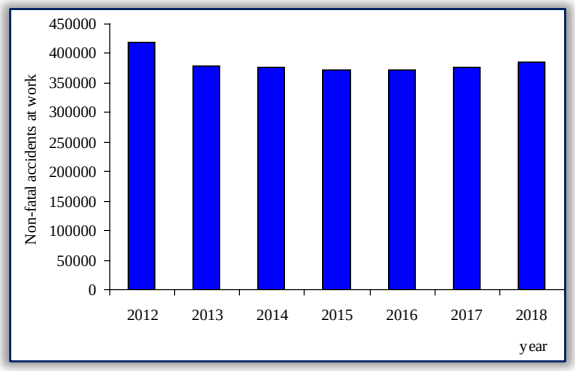

Figure 1. Non-fatal accidents at work, 2012-2018

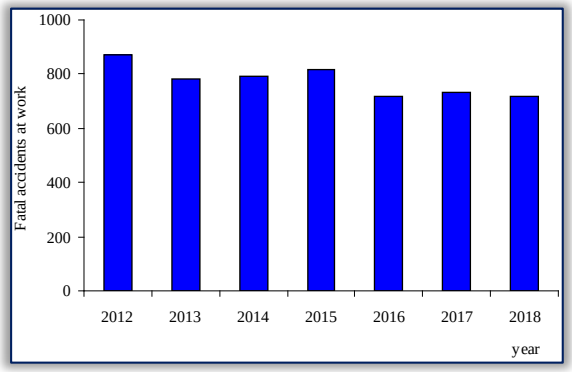

Figure 2. Fatal accidents at work, 2012-2018

Table 2. Number of non-fatal and fatal accidents at work in construction sector, EU-28, 2018 (persons)

	Accidents at work involving at four calendar days absence from work			Fatal accidents at work
	Total	Men	Women	Total
EU-28	385 249	376691	8515	716
Belgium	7694	7640	54	17
Bulgaria	205	199	6	21
Czech Republic	2468	2367	101	18
Denmark	7126	6832	270	3
Germany	118465	116186	2,268	90
Estonia	647	639	8	3
Ireland	2388	2241	144	5
Greece	382	373	9	8
Spain	59322	58450	872	67
France	75507	74379	1128	101
Croatia	1115	1089	25	12
Italy	28105	27637	468	123
Cyprus	308	304	4	2
Latvia	188	182	6	4
Lithuania	368	355	10	6
Luxembourg	2364	2345	19	5
Hungary	883	862	21	22
Malta	284	281	3	4
Netherlands	5768	5768	0	5
Austria	11753	11582	171	21
Poland	5047	4946	101	48
Portugal	18800	17487	1313	26
Romania	441	430	11	39
Slovenia	1464	1449	15	6
Slovakia	446	435	11	9
Finland	6681	6482	199	5
Sweden	4410	4219	190	12
United Kingdom	22619	21530	1088	34
Iceland (:)				
Norway	1370	1332	39	4
Switzerland	21714	21339	376	20

(:) not available; Source of data: Eurostat, update: 06/08/2021

In Table 2 the number of non-fatal and fatal accidents at work in the EU-28 Member States is given. From Table 2 evident is that the highest number of non-fatal accidents at work in construction sector was recorded in Germany (118465), followed by France with (75507), and Spain with (59322). On the other hand in Latvia (188), Malta (284) and the Cyprus (308), were recorded the lowest number of non-fatal accidents at work.

In 2018, the highest number of fatal accidents at work in construction sector was recorded in Italy (123), France (101) and Germany (90). By far the lowest number of fatal accidents was reported in Cyprus (2), Denmark (3) and Estonia (3).

In Table 3 the incidence rates for non-fatal and fatal accidents at work in construction sector in period from 2012 to 2018 in the EU-28 are given [3]. Across the whole of the EU-28 there were, on average, 5.90 fatal accidents per 100 000 persons employed, and on average, 2909 non-fatal accidents per 100000 persons employed in 2018.

Obviously is that in 2018 there is a decrease of incidence rates for non-fatal and fatal accidents at work in comparison with 2012. The smallest incidence rate for non-fatal accidents at work in construction sector was recorded in 2015 (2843), while for fatal accidents at work was recorded in 2018 (5.42).

Table 3. Incidence rates for non-fatal and fatal accidents at work in construction sector, EU-28, 2012-2018

Construction (F)	2012	2013	2014	2015	2016	2017	2018
Non-fatal accidents	3067	2869	2920	2843	2879	2873	2912
Fatal accidents	6.40	5.95	6.14	6.22	5.55	5.60	5.42

Source of data: Eurostat, update: 06/08/2021

In Figures 3 and 4 the incidence rates in construction sector are shown, relating the number of accidents to the overall number of persons employed. The range for incidence rates in construction sector among the EU-28 Member States was from less than 100 accidents per 100000 persons employed in Bulgaria to more than 2750 per 100000 persons employed in Belgium, Denmark, Germany, Spain, France, Luxembourg, Portugal, Finland, and Switzerland (Figure 3). The highest incidence rate was recorded in Spain, at 6822 non-fatal accidents per 100000 persons employed.

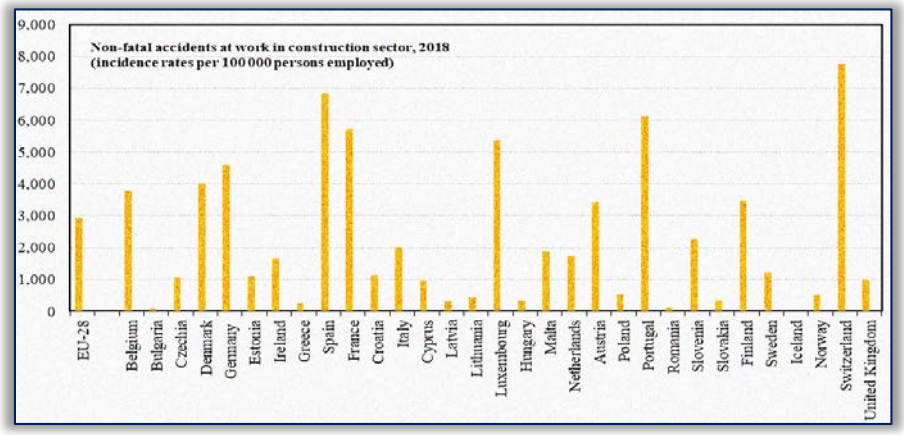

Figure 3. Non-fatal accidents at work in construction sector, 2018
(incidence rates per 100000 persons employed)

In 2018, the number of fatal accidents in construction sector per 100000 employed persons ranged from less than 2.00 in the Netherlands, Denmark, and Norway, and to more than 8.00 fatal accidents per 100000 persons employed in Belgium, Croatia, Italy, Luxembourg, Malta, Portugal, Romania and Slovenia (Figure 4). The highest rate among the EU Member States was recorded in Malta, at 26.31 fatal accidents per 100000 persons employed.

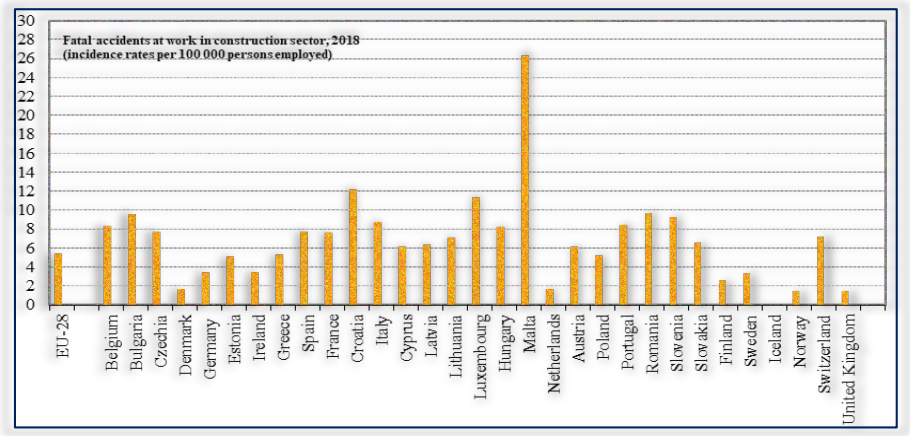

Figure 4. Fatal accidents at work in construction sector, 2018
(incidence rates per 100000 persons employed)

— Statistical indicators for non-fatal and fatal accidents at work in the Republic of North Macedonia

In the Republic of North Macedonia there are several organizations and institutions dealing exclusively with working conditions. These include State statistical office, the Labour inspectorate, Institute for public health, the Macedonian Occupational Safety and Health Association, Organization of the employers of Republic of Macedonia and the Trade unions. The data on the number of accidents at work in the Republic of North Macedonia is not confidential for the reason that different relevant institutions published various statistical data [4].

In this paper, the statistical indicators related to the number of non-fatal and fatal accidents at work in construction sector in the period 2012÷2018 are based on the data of the Macedonian Occupational Safety and Health Association [5-11]. The reason for that is what in the statistical reports of the other relevant institutions that register accidents at work no distinction is made between the number of non-fatal and fatal accidents at the workplace. In construction sector in 2018 there were 31 non-fatal accidents that resulted in at least four calendar days of absence from work and 8 fatal accidents (Table 4). In the total number of non-fatal accidents at work in the Republic of North Macedonia between 2012 and 2018, there was increase for 6 accidents i.e. equivalent to enlargement of 19.35 % (Figure 5). During on 2018, there were 5 fatal accidents at work fewer when compared with 2012 i.e. equivalent to increase of 62.5% (Figure 6). From Table 4 it is evident that the smallest number of non-fatal in 2013, while the smallest number of fatal accidents at work was recorded in 2012.

Table 4. Total number of non-fatal and fatal accidents at work in construction sector, Republic North Macedonia, 2012-2018 (persons)

Construction (F)	2012	2013	2014	2015	2016	2017	2018
Non-fatal accidents	25	13	7	3	12	25	31
Fatal accidents	3	7	5	4	6	6	8

Source: Macedonian Occupational Safety and Health Association

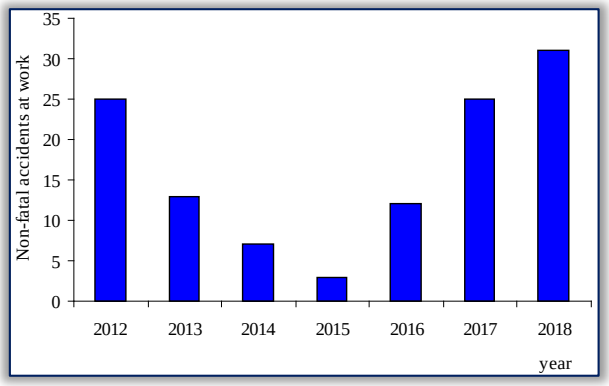

Figure 5. Non-fatal accidents at work, 2012-2018

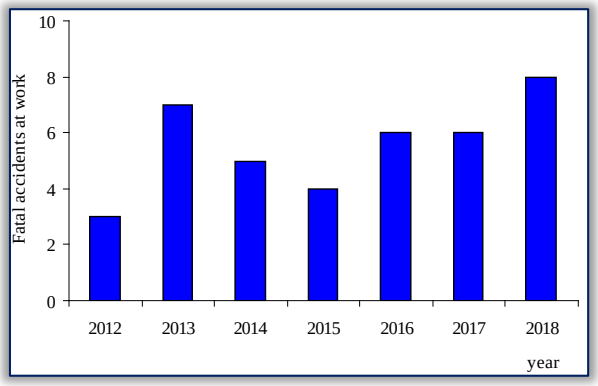

Figure 6. Fatal accidents at work, 2012-2018

In Table 5 the incidence rates for non-fatal and fatal accidents at work in period from 2012 to 2018 in construction sector are given [5-11]. In the period between 2012 and 2018, there is decrease in the incidence rate for non-fatal accidents at work. In comparison with the values of incidence rates of EU-28 Member States, the Republic of North Macedonia can be classified in the country with incidence rates less than 100. From Table 5 evident is that the smallest incidence rate for non-fatal accidents at work in construction sector was recorded in 2015 (0.45).

Table 5. Incidence rates for non-fatal and fatal accidents at work in construction sector, Republic of North, Macedonia, 2012-2018

Construction sector	2012	2013	2014	2015	2016	2017	2018
Non-fatal accidents	5.31	1.97	1.06	0.45	1.82	3.35	4.08
Fatal accidents	1.36	1.06	0.76	0.61	0.91	0.81	1.05

There is an equivalent decrease in the incidence rate for fatal accidents at work for 29.5% in the period between 2012 and 2018. The smallest incidence rate for fatal accidents at work was recorded in 2015 (0.61). The incidence rate of fatal accidents at work in 2018 in the Republic of North Macedonia was 1.05 deaths cases from accidents at work per 100000 persons employed. In comparison with the mean value of the incidence rates in EU-28 (5.42), the incidence rate in the Republic of North Macedonia is much lower.

4. CONCLUSION

In this paper the statistical indicators for non-fatal and fatal accidents at work in EU-28 Member States and in the Republic of North Macedonia from 2012 to 2018 in construction sector were presented. From the statistical indicators for the number of non-fatal and fatal accidents at work in the EU-28 Member States, may be concluded that there is considerable reduction of number of accidents at work in construction sector in relation to 2012. The situation with the accidents at work (non-fatal and fatal accidents at work) in construction sector in Republic North Macedonia in 2018 is opposite than the EU-28 Member State. Therefore, it is necessary to build and maintain a national preventive culture and introduce a systemic approach to managing occupational safety and health at work, as an important prerequisite for reducing the number of accidents at work in the construction sector.

Note: This paper was presented at IIZS 2021 – The XI International Conference on Industrial Engineering and Environmental Protection, organized by Technical Faculty "Mihajlo Pupin" Zrenjanin, University of Novi Sad, in Zrenjanin, SERBIA, in 07–08 October, 2021.

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