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ANALYSIS OF CAUSES OF SERIOUS AND FATAL OCCUPATIONAL INJURIES IN THE REPUBLIC OF SERBIA FOR THE PERIOD FROM 2016 TO 2018

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Abstract: Occupational injuries are a regular and following occurrence of every human activity and one of the major health and economic problems of modern society. Their consequences affect not only the injured worker, but also his family, work organization and society as a whole. This paper analyzes the causes of serious and fatal occupational injuries by four criteria: the activity of the employer, source of injury, cause of injury, and age of the injured person. It was concluded that, apart from certain illogicalities contained in the official statistics of the Ministry of Labor, the dominant factor causing serious and fatal occupational injuries in the Republic of Serbia is the human factor.

Keywords: occupational injuries, causes of occupational injuries, HSE

1. INTRODUCTION

Injury at work is an adverse event that results in a violation of the physical integrity of the worker, where each injury carries with it some pain tolerated by the injured. Injury, also referred to as trauma, is violent damage to the body caused by mechanical force (impact, crushing, stabbing, incision), electricity, etc [1,2].

Health damage, impairment or loss of ability to work, material costs due to sickness compensation, treatment, rehabilitation, disability, impairment of life activities, disruptions in the workplace, impaired productivity, and decreased quality of work caused by occupational injuries make the problem of occupational traumatism very topical [3,4].

Otherwise, an injury at work is the last event in the chain whose first link is a potential hazard resulting from the action of human and material factors. Under the influence of activation factors, the potential danger grows into an active one, and this one becomes an accident by the action of immediate factors. If all the factors coincide in time, there are inevitably occupational injuries [5]. Injury is also one of the most serious social problems, due to the incidence rate and the loss of working days due to sick leave, which is the basis for the grading of the severity of occupational injuries [4].

The aim of the paper is a multicriteria analysis of serious and fatal occupational injuries in the Republic of Serbia for the period 2016-2018 to highlight the most significant factors leading to injuries and to point out the illogicalities present in the official reports of the Ministry of Labor of the Republic of Serbia.

2. MATERIAL AND METHODS

The analysis of the work report of the Directorate for Safety and Health at Work of the Ministry of Labor of the Republic of Serbia concluded that for the period 2016-2018 on average 824 serious and/or fatal occupational injuries, 771 in 2016, 907 in 2017 and 795 in 2018. It should be noted that of this number, fatal injuries accounted for about 1% [6-8].

Occupational injuries can be analyzed according to many criteria, however, the author considered that four criteria play a dominant role in determining more specifically the severity of serious and fatal occupational injuries:

- 1) The activity of the employer,
- 2) The source of the injury,

- 3) Immediate cause of injury, and
- 4) Age of the injured.

3. RESULTS AND DISCUSSION

— Review of occupational injuries by employer activity

As Table 1 shows, the number of serious and fatal occupational injuries categorized by employer activity averages just over 800 injuries per year. The largest number of occupational injuries was recorded in the following industries: manufacturing (25.9%), wholesale and retail trade, repair of motor vehicles (10.3%), health and social care (9.2%) and transport and storage (8.3%). The number of serious and fatal occupational injuries in these four activities account for more than half (53.7%) of the total injuries. However, it is interesting to note that the construction industry is only in 6th place in the number of serious and fatal occupational injuries, although it is to be expected that injuries are very common in this type of activity. In contrast, in the administrative and support services, where the number of serious and fatal injuries would be expected to be negligible, it is around 5%.

Table 1. Number of serious and fatal occupational injuries by activity of employer [6-8]

Activity of the employer	2016.		2017.		2018.		Average	
	No	%	No	%	No	%	No	%
Construction	49	6,4	67	7,4	59	7,4	58	7,1
Agriculture, forestry and fishing	20	2,6	37	4,1	32	4,0	30	3,6
Mining	26	3,4	36	4,0	27	3,4	30	3,6
Manufacturing industry	205	26,6	216	23,8	216	27,2	212	25,9
Health and social care	65	8,4	94	10,4	70	8,8	76	9,2
Traffic and storage	61	7,9	79	8,7	65	8,2	68	8,3
Electricity, gas, steam and air conditioning supply	56	7,3	71	7,8	62	7,8	63	7,6
Water Supply, Wastewater Management, Controlling Waste Disposal	35	4,5	34	3,8	47	5,9	39	4,7
Wholesale and retail trade, repair of motor vehicles	91	11,8	94	10,4	69	8,7	85	10,3
Accommodation and catering services	9	1,2	14	1,5	7	0,9	10	1,2
Information and communication	9	1,2	15	1,6	9	1,1	11	1,3
Financial activity and insurance	15	1,9	17	1,9	9	1,1	14	1,6
Education	25	3,2	30	3,3	28	3,5	28	3,3
Professional, scientific, innovation and technical activities	14	1,8	14	1,5	19	2,4	16	1,9
Administrative and support service activities	41	5,3	22	2,4	52	6,5	38	4,7
Public administration and defense	12	1,6	42	4,6	14	1,8	23	2,7
No data	38	4,9	25	2,8	10	1,3	24	3,0
In total	771	100	907	100	795	100	824	100

— Review of occupational injuries by source of injury

An analysis of serious and fatal injuries by source of injury is presented in Table 2. Occupational injuries most often occur when employees move in work facilities (slip, trip, etc.), auxiliary rooms, or other sources depending on the work environment (37.3%), using tools when performing work activities (20.5%) and using machines and devices (13.6%).

Table 2. Review of occupational injuries by source of injury [6-8]

Source of the injury	2016.		2017.		2018.		Average	
	No	%	No	%	No	%	No	%
Facilities/Plants	13	1,7	25	2,8	16	2,0	18	2,2
Machines and devices	79	10,2	153	16,9	103	13,0	112	13,6
Passenger transport	47	6,1	69	7,6	46	5,8	54	6,6
Freight transport	42	5,4	49	5,4	44	5,5	45	5,5

Table 2. Review of occupational injuries by source of injury (continuation) [6-8]

Source of the injury	2016.		2017.		2018.		Average	
	No	%	No	%	No	%	No	%
Electrical devices, tools and installations	15	1,9	4	0,4	5	0,6	8	1,0
Scaffolding	2	0,3	7	0,8	2	0,3	4	0,4
Tools	175	22,7	181	20,0	150	18,9	169	20,5
Sources depending on the work process	73	9,5	60	6,6	26	3,3	53	6,4
Installation	259	33,6	317	35,0	346	43,5	307	37,3
Other sources of employee injury	55	7,1	26	2,9	42	5,3	41	5,0
No data	11	1,4	16	1,8	15	1,9	14	1,7
In total	771	100	907	100	795	100	824	100

— Review of occupational injuries by cause of injury

Table 3 shows that the most common cause of occupational injuries is non-application or non-compliance with special rules on safety at work (31.4%), performing work operations in a manner contrary to the rules of safety at work (20.5%), and non-application or non-compliance with basic rules occupational health and safety (16.6%). These three causes, which together account for 70% of the causes of injuries, are a direct consequence of neglect and non-compliance with safety and health rules at work.

Table 3. Review of occupational injuries by cause of injury [6-8]

Cause of injury	2016.		2017.		2018.		Average	
	No	%	No	%	No	%	No	%
Defective work equipment	31	4,0	7	0,8	15	1,9	18	2,1
Inoperative, slippery and obstructed passageways and surfaces on which workers stand while performing work activities	93	12,1	116	12,8	101	12,7	103	12,5
Inoperative guardrails and other fall protection devices	13	1,7	7	0,8	16	2,0	12	1,5
Inoperative safety devices on operating equipment	9	1,2	5	0,6	10	1,3	8	1,0
Reducing inadequate lighting	2	0,3	2	0,2	5	0,6	3	0,4
Improper protection against accidental electric shock	8	1,0	2	0,2	7	0,9	6	0,7
Inoperative protection against heat radiation	1	0,1	3	0,3	2	0,3	2	0,2
Disorder in the technological process	2	0,3	9	1,0	5	0,6	5	0,6
The basic safety and health rules at work have not been applied	169	21,9	81	8,9	160	20,1	137	16,6
Performing work activities in a practice contrary to the rules of occupational safety	136	17,6	197	21,7	173	21,8	169	20,5
Perform work activities without the use of appropriate personal protective equipment or the use of faulty personal protective equipment	15	1,9	45	5,0	29	3,6	30	3,6
Employee fatigue due to hard work and overtime, insufficient rest, etc	19	2,5	28	3,1	23	2,9	23	2,8

Table 3. Review of occupational injuries by cause of injury (continuation)

Cause of injury	2016.		2017.		2018.		Average	
	No	%	No	%	No	%	No	%
Poor work organization	7	0,9	5	0,6	8	1,0	7	0,8
Not applied specific occupational safety rules	216	28	359	39,6	201	25,3	259	31,4
Unlawful action by a third party	38	4,9	17	1,9	22	2,8	26	3,1
Force Majeure	2	0,3	3	0,3	3	0,4	3	0,3
No data	10	1,3	21	2,3	15	1,9	15	1,9
In total	771	100	907	100	795	100	824	100

— Review of work-related injuries by age of the injured worker

Table 4 shows that according to the age of the injured worker, the highest number of occupational injuries was recorded in employees aged 30 to 49 years (46.9%) and in the elderly over 50 years (39.2%), which accounts for over 85% of the total number of serious and fatal occupational injuries in the Republic of Serbia.

Table 4. Review of work-related injuries by age of the injured worker [6-8]

Age of the injured worker	2016.		2017.		2018.		Average	
	No	%	No	%	No	%	No	%
< 18	0	0,0	0	0,0	1	0,1	0	0,0
18 - 24	33	4,3	38	4,2	33	4,2	35	4,2
25 - 29	69	8,9	81	8,9	68	8,6	73	8,8
30 - 49	372	48,2	432	47,6	356	44,8	387	46,9
>50	297	38,5	344	37,9	329	41,4	323	39,2
No data	0	0,0	12	1,3	8	1,0	7	0,8
In total	771	100	907	100	795	100	824	100

4. CONCLUSIONS

The analysis of statistics on serious and fatal occupational injuries in the Republic of Serbia for the period 2016-2018 has led to several important conclusions.

Although all research shows that construction is the most common occupational accident activity, this was not the case for Serbian companies. On the contrary, construction is only sixth in official statistics in terms of the number of serious and fatal occupational injuries. The explanation for this phenomenon could be that a large number of construction employees do without a contract with the employer, and in the case of injury, they are driven by a private vehicle to the emergency center, explaining that they were injured at home instead of at the construction site.

However, serious occupational injuries also occurred in workplaces not characterized as high-risk workplaces, as in the case of administrative and support services, which, on the other hand, conclude that the possibility of injury at work should not be excluded in any workplace.

When it comes to the source of occupational injuries, the most common injuries occur when employees are moving in work-related facilities due to slipping, tripping, etc. (37.3%), using tools when performing work activities and using machines and devices. Such a high percentage of injuries in work facilities, due to extremely banal reasons, implies poor organization of the workspace, lack or disregard of the lanes, and warnings about slippery movement.

The most common causes of occupational injuries are the failure to apply basic and specific occupational safety rules and perform work operations in a manner contrary to occupational safety rules. The aforementioned causes, which together account for 70% of the causative agents of injuries, are a direct consequence of neglect and non-compliance with safety and health rules at work. However, if you look at the other values shown in Table 3, it is concluded that the human factor is absolutely the dominant cause of serious and fatal occupational injuries.

When it comes to the age of workers who have suffered an injury, the two age groups with the highest percentage of injuries are characteristic. Over 45% of serious and fatal occupational injuries belong to the 30-49 age group. This may be explained by the theory that in this group there are workers with extensive work experience, excellent psycho-physical condition, which can lead to too much self-confidence or the personal conviction that nothing can happen to them, resulting in neglect and disrespect for the occupational safety rules. The second group, with about 40% of serious and fatal occupational injuries, belongs to workers older than 50 years. The explanation would be similar to that of the previous group of workers, noting that workers of this age have significantly less psycho-physical fitness.

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