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INTEGRATED SECURITY SYSTEMS AS AN INSTRUMENT OF REDUCING THE NUMBER OF OCCUPATIONAL INJURIES AND MATERIAL COSTS

The aim of this paper is to show the importance of integrated security systems through data analysis, using the rates of occupational injuries and illnesses as key indicators of the level of safety and health at workplace. An empirical study of the number of occupational injuries and their causes has been carried out in Serbia, Croatia and Slovenia. The objective was to establish the causes of occupational injuries so they could be prevented by implementing an integrated system. The analysis shows the importance of integrated systems of protection and how their implementation can significantly and efficiently reduce the number of workplace injuries. The results of the study suggest that every employer should have an integrated security system implemented as their positive impact on occupational health and safety has been proven.

Keywords: integrated security systems; occupational injuries; occupational health and safety.

JEL classification: D23, D80, L20.

Снежана Живкович, Мірко Маркич, Міліша Тодорович ИНТЕГРОВАНІ СИСТЕМИ БЕЗПЕКИ ЯК СПОСІБ ЗМЕНШЕННЯ КІЛЬКОСТІ ВИРОБНИЧИХ ТРАВМ ТА МАТЕРІАЛЬНИХ ВИТРАТ

У статті продемонстровано важливість інтегрованих систем безпеки, у вигляді індикаторів використано показники виробничих травм та захворювань. Емпіричне дослідження проведено за статистичними даними Сербії, Хорватії та Словенії; мета аналізу даних – виявити найбільш розповсюджені причини виробничих травм. Аналіз причин травм продемонстрував потенційну важливість впровадження інтегрованих систем безпеки та їх потенційну здатність знизити статистику виробничих травм. Оскільки корисність таких систем доведено, їх впровадження рекомендовано для всіх працедавців досліджених країн, незалежно від галузі діяльності.

Ключові слова: інтегровані системи безпеки; виробничі травми; безпека на виробництві.

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Снежана Живкович, Мірко Маркич, Милиша Тодорович ИНТЕГРИРОВАННЫЕ СИСТЕМЫ БЕЗОПАСНОСТИ КАК СПОСОБ СНИЖЕНИЯ КОЛИЧЕСТВА ПРОИЗВОДСТВЕННЫХ ТРАВМ И МАТЕРИАЛЬНЫХ ЗАТРАТ

В статье показана важность интегрированных систем безопасности, в качестве индикаторов использованы показатели производственных травм и заболеваний. Эмпирическое исследование проведено по статистическим данным Сербии, Хорватии и Словении; цель анализа данных – выявить наиболее распространённые причины производственных травм. Анализ причин травм продемонстрировал потенциальную важность внедрения интегрированных систем безопасности и их потенциальную способность эффективно снизить статистику производственных травм. Поскольку полезность интегрированных систем безопасности доказана, их внедрение рекомендовано всем работодателям исследованных стран, независимо от отрасли деятельности.

Ключевые слова: интегрированные системы безопасности; производственные травмы; безопасность на производстве.

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1. Introduction

The review of the data published by ILO and the European Agency for Occupational Health and Safety shows that from the consequences of occupational injuries each day about 600 people have fatal injuries. Excluding Europe, each year about 115 employees are injured at work or develop an occupational illness causing a loss of about 4% of internal gross product primarily due to the costs resulting from occupational injuries and illnesses. In the European Union over 8000 people lose their lives at workplace annually, while 10 mln people suffer from some kind of occupational illness or injury. Among the injured, most work in agriculture where on average 13 people per 100,000 are injured, followed by the industrial and services sector with 8 and 3 injured per 100,000 employees respectively (Zivkovic, 2011).

Still, many countries lack the expertise and resources to collect statistics that would allow a sufficiently reliable evaluation of the magnitude of occupational injuries and diseases. Because of this, the data on global and/or regional occupational injuries are often merely estimations (Pavlic, Likar, Pavlic, Markic, 2011).

Every year over 2.2 mln people die from some kind of occupational injury or illness. Fatalities and injuries at work occur especially in developing countries in agriculture, construction and mining. Except for being a personal tragedy, occupational injuries are detrimental on the state level as well, because in order to remedy the consequences of occupational injuries, around 2–4% of the world GDP is spent. Studies conducted in the UK have shown that the total costs of occupational injuries, i.e. loss of health due to poor working conditions, amount to 5–10% of the employer's total profit. By a simple cost-benefit analysis employers may see that investing into an efficient occupational health and safety system is a sound decision.

Kacian (2000) defines occupational safety as "a set of conditions enabling normal process flow and enabling smooth running of business operations, thus enabling the achievement of better economic results", and the factors influencing the level of occupational safety may be divided into human, social and economic.

In the contemporary market economy in which efficiency is imperative, from the economic point of view the consequences of occupational injuries and illnesses are manifested primarily in the form of costs. Therefore, according to the iceberg model, the so-called visible costs are far lower than the invisible ones.

The economic, i.e. financial objectives of OHS are accomplished by means of an integrated system of protection. Based on that principle Petersen (2003) links scientific methods and managerial techniques to create safety management techniques and based on the goal-oriented safety management concept (Petersen, 1996a) for the purpose of performing a safety system effectiveness analysis (Petersen, 1996b) in accordance with the laws of economy and the principles of management establishes standards for monitoring safety system performance (Petersen, 2005).

The goal of this study is to identify the causes of occupational injuries so that through an integrated system of protection employers could work on their elimination.

Using the appropriate research methods the objectives have been realized and the goal of the research study has been achieved. In this paper the basic causes of occupational injuries in Croatia, Slovenia and Serbia are listed and the importance of implementing an integrated security system for the purposes of risk mitigation has been emphasized, in addition to other advantages of OHS system implementation.

2. Narrow definition of occupational injury

Occupational injury is defined as an injury suffered by an employee in a spatial, temporal and causal connection with employment which is the basis of insurance, caused by an immediate and short-term exposure to a mechanical, physical or chemical hazard, sudden change of position or burdening of the body or other change in the physiological state of the organism. The problems occurring in relation with occupational injuries are important from the perspective of the injured, employers and the society as a whole.

All costs associated with occupational injuries may be divided into 4 groups: direct, indirect, quantifiable and unquantifiable. Direct and quantifiable expenses may easily be expressed in monetary value, which is not the case with indirect and unquantifiable ones. In this paper we will be addressing only direct and quantifiable costs of occupational injuries.

The process of occupational injury analysis may be observed as a cycle consisting of 5 steps:

1. Information analysis.
2. Establishing the consequences of occupational injuries.
3. Analysis of invested resources.
4. Defining measures intended to reduce the number and severity of occupational injuries.
5. Monitoring the implementation of measures and gathering feedback (Todorovic, 2010).

Information analysis is the first step in occupational injury analysis which begins with the analysis of available information.

The first step is to analyse occupational injuries by the following criteria:

- a) number of injuries per 1,000 employees;
- b) frequency index.

The number of occupational injuries occurring over a specific time period shows the trend and confirms the quality of the implemented occupational health and safety policies.

The injury rate represents the relationship between the number of occupational injuries over a specific period and the average number of employees. The criteria for assessing the injury rate are shown in Table 1.

Table 1. Criteria for injury rate assessment

Low	up to 2.0% employees are injured
Moderate (increased)	2.1–4.0% employees are injured
High	4.1–6.0% employees are injured
Very high	6.1% and more employees are injured

Source: Spasic, 2003.

The frequency index is calculated using the number of employees injured at work in the given period of time and the number of hours worked by employees in the analysed period expressed by the formula:

$$IU = \frac{BP \cdot 1,000,000}{RS}, \quad (1)$$

where IU – the frequency index; BP – the total number of occupational injuries; RS – the total number of hours worked in a given period; 1,000,000 – constant.

The tolerable frequency index is between 5 and 10 per 1,000,000 worked hours.

2.1. Establishing the consequences of occupational injuries. The costs resulting from occupational injuries are highly complex, primarily because it is impossible to make a precise measurement of the monetary value of their consequences. Here we are dealing only with costs related to occupational injury leave.

To establish the occupational injury severity index (IT) the following data are required:

- a) the actual number of working days lost (IRD);
- b) estimated time loss resulting from fatal injuries or partial or complete incapacity for work (VT);
- c) the total number of effective working hours recorded in the given time interval (ERS).

$$IT = \frac{(IRD + VT) \cdot 1,000}{ERS} \quad (2)$$

1,000 = constant.

The tolerable value of IT is between 0.5 and 1.00 lost working days per 1,000 worked hours. A detailed analysis for the year 2008 due to one fatal occupational injury indicates 0.66 lost working days per 1,000 worked hours⁴.

2.2. Defining measures intended to reduce the number and severity of occupational injuries. Every company and employer should have the goal of preventing occupational injuries. The process of defining measures aimed at avoiding occupational injuries may be grouped into several categories:

- a) giving special attention to organizing activities and designing working environment, workplace and equipment testing;
- b) continuous training of employees in workplace safety with active monitoring of the application of acquired knowledge and motivating employees to follow safety procedures;
- c) procurement of proper personal protective equipment;
- d) continuous monitoring of employee health (Zivkovic, 2008).

2.3. Monitoring the implementation of measures and gathering a feedback. The starting point for taking any measure to reduce the number and severity of occupational injuries is information. Based on the relevant information appropriate safety measures can be prescribed. If one begins by accepting the fact that technological processes and working conditions are changing, continuous monitoring of the application of safety procedures emerges as a business requirement. Based on the results, the existing measures have to be changed, adapted to actual working conditions and new safety and health policies must be formulated.

3. Research methodology

3.1. Subject matter and the problem. The data on the number and severity of occupational injuries and illnesses have to be the key indicators of occupational safety at the micro (individual) and macro (state) levels. In statistical processing, data presentation and interpretation and, in addition to standard methods of descriptive statistics, trend and time series analyses are used, because it is the established trend in

⁴ In the case of a fatal occupational injury according to the time table 7,500 working days are lost per one employee. More details in (Spasic, 2003).

occupational injury and illness occurrence which best represents the level of safety at a workplace. In addition, the trend analysis may help in recognizing the early signs of crisis and timely planning of effective occupational health and safety measures.

In the official, expert-based and public representations of occupational health and safety standards in Croatia, in the analysis of the annual data on occupational injuries and illnesses (Deckovic-Vukres, Hemen, Rutar-Kozul, 2008; Pap, 2008) the systematic method of trend analysis has not been used. One exception is the rare use of trend analysis for the data at the county level and similar (Palacic, 2002). Therefore, in drawing conclusions on the national level of occupational health and safety, the key knowledge on the trend in occupational injury and illness occurrence is missing, which is also the case in Slovenia and Serbia, so that can be identified as a research problem.

3.2. Goal, hypotheses and tasks. The research goal is to establish the key occupational safety indicators, particularly the causes of occupational injuries, so that through an integrated security system such causes could be prevented in a systematic manner.

The research tasks may be derived from the research goal:

1. Gathering and analysing the official data on the number of occupational injuries.
2. Identification and analysis of the most common causes of occupational injuries.

3.3. Research methods. Considering the research goal, the appropriate research methods used are:

1. Secondary data analysis.
2. Statistical methods of analysis.

Research results are presented in tables and charts, using frequency and percentage of investigated phenomena. Non-parameter Pearson's χ^2 test was used to compare the frequency of individual attribute parameters. The trend of event occurrence was also determined.

According to Susic (2004), "the trend component represents the basic development of the specific data in time. That is a secondary (long-term) component, which is expressed as a time function in standard time series analysis". In practice, the use of the linear trend, exponential trend and asymptote models is common, and the selection of the model depends on the specific use (Taradi, 2009).

4. A brief summary of the previous research

4.1. Croatia. The assessment of occupational safety in 2010 has been made in line with the annual report of the State Inspectorate and the data published by the Croatian Institute for Health Insurance.

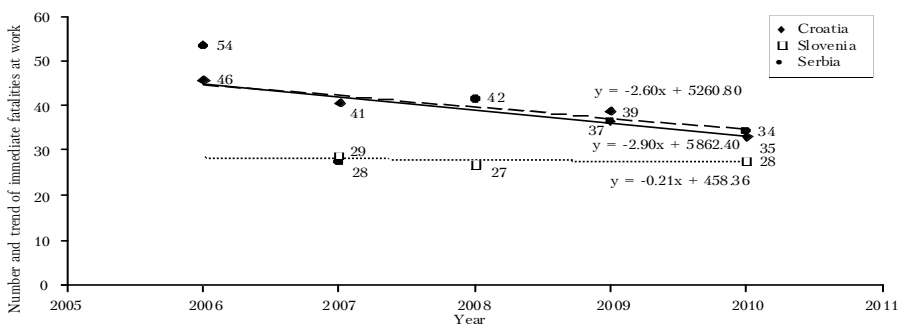
The established positive trend in occupational safety recorded in the previous years continued in 2010. Namely, the total number of occupational injuries of average 24,000 injuries per year has reduced significantly and amounts to 18,656 injuries and also the rate of injuries per thousand employees has evidently reduced from average 17.00 to 13.02. Moreover, the number of fatally injured employees at workplace in 2010 was 34 as compared to 39 fatalities in 2009, i.e. 46 in 2006 and 41 in 2007 (Pap, 2011).

4.2. Slovenia. The records show that in 2010 in Slovenia 20,803 occupational injuries occurred, 69.3% or 14,421 of men and 31.7% or 6,382 of women. The number of fatalities was 28, which is 0.3 per 1,000 employees. In the view of the fact that fewer injuries were recorded in 2007 and 2008 there is an upward trend in the number of injuries in 2010, i.e. an increase in the number of injuries from 17,048 in 2008 and 17,086 in 2007. The number of fatalities in the two years was almost equal to the fatality rate in 2010, 27 in 2008 and 29 in 2007 (Pavlic, Markic, 2010).

4.3. Serbia. The analysis of occupational injuries recorded in 2010 in Serbia (35 fatal, 1026 severe injuries, 29 collective and 232 minor injuries) points to the facts that occupational injuries most commonly occur in industrial production and construction (approx. 73%). 82% are suffered by men, and in 69% cases injuries involved arms, hands, fingers and toes, and the main source was working equipment. Of the employees who had suffered a fatal injury most were employed for an indefinite period (41%), followed by those employed for a definite period (37%) and non-registered employees, i.e. workers without an employment contract (22%). The number of fatalities increased: 37 in 2009 and 42 in 2008, but these were still fewer than in 2006 – 54 fatalities.

5. Results of the occupational injury data analysis

Based on the above data, it is possible to show the movement of immediate fatalities at work in Croatia, Slovenia and Serbia in the period 2006–2010 (Figure 1). Primarily, it is evident that in Serbia and Croatia there is a notable negative trend of immediate fatalities at work during the study period, provided that this trend is more distinct in Serbia. In Slovenia, there is a fairly uniform, but slightly negative trend in the number of immediate fatalities at work.



Source: Developed by the authors.

Figure 1. Number and trend of immediate fatalities at work in Croatia, Slovenia and Serbia in 2006–2010

5.1. Croatia. According to the available data, in Croatia each year 22,800 employees suffer an injury, of which 80% are injured at workplace and 20% have a work-related injury (commuting to and from work). Over the course of several years, 1,900 employees were injured per month; 3 suffered a fatal injury at workplace and 1 – in work-related circumstances, while 100 suffered serious injuries. In 2010, out of 1,432,456 employees, 18,656 (1.30%) suffered an injury (11,777 men and 6,879 women), and 34 lost their lives at work and 12 in work-related circumstances. Considering the total number of employees, it is statistically significant that a larger number of workers were killed at work than the number of workers who died in work-

related circumstances ($p < 0.01$). In relation to the total number of employed men and women, men are statistically more likely to be injured – 1.52% to 1.05% – $p < 0.001$.

At workplaces 14,176 employees were injured, 1,168 seriously in individual cases, and in 21 group accidents 52 employees were injured while 34 lost their lives. On the way to work 816 men and twice as many (1,609) women were injured. On their way from work 549 and 909 women were injured (Pap, 2011). In relation to the total number of employees, women were more likely to be injured than men on their way to and from work ($p < 0.001$). On the whole, and within each gender respectively, the number of injuries that occurred while they were commuting to work was significantly greater than the number of injuries that occurred while they were returning home from work ($p < 0.001$).

According to the number of injuries, the highest injury rate was recorded in the processing industry (4,622 of the total of 255,333 employees with 398 severe and 3 fatal injuries). The highest rate was recorded in the building industry and ship and boat repair industry (827 injuries with 58 severely injured and 1 fatality), followed by construction (1,958 injured, 265 severely injured and 11 fatally injured, out of 117,535 employees) and forestry (269 injuries and 6 fatalities out of the total of 10,659 employees). In relation to the number of employees, the number of deaths and injuries in the forestry sector is statistically higher than in construction ($p < 0.001$). The share of serious injuries to the total number of injuries was statistically higher in construction than in ship and boat repair industry (13.07% vs. 7.01%).

The most common cause of injuries and fatalities at workplace is the performance of a work operation in a way not compliant with occupational safety rules, which was the case for 400 injuries; damaged or defective protective fencing and other means of preventing fall from height caused 35 injuries, while 126 injuries resulted from irregular, slippery or obstructed passages and walking surfaces, and 55 due to a disturbance in the technological process. Defective equipment caused 88 injuries, poor work organization – 63 and the lack of specialty professional training – 24; 18 resulted from malfunctioning of the equipment protective system, 39 due to work operations without appropriate protection or PPE, 74 due to work without appropriate technology and special instructions for complex works and assignments and 7 due to the lack of special health or psychical requirements prescribed for employees (Pap, 2011). Performance of work operations in a manner contrary to the rules of occupational safety, when compared to the total number of injuries was statistically more frequent than any other cause respectively ($p < 0.001$).

The basic data on the number of injuries are provided in Table 2.

Table 2. Occupational injuries by gender in 2010

Number of employees (1,432,454)	TOTAL NUMBER OF INJURIES		
	Men (775,142)	Women (657,312)	Fatalities
At workplace	10,072	4,104	34
On the way to work	816	1,609	4
On the way from work	549	909	3
At a business trip	148	99	1
Other	192	158	4
Total: 18,656	11,777	6,879	46

Source: Pap (2011, p. 207).

5.2. Slovenia. According to the data provided by Benavides, Benach, Martinez, Gonzalez (2005), in the EU member states the trend shows a decrease in the number of fatalities at workplace, which is also the case in Slovenia where since 1991 there is a distinctive downward trend in the number of fatalities according to the records of ILO and Health Insurance Institute of Slovenia. From the data provided by the Labour Inspectorate of the Republic of Slovenia on fatalities at workplace (exclusive of injuries during commute) there is a significant increase in the number of fatalities from 1998 onwards (Pavlic, Markic, 2010).

It is interesting to compare the number of fatalities at workplace in Slovenia and Croatia according to the data provided by ILO, as it is evident that the trends are aligned, except in the period 1991–92 in Croatia when due to specific circumstances the data have not been recorded. On the absolute level, Croatia has registered a higher number of fatalities at workplace than Slovenia, bearing in mind that Slovenia has about 800,000 employees and Croatia – about 1.5 mln. Therefore, it is surprising that the absolute number of all occupational injuries in Croatia since 1991 onwards, according to ILO, is lower than in Slovenia.

Table 3. The number of injuries and fatalities at workplace by industry and gender in 2010

INDUSTRY	Injuries at workplace					Fatalities	
	Total	M	Per 1,000 male employees	F	Per 1,000 female employees	No.	Per 10,000 employees
Agriculture, hunting, forestry and fishery	453	383	33.7	70	12.7	-	-
Mining	161	156	61.6	5	13.2	-	-
Production	6,661	5,203	42.0	1,458	23.0	6	0.3
Power and gas supply	230	206	33.3	24	16.6	-	-
Utilities	384	356	48.6	28	14.6	-	-
Construction	2,567	2,495	37.2	72	11.2	13	1.8
Sales and repair of motor vehicles	2,344	1,302	24.5	1,042	18.2	1	0.1
Carriage and storage of goods	1,388	1,277	33.4	111	13.1	5	1.1
Hospitality	796	321	24.5	475	25.7	-	-
IT and communications	183	119	7.8	64	8.4	-	-
Finance and insurance	266	82	9.3	184	11.8	-	-
Real estate	76	55	23.1	21	11.0	1	2.3
Expert, scientific and technical activities	528	348	13.7	180	8.0	1	0.2
Other business activities	778	475	34.3	303	24.6	-	-
Public administration	1,316	893	34.7	423	15.5	-	-
Education	1,033	234	14.4	799	15.1	1	0.1
Healthcare and social protection	1,207	255	25.1	952	21.8	-	-
Art, entertainment and recreation	270	175	22.8	95	13.7	-	-
Other activities	126	64	15.0	62	6.7	-	-
Activities of extraterritorial organizations and bodies	2	2	-	-	-	-	-
Unclassified	34	20	4.4	14	3.9	-	-
Total	20,803	14,421	31.5	6,382	17.4	28	0.3

Source: The Institute of Public Health of the Republic of Slovenia.

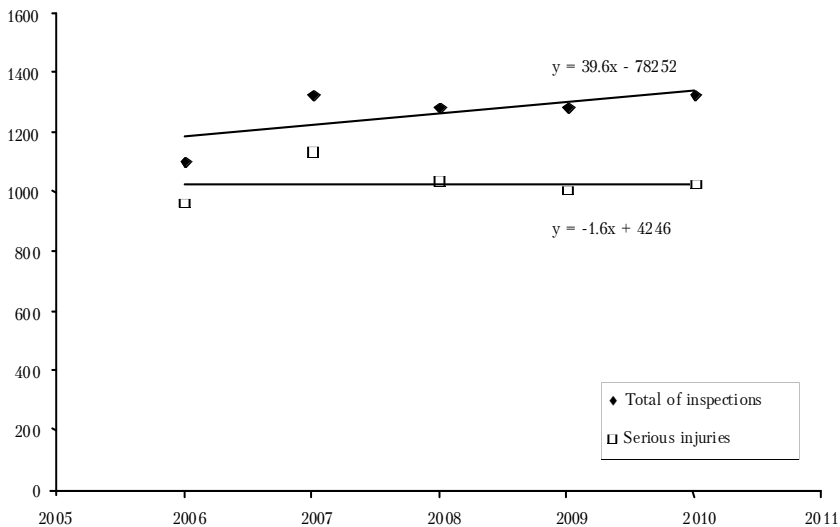
From the above-given data it is clear that the highest number of occupational injuries was recorded in the production industry (32.02%), construction (12.33%) and sales and repair of motor vehicles (9.84%), while, as expected, the highest fatality rate is recorded in the construction industry – 13 cases (46.42%), production – 6 cases (21.42%) and carriage and storage of goods – 5 cases (17.86%). In relation to the total number of the injured, injuries in production are statistically more likely than the frequency of injuries in all other industries respectively ($p < 0.001$). Fatalities in relation to the total number of fatalities were statistically more common in transport and storage industry ($p < 0.05$) than in all other industries in which there is a lower frequency of fatalities ($p < 0.001$).

5.3. Serbia. A comparative analysis of workplace inspections in 2010 as compared to 2009 indicates that the total number of fatalities at workplace was reduced by approximately 5% as compared to the same period in 2009. Namely, in 2010 there were 35 fatalities at workplace, while in 2009 there were 37 and the number of inspections due to severe injuries at workplace in 2010 is a bit higher compared to 2009, because the Inspectorate consistently requires that employers report all injuries causing employees to be absent from work over 3 business days.

Table 4. The number of inspections and registered occupational injuries in 2006–2010

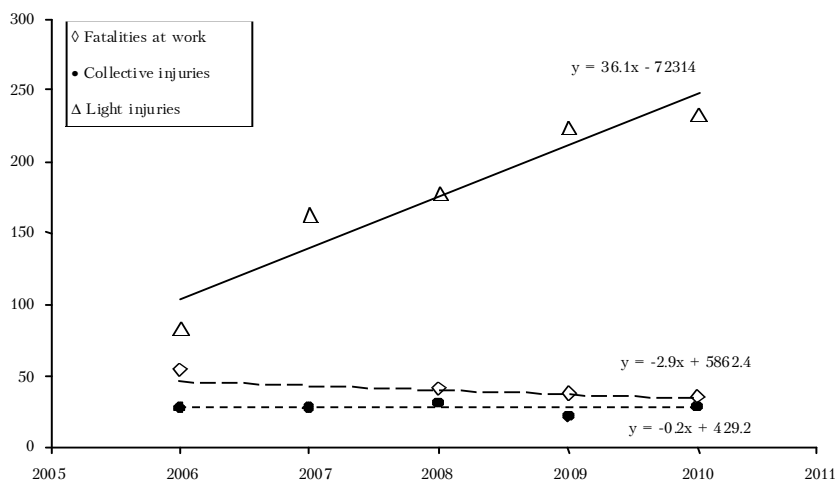
Year	NUMBER OF INSPECTIONS AND INJURIES				
	Total	Fatal	Collective	Severe	Minor
2006	1,102	54	27	966	82
2007	1,330	28	28	1,140	162
2008	1,285	42	32	1,034	177
2009	1,286	37	22	1,004	223
2010	1,322	35	29	1,026	232

Source: Labour Inspectorate of the Ministry of Labour and Social Policy.



Source: Developed by the authors.

Figure 2. Number and trend of inspections and serious occupational injuries in Serbia in 2006–2010



Source: Developed by the authors.

Figure 3. Number and trend of light and collective injuries and fatalities at work in Serbia in 2006–2010

Based on Table 4, corresponding trends were generated in charts 2 and 3. In the reporting period, there is a growing trend in the number of inspections, the trend of reducing the number of serious injuries and fatalities, but there is also a very positive trend in the number of light injuries. Collective injuries have relatively consistent presence with a slightly pronounced negative trend.

6. Discussion

Maximum reduction, i.e. minimizing the risk of occupational injury should be a long-term goal by which the current situation would be changed, which indicates that the importance of safety measures is not given sufficient attention, personal protective equipment is not sufficiently used and legal requirements are being met only to a certain extent. However, despite the fact that Croatian, Slovenian and Serbian legislation has been harmonized with the European laws in this field and provides all pre-conditions for employee protection, the incomplete application remains an issue.

The analysis of causes and circumstances that have led to occupational injuries indicates that the most common causes for injuries are as follows:

1. In the Republic of Croatia, according to Croatian Institute for Health Protection and Safety at Work data:

- unsafe, slippery and obstructed passages and surfaces;
- failure to apply special safety rules;
- illegal actions by third parties;
- performance of work operations contrary to safety rules;
- failure to adhere to basic safety rules;
- defective working equipment;
- force majeure.

2. In the Republic of Slovenia, according to the Health Insurance Institute:

- unsafe, slippery and obstructed passages and surfaces;
- performance of work operations contrary to safety rules;
- improper use of working equipment;

- incomplete implementation of occupational health and safety measures at workplace;

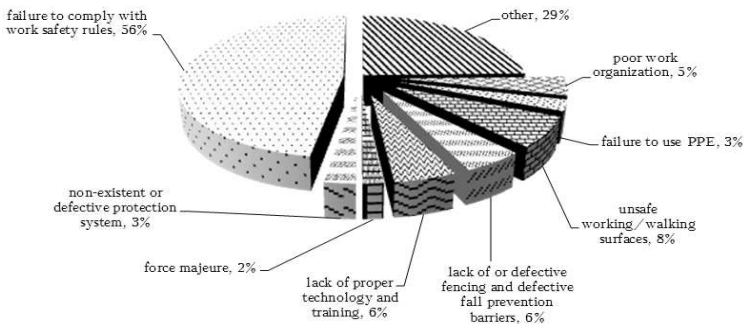
- failure to adhere to basic work safety rules;
- deviation from the prescribed and established work process;
- force majeure.

3. In the Republic of Serbia, according to the data of the Occupational Health and Safety Directorate:

- defective working equipment;
- unsafe, slippery and obstructed passages and surfaces;
- non-functionality or defectiveness of a protective safety device on the working equipment;

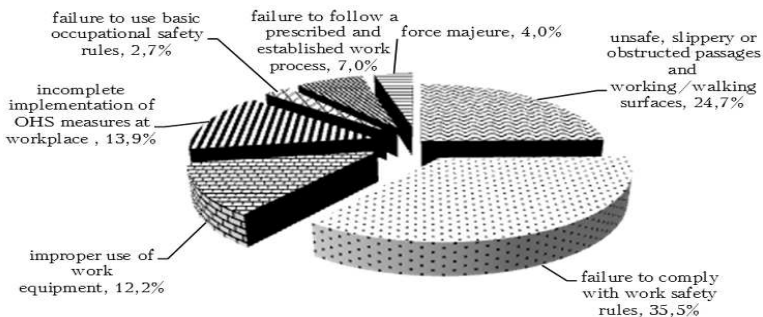
- defective or insufficient protection from high voltage injury;
- performance of work operations contrary to work safety rules;
- performance of work operations without protection and PPE;
- weariness caused by strenuous and overtime work, lack of rest etc.
- poor organization of work;
- acute and chronic illness;
- other unapplied special work safety rules;
- illegal actions of third parties;
- force majeure.

According to the research results, the most common causes of occupational injuries by countries are shown in pie charts 4, 5 and 6.



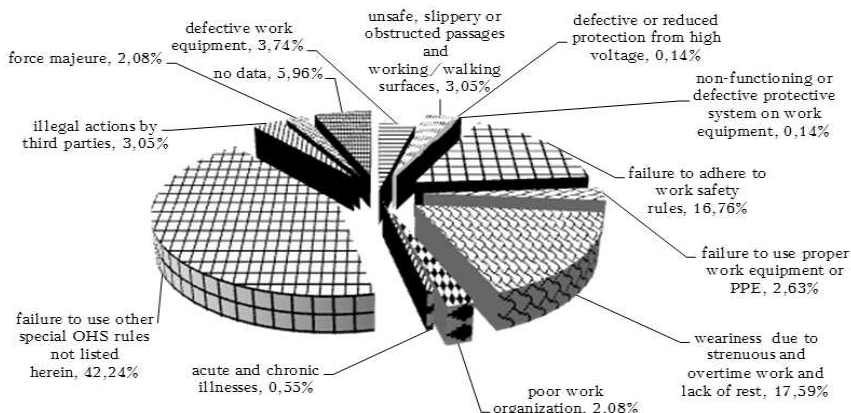
Source: Pap (2011, p. 218).

Figure 4. Causes for severe occupational injuries in 2010 (Croatia)



Source: Health Insurance Institute.

Figure 5. Causes for severe occupational injuries in 2010 (Slovenia)



Source: Occupational Safety and Health Directorate, 2010 Labour Report.

Figure 6. Causes for severe occupational injuries in 2010 (Serbia)

Analyzing the presented percentages (Figures 4, 5 and 6) on the causes of severe injuries in 2010, the most common cause in Croatia and Slovenia is work operations against safety rules. Comparing the percentages, this cause was statistically more pronounced in Croatia (56%) than in Slovenia (35.5%) – $p < 0.01$. This cause in Serbia is represented in 16.76% of all the cases and is statistically less frequent than in Slovenia ($p < 0.01$) and Croatia ($p < 0.001$). In Serbia, the most common causes for severe injuries are unapplied other special safety rules that are not listed herein and which were present in 42.24% of all the cases.

The most common causes for occupational injuries in Croatia, Slovenia and Serbia are the lack of professional training and safe working conditions. In the process of ensuring safe working conditions there are multiple factors that have to be taken into account. However, the number of occupational injuries and reports on fatalities points to the fact that ensuring occupational health and safety requires further work.

7. Conclusion

Bearing in mind that analyzing the trend of occupational injuries shows the state of occupational safety in the best way, and the analyzing trend is the function of early recognition of crisis and thus timely planning and taking adequate safety measures, based on previously presented data, we can conclude that in the period from 2006 to 2010 there was a negative trend of immediate fatalities at work in Serbia and Croatia. In Slovenia, the trend was rather smooth, but slightly negative. In the same period in Serbia, there is a trend of increase in the number of inspections, the trend of reducing the number of severe injuries, but also a very positive trend in the number of light injuries. Collective injuries have relatively consistent presence with a slightly pronounced negative trend.

From the results it is evident that apart from defined causes of occupational injuries, that are common in Croatia, Slovenia and Serbia, there are specific ones, which are listed as the causes only in a particular state. Thus, something should be done on standardization and creation of a unique list of causes in order to provide better and more accurate monitoring and subsequent analysis of data through a common list of key indicators.

Integrated system of protection promoting a safe and healthy work environment by clearly defining all technical standards which set the framework for an organization's activity directed towards constant reducing of danger and risk helps organizations in managing health and safety risks in accordance with applicable legislation and reducing them to the acceptable level. Recognizing dangers, hazards and their valuation to establish a priority in dealing with them is the first step dictating the choice of preventive measures by which possibilities of injury and illness at workplace are prevented, remedied or mitigated.

A multivariate regression analysis is suggested as a next step in this research, aimed at establishing the causes for occupational injuries which show a statistically significant trend linked to an upward trend in occupational injuries and illnesses occurring in Croatia, Slovenia and Serbia.

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