UDC:331.45(47.11)"2015/2019"
DOI:10.7562/SE2022.12.01.02
Research paper
www.safety.ni.ac.rs

SINIŠA DODIĆ[1]
BOJANA BAJIĆ[2]
DAMJAN VUČUROVIĆ[3]

[1, 2, 3]University of Novi Sad,
Faculty of Technology Novi Sad

[1]*dod@uns.ac.rs*
[2] *baj@uns.ac.rs*
[3] *dvdamjan@uns.ac.rs*

ANALYSIS OF OCCUPATIONAL ACCIDENTS IN THE REPUBLIC OF SERBIA FOR THE PERIOD 2015-2019

Abstract: *Occupational accidents have a significant impact on integrity in the workplace, but also cause high costs for the system of social security in the country. The main purpose of this research was to analyse the number of occupational accidents in Serbia (officially recorded) during the 2015-2019 period, in the working environment and working conditions with the aim to describe the state of working conditions in the country. Due to data incompatibility, index numbers by time and indicator were calculated. The number of total and fatal accidents increased from 2015 to 2019 with certain stagnation regarding the number of fatal accidents in 2019. The two economic sectors with the highest overall number of occupational accidents and fatalities were construction and manufacturing. The main causes of fatal work injuries were slip-trips and falls, which are some of the most common causes in construction and manufacturing.*

Key words: occupational accident, safety, accident statistics.

INTRODUCTION

Due to the Resolution on the Accession of the Republic of Serbia to the European Union, requests for implementing the system of occupational health and safety tailored to the contemporary market conditions of the economy in the EU have emerged. The Strategy of occupational health and safety in the Republic of Serbia [1] promoted the following: the implementation of the principles for prevention of occupational accidents and professional illnesses, the active participation of the occupational medicine services, the implementation of work provider's responsibility principles regarding occupational health and safety regulations, the involvement of employee representatives concerning occupational health and safety (the occupational health and safety committee), the introduction of special occupational insurance for determining compensation arising from occupational accidents and professional illnesses, implementing health and safety in the school curriculum, introducing a general register of occupational accidents and professional illnesses, continual education/training of specialists and officials responsible for occupational health and safety and other officials, promotion of the culture of prevention and examples of good practice, as well as fundamental requirements in this area..

According to the number of occupational accidents or the level of incidence, Serbia is placed in the middle of EU countries scale. However, this should be viewed with some caution, considering the fact that the methodology of data collection and processing has not been fully implemented [2]. Prevention of occupational accidents and illnesses will lead to fewer interruptions and production delays, and it will lower the total cost of production. Additionally, if the company's policy requires the use of adequate safety equipment, ensuring a suitable work environment and its proper maintenance, this will lead to the improvement of productivity and quality of work, and will reduce the risk concerning the health and safety of employees. One way of changing the approach is to indicate that the investment in the development and implementation of the system for evaluating and preventing workplace accidents is a strategic decision that will improve the productivity and competition of Serbian businesses. The costs associated with occupational accidents are compensation to the employee for job-related damages, material damage, production delays and disturbances in the work organization, hiring other employees as substitutes for the injured ones, equipment replacement, etc. Investing in occupational health and safety entails improving working conditions and occupational health and safety, purchasing new equipment, replacing hazardous chemicals with safer or less harmful alternatives, purchasing products and personal protective equipment, and so on. Two-thirds of these expenses are concentrated in four highly risky fields of work (agriculture, construction industry, manufacturing and transport). The costs are equally divided into the costs of short-term injury effects (medical costs and wages) and long-term injury effects of more serious cases (permanent disabilities and deaths). The investment in occupational health and safety contributes to the well-being of employees and is profitable. According to the evaluation, investing in this field can result in a higher percentage of cost refunds, on average 2.2 % [3]. Statistical analysis of occupational accidents is an effective method of describing and evaluating hazardous working conditions in any country. It can be used for determining country-wide priorities that are related to

the application of rules of prevention and are crucial in determining the indicators of working conditions [4].

This research focuses on the analysis of the data of occupational fatalities and the total number of occupational accidents between 2015 and 2019 in Serbia including an effort to present the statistics of occupational accidents in Serbia through comparison by using ESAW methodology [2].

MATERIALS AND METHODS

From 2015 to 2019 the registered number of employees in Serbia was 2074494 ± 68470 on average, out of whom 55 % were men. The dominant type of businesses in Serbia were micro (84 %), small (around 12 %), and medium-sized businesses (around 3 %) during the 2015-2019 period, which includes 60 % of employees on average (20 % in businesses employing less than 10 people, 18 % in companies employing 10-49 people and 22 % employed in medium-sized companies). Out of all the companies in Serbia, during the period of analysis, 18 % belonged to the manufacturing, 9% to the construction industry, 35 % to retail and wholesale trade and 27 % to service businesses [5-9]. The key role in providing and applying monitoring of health and safety measures in the workplace in Serbia belongs to the Labor Inspectorate as a part of the Ministry of Labor, Employment, Veteran and Social Policy. Besides monitoring the application of the Occupational Health and Safety Act, the Labor Inspectorate also monitors the application of other regulations regarding measures and security norms as well as occupational health and safety, technical measures related to occupational health and safety, standards and commonly acknowledged measures concerning the issues in the field of occupational health and safety [1]. By 2018, the concept that was used for recording occupational accidents was unchanged from the 1960s. Only since 2019 have occupational accidents been analysed by the new methodology which is in compliance with ESAW methodology [2]. Due to this methodology, there is a record of information regarding occupational accidents within the EU, which allows comparison of data of the countries that are a part of the EU and the analysis of occupational accidents to enable improvement in the field of occupational health and safety. The insight in the general database enables not only the inspection of the comparing data regarding occupational accidents but also following the trends in the field of occupational health and safety, including taking appropriate measures for the prevention of accidents.

In Serbia, employers are required by law to notify the Labor Inspectorate and the responsible police department, both in person and in writing, immediately or within 24 hours of the accident occurring, including any fatal, collective, or heavy occupational accident or injury that prevents an employee from working more than three days in a row. Different state institutions publish their own data concerning occupational accidents. The most detailed and reliable database of fatal and heavy occupational accidents can be obtained by the Labor Inspectorate, whereas relatively updated data of the total number of occupational accidents can be obtained by the Directorate for Safety and Health at Work which is a part of Ministry of Labor, Employment, Veteran and Social Policy [10-14]. According to Serbian laws, an occupational accident is defined as any injury, illness, or death that occurred as a consequence of an occupational accident, which is defined as any unexpected or unplanned event. It also includes any act of violence committed at work or in connection with a workplace, causing an illness or fatal accident to the insured person, which occurred immediately or within a year. The term "employee" is also used to refer to people who have a formal contract of employment, which is a relationship of employment with an employer for a specific or indefinite amount of time, and persons who perform temporary and occasional jobs under a work contract or contract of temporary employment; persons who run business individually or are founders of enterprises or entrepreneur's shops, as well as persons who undertake agricultural activities and are registered in the Central Registry of Compulsory Social Insurance.

The main data regarding occupational accidents used in this analysis are taken from the Report on the work of the Labor Inspectorate and the Directorate for Safety and Health at Work under the Ministry of Labor, Employment, Veteran and Social Policy of the Republic of Serbia dating from 2015 to 2019. Information about the accidents that occur while commuting to work and workplace accidents involving self-employed individuals are not fully available, thus they are not included in the analysis. Despite similar methodologies of data collecting and processing included by the public institutions, they do not always refer to the same reference population of employees. If the same reference population is not used for obtaining all data sources, the incident rate cannot be determined (in an attempt to avoid incorrect conclusions). Therefore, index numbers, whether regarding the annual or indication base, are more adequate and advantageous for the report. It should be emphasized that the index number is defined as the ratio between the number of occupational accidents in a certain year (from 2015 to 2019) and the number of them in 2019 (which is taken as the reference year because that was the first time ESAW methodology was used in Serbia) or as the ratio between the number of occupational accidents in the observed group compared to the reference group (which varies according to the analysis). The index number eliminates the questions regarding data comparison obtained from different institutions as it directly shows the trend of occupational accidents and their frequency. Besides this, concerning e.g. economic activity and the age group, there are differences between data obtained from different sources. Nevertheless, prior to this analysis, data was grouped by taking into account the incidence only regarding the most common occupations. The analysis includes the number of fatalities and the total number of occupational accidents between 2015 and 2019, in

accordance with ESAW variables [2], economic activity, and the cause of the accident (deviation).

RESULTS AND DISCUSSION

The numbers and the incidence rate of the total number of occupational and fatal accidents in Serbia between 2015 and 2019 are shown in Table 1. The results show the general trend of the increasing number and incidence rate of total and fatal accidents between 2015 and 2019. The number of total occupational accidents and the incidence rate has its maximum in 2019, while all of these indicators have the maximum in 2018 regarding fatal accidents, after which there is certain stabilization of the observed indicators. In the period of analysis, fatal accidents were approximately at 0.46% regarding the total number of occupational accidents, with the values fluctuating around this figure randomly.

Table 1. *Total and fatal accidents and corresponding mean ($\bar{x}$) and standard deviation (s) values, and incidence rates for total and fatal accidents in Serbia, between 2015 and 2019*

Year	Total accidents		Fatal accidents	
	Number	Incidence rates[a]	Number	Incidence rates[a]
2015	7539	377.7	38	1.90
2016	8591	427.5	42	2.09
2017	9535	462.3	39	1.89
2018	9882	463.7	53	2.49
2019	12709	584.8	49	2.25
$\bar{x}\pm$ s	9651 ± 1732		44 ± 6	

[a] The incidence rate is defined as the number of accidents at work per 100000 employed persons.

Comparison of the occupational accident incidence rate in Serbia to those in other countries EU-28 is affected by differences in definitions of occupational accidents as well as other methodological issues. However, keeping in mind all the limitations, it can be observed that the total accidents in Serbia in the period from 2015 to 2019 were substantially lower than the average value of the incidence rate for E-28 for the period of analysis, having a value of around 1600. On the other hand, fatal incidence rates in Serbia were significantly higher than the average values of the fatal incidence rates for EU-28 whose values are around 1.6. Serbia is, according to the fatal incidence rate within the period of analysis, in the same range as Hungary, Italy and Latvia, which is around 2.1 on average. The risk of occupational accidents in small companies is higher than in bigger ones. Therefore, a larger number of occupational accidents may be expected in Serbia. Although the distribution of the size of the companies in Serbia does not differ significantly from the average of EU-28, in which there is around 65 % of employees in micro, small or medium-sized companies, Serbia has a tendency to show higher rates of fatal incidence rate in comparison to EU-28, whereas the fatal incidence rates EU-28 constantly decreased, as well as the rates of total accidents [15]. Besides this, there has been a decrease in fatal incident rates in Serbia in 2019 compared to the previous years, mostly due to the increase in the number of employees, and also because of the fact that the number of fatal accidents fluctuated around the medium value during the period of analysis. These findings could be explained by the fact that most companies in Serbia achieved a low level of prevention regarding occupational health and safety. This is primarily because of economic factors, poor employee education in this area, and the fact that 40% of employees work for businesses with fewer than 50 employees. In Serbia, the 2013-2017 Occupational Health and Safety Strategy, as well as the 2018-2021 Strategy, are being implemented, with the focus on constant improvement in this field through applying rules and regulations regarding occupational health and safety, mutual collaboration between employers and employees, raising awareness, improving knowledge and skills, specifically establishing work ethics and creating preconditions for well-being at work as well as the quality of life and health at work. The mission is to establish a system for fulfilling safe working conditions that enable a decrease in the number of occupational accidents as much as possible. The mission is aimed at all the business subjects in Serbia, especially in the sector of small and medium companies and entrepreneurs. However, these efforts have not completely fulfilled their purpose during the period of analysis, so the number of total occupational accidents in Serbia during those 5 years was on the increase reaching its peak in 2019 in terms of both the number of accidents and the incidence rate. The index numbers by time (2019 is the reference value representing 100%), which include the analysis according to fields of work (economic activities) are shown in Tables 2 and 3, for fatal accidents and total accidents respectively.

The rates of variation - all index numbers of economic activities electricity, gas, steam and air conditioning supply and other service activities were higher than or equal to one, whereas the variation rates regarding economic activities agriculture, forestry and fishing, water supply, sewerage, waste management and remediation activities and wholesale and retail trade were lower than or equal to one. Regarding the remaining economic activities, the index numbers were either higher or lower than 1 during the whole period of analysis. Furthermore, it can be deduced that the economic activity construction had the lowest variation coefficient (17%), whereas other service activities had the highest value (69%) during the 5 years of analysis.

Table 2. *Mean ($\bar{x}$) and standard deviation (s) for the numbers of fatal accidents and index numbers according to economic activity in Serbia, between 2015 and 2019*

Economic activity	$\bar{x} \pm s$	2015	2016	2017	2018	2019
Index number by time						
Agriculture, forestry and fishing	5 ± 2	56	44	56	44	100
Manufacturing	9 ± 4	63	113	100	200	100
Electricity, gas, steam and air conditioning supply	1 ± 0	100	100	200	200	100
Water supply, sewerage, waste management and remediation activities	3 ± 1	50	25	50	100	100
Construction	17 ± 3	79	116	79	79	100
Wholesale and retail trade	3 ± 1	100	50	25	75	100
Transportation and storage	3 ± 1	67	67	133	100	100
Other service activities	3 ± 2	400	100	200	600	100
Index number by economic activity						
Agriculture, forestry and fishing		33	18	33	27	47
Manufacturing		33	41	53	90	42
Electricity, gas, steam and air conditioning supply		7	5	13	13	5
Water supply, sewerage, waste management and remediation activities		13	5	13	27	21
Construction		100	100	100	100	100
Wholesale and retail trade		27	9	7	20	21
Transportation and storage		13	9	27	20	16
Other service activities		27	5	13	40	5

Table 3. *Mean ($\bar{x}$) and standard deviation (s) for the numbers of total accidents and index numbers according to economic activity in Serbia, between 2015 and 2019*

Economic activity	$\bar{x} \pm s$	2015	2016	2017	2018	2019
Index number by time						
Agriculture, forestry and fishing	323 ± 80	151	95	167	177	100
Manufacturing	3030 ± 547	69	63	65	74	100
Electricity, gas, steam and air conditioning supply	632 ± 179	43	90	108	116	100
Water supply, sewerage, waste management and remediation activities	434 ± 185	23	59	54	92	100
Construction	515 ± 217	24	71	91	47	100
Wholesale and retail trade	830 ± 196	56	123	120	104	100
Transportation and storage	747 ± 140	56	75	92	89	100
Administrative and support service activities	496 ± 154	80	74	37	108	100
Public administration and defence, compulsory social security	295 ± 199	17	22	72	30	100
Education	417 ± 155	58	39	44	51	100
Human health and social work activities	962 ± 206	67	54	74	65	100
Other service activities	969 ± 142	69	75	71	72	100
Index number by economic activity						
Agriculture, forestry and fishing		189	41	55	114	30
Manufacturing		1504	471	376	836	527
Electricity, gas, steam and air conditioning supply		158	114	106	221	90
Water supply, sewerage, waste management and remediation activities		80	71	51	167	86
Construction		100	100	100	100	100
Wholesale and retail trade		249	185	140	236	107
Transportation and storage		271	124	118	223	117
Administrative and support service activities		266	84	33	185	80
Public administration and defence, compulsory social security		56	24	63	50	79
Education		221	51	45	100	92
Human health and social work activities		476	133	140	240	173
Other service activities		461	172	126	249	161

Taking into account the index numbers by time for total accidents between 2015 and 2019 (Table 3), it can be concluded that economic activities agriculture, forestry and fishing and wholesale and retail trade had all the values above 1 except in 2016 and 2015 when they were lower, respectively. In contrast, all other economic activities had values below 1, throughout the entire analysis period, with the exception of the provision of electricity, gas, steam, and air conditioning, administration, and transportation. This is another confirmation that 2019 has been a very unfavourable year regarding the number of total occupational accidents in Serbia, which requires future investigation into the root cause.

Similarly to the data concerning fatal occupational accidents, the manufacturing activity showed the lowest coefficient of variation (18%). However, different findings regarding the highest value were reported. According to these results, construction, mandatory social security, water supply, sewerage, waste management, and remediation activities were the activities with the highest variation coefficient during the analysis period (67%, 43%, and 42%, respectively).

Index numbers by economic activities regarding fatal occupational activities show that all the economic activities had values less than 1, independently of the observed year (Table 2). Therefore, the activity construction (taken as the referent value 1 or 100 %) can be regarded as the economic activity with the highest number of fatal occupational activities during the period of analysis, after which come the following activities - manufacturing (10-67% less), agriculture, forestry and fishing (67–82% less), which represents a certain kind of relevance regarding fatal occupational accidents. However, it is not possible to define a general pattern of relevant significance regarding these activities in the course of time as their development was not continual from 2015 to 2019. Other economic activities have lower index values by about 85-95% during most of the years in comparison to the reference activity construction, so they can be regarded as the activities with the least influence on fatal occupational activities. Nevertheless, due to the analysis of index numbers of total accidents according to economic activities, there is a different view, which can be seen in Table 3: manufacturing was the activity that showed the highest index numbers independently from the observed year (270-1400% above construction activity), followed by human health and social work activities, wholesale and retail trade, transportation and storage and other service activities, which had higher index numbers compared to the reference activity 33-376%, 7-149%, 17-171% and 26-361%, respectively. The other activities are at least 79% exposed below the construction index numbers. The activities of public administration and defence, and compulsory social security had index numbers lower than 1 during the whole period of analysis, specifically less by 21-76% compared to the reference activity. The other economic activities during the period of analysis had higher or lower values compared to the construction activity.

As in most other countries EU-28 [15], construction is the economic activity that accounts for the highest number of fatal occupational accidents in Serbia, although it is not the activity in which a high number of persons are employed [16-20]. It is important to emphasize that the activity construction in Serbia accounts for about 7% on average regarding the total number of employees during the period of analysis, while services add to this by around 50% [5-9]. Fatal occupational accidents in the activity of construction, during the period of analysis make up approximately around 40 % of all fatal occupational accidents. The reason for such a high rate of occupational accidents in construction activity, both in Serbia and other countries, comes as a result of the four most common dangers or risks: falls, caught-in/between, struck-by, and electrocution hazards, which are defined through Construction Focus Four programme established by Occupational Safety and Health Administration [21]. Another factor is the failure of employees in the construction sector to recognize and manage pertinent safety risks. This directly increases the likelihood of accidents, catastrophic safety incidents, and accidental exposure to dangers [22, 23]. Unfortunately, some research shows that employees might not recognize up to 57% of safety dangers in a typical working environment [22-26].

Besides these objective reasons, another factor that contributes to a high number of fatal occupational accidents in construction activity, as well as to a large number of total fatal accidents and total number of occupational accidents, is the inefficient measure implementation defined by Occupational Health and Safety Strategy in the Republic of Serbia introduced for the period 2013-2017 [27], and further for 2018-2022 [1]. This, including other factors, is related to the introduction of the occupational accident prevention principle, the principle of work organizer responsibilities for the implementation of occupational health and safety measures, the introduction of a general register of occupational accidents, continual education/training of persons responsible for health and safety in the workplace as well as other persons and promotion of the culture of prevention and examples of good practice in the field of health and safety at work. However, none of the aforementioned strategies for reducing the number of occupational accidents have been successful during the period of analysis because, as previously stated, there was not a decrease in fatal occupational accidents until 2018. In the meantime, in 2019 there was a certain decline in the number of fatal accidents, which will be analysed in detail during the following years regarding its stabilization and confirmation. Manufacturing ranks second in Serbia in terms of fatal occupational accidents, despite being (at least 44%) lower than the level of construction activity. Besides these two activities, agriculture, transport, trade

and other service activities also showed a significant contribution to the number of fatal occupational accidents. Thus, these activities should be additionally analysed. All of this is in accordance with countries of EU-28, where agriculture, construction industry, manufacturing and transportation are the most significant activities regarding the number of occupational accidents [15]. It is important to emphasize that there were no fatal occupational accidents during the analysed period in the activities of administrative and support service activities, public administration and defence, compulsory social security, education and human health and social work activities (listed in Table 3; therefore they are not listed in Table 2. From 2015 to 2019 it can be found that the final number of fatal and total occupational accidents in the construction activity would be much more predictable considering the fact that its variation coefficient was the lowest. On the other hand, the activities such as water supply, sewerage, waste management and remediation and other service activities – regarding fatal accidents as well as the activities public administration and defence, compulsory social security – and also the total number of occupational accidents, had the highest variation coefficients and were much less predictable. In terms of fatal occupational accidents, the reference year of 2019 was best for the following activities: electricity, gas, steam, and air conditioning supply, but the worst for construction activity. In terms of the overall number of occupational accidents, however, the reference year of 2019 was the worst. In contrast to manufacturing activity, 2019 was the best year for forestry, fishing, and agriculture. Index numbers by the cause of the accident (deviation) are shown in Table 4.

Table 4. *Mean ($\bar{x}$) and standard deviation (s) for the numbers of fatal accidents and index numbers according to accident cause (deviation) in Serbia, between 2015 and 2019*

Accident cause (deviation)	$\bar{x} \pm s$	2015	2016	2017	2018	2019
Index number by time						
Electrical problems, explosion, fire	7 ± 2	333	200	267	233	100
Overflow, overturn, leak, flow, vaporization, emission	2 ± 0	100	50	50	100	100
Breakage, bursting, splitting, slipping, fall, collapse of material agent	12 ± 3	56	81	56	94	100
Loss of control of machine, means of transport or handling equipment, hand-held tool, object, animal	8 ± 3	30	90	60	120	100
Slipping-Stumbling and falling-Fall of persons	15 ± 2	78	72	83	94	100
Index number by deviation						
Electrical problems, explosion, fire		71	46	53	41	17
Overflow, overturn, leak, flow, vaporization, emission		14	8	7	12	11
Breakage, bursting, splitting, slipping, fall, collapse of material agent		64	100	60	88	89
Loss of control of machine, means of transport or handling equipment, hand-held tool, object, animal		21	69	40	71	56
Slipping-Stumbling and falling-Fall of persons		100	100	100	100	100

Table 4 provides insights into fatal occupational accidents caused by electrical problems, explosions, and fire showing index numbers by time higher than 1 which is 100-233% more in comparison to the reference year. On the other hand, the accidents caused by breakage, bursting, splitting, slipping, fall, collapse of material agent and slipping-stumbling and falling-fall of persons, show index numbers less than 1 during the whole period of analysis, whereas the rest of the aforementioned factors had higher or lower values during the analysis period. The largest number of fatal accidents in the analysis period is caused by slipping-stumbling and falling-fall of persons, on average 15 ± 2, which represents around 34 % of total accidents. The variation coefficient with the accidents caused by loss of control of machine, means of transport or handling equipment, hand-held tool, object, or animal, was the highest (40%), whereas regarding slip-ping-stumbling and falling-fall of persons was the lowest (12%). Interestingly, it can be noticed that with all the recorded causes of fatal accidents, index numbers according to the cause of the accident were lower than 1 in comparison to the cause observed in reference to slipping-stumbling and falling-fall of persons, except in 2018 at breakage, bursting, splitting, slipping, fall, and collapse of material agent. Also, it can be concluded that fatal occupational accidents caused by slipping-stumbling and falling-fall of persons, were by far the most common causes throughout the entire analysis period. The lowest index numbers according to the cause, independently of the observed year, were the result of overflow, overturn, leak, flow, vaporization, and emission, at least 86% below the reference cause. As previously stated, the most significant economic activity regarding fatal occupational accidents is construction. Therefore, it can be expected that in this particular activity accidents like slipping-stumbling and falling-fall of persons and breakage, bursting, splitting, slipping, fall, and collapse of material agents, according to the results, cause most occupational fatal accidents. Also, a no less significant activity when it comes to the stated causes of occupational accidents involves manufacturing, the

activity which, among the rest, includes monotonous work and repetition, the placement of objects, inexperience, frequent (and tolerated) risky behaviour as well as poor maintenance of the premises and equipment [28]. Besides the aforementioned, a significant number of occupational accidents is caused by non-reading and non-understanding the manual, the lack of protective clothes and shoes, psychophysical conditions (rush, stress, lack of concentration), unfavourable environmental factors, irregular handling, as well as not easily used or badly constructed machine parts [29].

CONCLUSION

There has been no pattern in the change of index numbers by time during the analysed period (2015-2019) for either of the factors (economic activity and the cause of the accident). Thus, it can be presumed that the numbers occurred more or less randomly with the evident increase of fatal occupational accidents during the analysed period, which is primarily caused by unsuccessfully implemented strategies, that would contribute to a significant decrease in fatal occupational accidents from 2015 to 2019. Besides this, considering the situation in the EU, it is expected that in Serbia the share of small and medium-sized companies will continue to rise, as well as that flexible production will be more and more present, and the outcome could, unfortunately, be that the occupational accidents indicators could deteriorate if urgent precautions are not undertaken.

Some of the precautions should be as follows: a) the implementation of (already significant) number of laws that define minimum requirements for occupational health and safety in Serbia – most accidents could be prevented through the implementation of the existing regulations and rational use of the resources; b) the development of the regulations for reporting minor occupational accidents concerning the fact that the results indicated bad reporting regarding these types- of accidents and c) the development of a well-defined statistical methodology on data collecting and processing along with creating a general register of occupational accidents for official records, which is a general trend for EU organizations – to have comparable data as the statistical data and analyses can (and should) be used for further strategy development regarding occupational accidents.

REFERENCES

[1]GRS – Government of the Republic of Serbia. Occupational safety and health strategy in the Republic of Serbia for the period from 2018 to 2022, Belgrade, 2018.

[2]Eurostat. European statistics on accidents at work (ESAW)-Summary methodology, Theme: Population and social conditions, 2013 Ed., European Communities, Luxembourg, 2013.

[3]European Commission. EU Strategic Framework on Health and Safety at Work 2014-2020, 2014.

[4]Macedo, A.C.; Silva, I.L. Analysis of occupational accidents in Portugal between 1992 and 2001. Saf. Sci. 2005, 43, 269-286.

[5]Statistical Yearbook of the Republic of Serbia, Theme: Labor market. Statistical Office of the Republic of Serbia, Belgrade, 2016.

[6]Statistical Yearbook of the Republic of Serbia, Theme: Labor market. Statistical Office of the Republic of Serbia, Belgrade, 2017.

[7]Statistical Yearbook of the Republic of Serbia, Theme: Labor market. Statistical Office of the Republic of Serbia, Belgrade, 2018.

[8]Statistical Yearbook of the Republic of Serbia, Theme: Labor market. Statistical Office of the Republic of Serbia, Belgrade, 2019.

[9]Statistical Yearbook of the Republic of Serbia, Theme: Labor market. Statistical Office of the Republic of Serbia, Belgrade, 2020.

[10] DSHW – Directorate for Safety and Health at Work. Report on the work of the Directorate for Safety and Health at Work for 2015. Ministry of Labor, Employment, Veterans and Social Affairs of the Republic of Serbia, Belgrade, 2016.

[11] DSHW – Directorate for Safety and Health at Work. Report on the work of the Directorate for Safety and Health at Work for 2016. Ministry of Labor, Employment, Veterans and Social Affairs of the Republic of Serbia, Belgrade, 2017.

[12] DSHW – Directorate for Safety and Health at Work. Report on the work of the Directorate for Safety and Health at Work for 2017. Ministry of Labor, Employment, Veterans and Social Affairs of the Republic of Serbia, Belgrade, 2018.

[13] DSHW – Directorate for Safety and Health at Work. Report on the work of the Directorate for Safety and Health at Work for 2018. Ministry of Labor, Employment, Veterans and Social Affairs of the Republic of Serbia, Belgrade, 2019.

[14] DSHW – Directorate for Safety and Health at Work. Report on the work of the Directorate for Safety and Health at Work for 2019. Ministry of Labor, Employment, Veterans and Social Affairs of the Republic of Serbia, Belgrade, 2020.

[15] Eurostat. Accidents at work statistics. A Statistical Portrait data 2010-2017, Theme: Population and Social Conditions, European Communities, Luxembourg, 2019.

[16] Labor inspectorate. Report on the work of the Labor Inspectorate for 2015. Ministry of Labor, Employment, Veterans and Social Affairs of the Republic of Serbia, Belgrade, 2016.

[17] Labor inspectorate. Report on the work of the Labor Inspectorate for 2016. Ministry of Labor, Employment, Veterans and Social Affairs of the Republic of Serbia, Belgrade, 2017.

[18] Labor inspectorate. Report on the work of the Labor Inspectorate for 2017. Ministry of Labor, Employment, Veterans and Social Affairs of the Republic of Serbia, Belgrade, 2018.

[19] Labor inspectorate. Report on the work of the Labor Inspectorate for 2018. Ministry of Labor, Employment,

Veterans and Social Affairs of the Republic of Serbia, Belgrade, 2019.

[20] Labor inspectorate. Report on the work of the Labor Inspectorate for 2019. Ministry of Labor, Employment, Veterans and Social Affairs of the Republic of Serbia, Belgrade, 2020.

[21] Occupational Safety and Health Administration (OSHA). Outreach training program. https://www.osha.gov/dte/outreach/construction/focus_four/ (December, 2018), 2011.

[22] G. Carter, S.Smith: "Safety hazard identification on construction projects", J. Constr. Eng. Manage. 2006, 132 (2), 197–205.

[23] I. Jeelani, A. Albert, K. Han, R. Azevedo: "Are visual search patterns predictive of hazard recognition performance empirical investigation using eye-tracking technology", J. Constr. Eng. Manage. 2019, 145 (1), 04018115.

[24] A. Albert, M.R. Hallowell, M. Skaggs, B. Kleiner: "Empirical measurement and improvement of hazard recognition skill". Saf. Sci. 2017, 93 (1), 1–8.

[25] S. Bahn: "Workplace hazard identification and management: the case of an underground mining operation", Saf. Sci. 2013, 57 (1), 129–137.

[26] A. Perlman, R. Sacks, R. Barak: "Hazard recognition and risk perception in construction", Saf. Sci. 2014, 64 (1), 22–31.

[27] GRS – Government of the Republic of Serbia. Occupational safety and health strategy in the Republic of Serbia for the period from 2013 to 2017, Belgrade, 2013.

[28] C. Jacinto, M, Canoa C. GuedesSoares: "Workplace and organisational factors in accident analysis within the Food Industry", Saf. Sci. 2009, 47, 626-635.

[29] R. Kogler, E.Quendler, L.Boxberger: "Analysis of occupational accidents with agricultural machinery in the period 2008-2010 in Austria", Saf. Sci. 2015, 72, 319-328.

ACKNOWLEDGEMENTS

This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Grant no. 451-03-68/2022-14/200134).

ANALIZA POVREDA NA RADU U SRBIJI ZA PERIOD 2015-2019

Siniša Dodić, Bojana Bajić, Damjan Vučurović

Rezime: *Povrede na radu imaju značajan uticaj na integritet na radnom mestu, ali i uzrokuju visoke troškove za sistem socijalne zaštite. Osnovna svrha ovog istraživanja bila je analiza broja povreda na radu u Srbiji (zvanično evidentiranih) u periodu 2015-2019, u radnom okruženju i uslovima koji se odnose na radnu snagu, u pokušaju da se prikaže stanje uslova rada. Zbog nekompatibilnosti podataka, izračunati su indeksi po vremenu i indikatoru. Broj ukupnih povreda i povreda sa smrtnim ishodom se povećao od 2015. do 2019. godine uz izvesnu stagnaciju u odnosu na broj povreda sa smrtnim ishodom u 2019. Građevinarstvo i proizvodnja su bile najvažnije privredne delatnosti po ukupnom broju povreda na radu i broju smrtno stradalih. Glavni uzroci povreda na radu sa smrtnim ishodom bili su klizanje-spoticanje i pad, kao jedno od najčešćih uzroka u građevinarstvu i proizvodnji.*

Ključne reči: povreda na radu, bezbednost na radu, statistika povreda na radu