



MODELLING THE APPLICATION OF WORKPLACE SAFETY AND HEALTH ACT IN LITHUANIAN CONSTRUCTION SECTOR

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Abstract. Being one of the largest European industry branches, construction is also characterized by some of the worst workplace health and safety indices in the region. On average, workers at construction sites face double the chance of non-fatal accidents at work compared with workers from other EU sectors. With a view to reducing the number of accidents and occupational illnesses in the construction sector, numerous legal acts have been passed and consistently implemented within recent decades, which allowed improving work conditions in the EU member countries. Although EU legal acts apply in Lithuania, the increase in accidents at work in the construction sector is reflected in the statistics. To prevent accidents at work and occupational illnesses, as well as increase work productivity and job satisfaction, the implementation of measures ensuring safe work at construction sites becomes a necessity. Work safety in various construction processes can be achieved not only by making use of collective and personal protective equipment, occupational risk assessment, employee instruction and training on safety at work, but also by properly organizing work and creating proper working conditions. In order to ensure safe work for construction workers, knowledge and application of standard legal acts is necessary.

Keywords: workplace health and safety, accident, occupational illness, construction sector, construction process, safe work, legal acts.

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1. Introduction

Over 12 million people working in the sector, construction is one of the largest industry branches in Europe. Unfortunately, this sector is also characterized by some of the worst workplace health and safety indices in the region. On average, workers at construction sites

face double the chance of non-fatal accidents at work compared with workers from other EU sectors. (Hola 2009; Liaudanskienė et al. 2009; Dèjus 2008; Stankiuvienė 2008; Lopez et al. 2008; Nielsen 2007).

In developed countries, much attention is devoted to working conditions, i.e. making sure that the working conditions do not pose health threats or endanger human lives (McDonald et al. 2009; Babichenko, J. and Babichenko, S. 2008; Giretti et al. 2008; Hernaus et al. 2008; Kleiner et al. 2008; Kazlauskaitė and Bučiūnienė 2008; Lu et al. 2008). Usually, it is the state that specifies workplace safety and health conditions by passing respective laws and other standard documents, which must be adhered to by the employers. However, the level and state of workplace health and safety conditions secured should not be important to state institutions alone. It is also of importance to employers, employee trade unions, insurance companies and could also be important to large scale clients. When selecting a product, Western clients tend to take into account the image that the producer has projected in a given sector, and might prefer producers that adhere to workplace health and safety requirements (Duijm et al. 2008). Therefore, companies strive to exhibit a good level of workplace health and safety through managing workplace health and safety risks and improving their results in this area. In light of the complex competitive situation, the continuity of operations is better secured by ensuring workplace safety, since each undesirable incident may result in huge losses (Juščius and Snieška 2008).

With a view to reducing the number of accidents and occupational illnesses in the construction sector, numerous legal acts have been passed and consistently implemented within recent decades, which allowed improving the work conditions in EU member countries. Legal acts that deal with work safety are especially numerous in labour law. The following aspects are specified in the acts mentioned above: organization and control of safety of work carried out in the company; accident prevention and operation rules; employee provision with personal protective equipment and materials to prevent harmful factors; methods of investigation and prevention of work-related accidents, professional illnesses and industrial accidents.

Although EU legal acts apply in Lithuania, the increase in accidents at work in the construction sector is reflected by the statistics (Perera et al. 2009; Apanavičienė and Liaudanskienė 2008; Paslawski 2008; Zavadskas et al. 2008; Vaidogas and Juocevičius 2008, 2009; Department of Statistics to the Government of the Republic of Lithuania). To prevent accidents at work and occupational illnesses, as well as increase work productivity and job satisfaction, it is necessary to implement measures for ensuring safe work at construction sites (Alinaitwe et al. 2009; Hallowel and Gambatese 2009; Turskis et al. 2009; Idoro 2008; Zavadskas and Vaidogas 2008, 2009).

The analysis of the causes of severe accidents at construction sites reveals that over two thirds of accidents happen due to bad work organization, lack of supervision and control, as well as failure to assess operational risks (Enshassi et al. 2009; Fung et al. 2008; Vegso et al. 2007). A rather high level of work-related injuries is attributed to failure to comply with workplace health and safety requirements. Other important causes directly resulting in accidents in the construction sector are lack of knowledge and training, as well as insufficient understanding of how to safely carry out the work assigned (Stankiuvienė 2008). The irresponsibility of employees is one of the most important factors that impact work-related

accidents. The latter demonstrates the poor state of safety culture on the company level. Other authors analyze the causes behind work-related accidents from historical, procedural, economic, psychological, ergonomic, organizational and work environment points of view (Giretti *et al.* 2009; Reinhold *et al.* 2008).

In terms of damaging factors, the analysis of work-related accidents in construction companies highlights falling from height, collision with construction vehicles and falling objects as the most frequent ones.

Work safety in various construction processes can be achieved not only by making use of collective and personal protective equipment, occupational risk assessment, employee instruction and training on safety at work, but also by properly organizing work and creating proper working conditions (Jorgensen *et al.* 2007). In order to ensure safe work for construction workers, knowledge and application of standard legal acts is necessary.

2. Relevance of the research

The issue of workplace safety is extremely relevant, since by failing to adhere to its principles, not only moral hazard, but also damage to health is inflicted; sometimes lives are endangered. From the legal point of view, such violations of law are hard to assess, as both the employer and employee will strive to interpret the conflict in their own favour. When carrying out prevention activities, light-headed approach to the situation by both the employer and employee is often observed, where both parties expect a happy end in the law violation situation. To ensure legal regulation of workplace health and safety, it is important to understand the laws, bylaws, and resolutions in workplace health and safety area.

Failure to comply with standard legal acts, understand their contents and interpret their requirements results in an increased number of accidents and occupational illnesses. Modern construction is still causing serious concern due to the threat and level of accidents and occupational illnesses. Numerous tasks carried out at construction sites expose workers to various dangers (Fig. 1). According to statistical data, the more dangerous the work, the worse the outcomes for the worker as well as for the economy, finances, social costs and the psycho-social state of the society.

Workers at construction sites are exposed to extremely high risks, since work conditions are continuously changing, various construction equipment and mechanisms are used, and workers of various professions/professional levels are involved. The workplace can be uncomfortable, unsafe or exposed to unfavorable meteorological conditions. Therefore, one of the main goals for the employers is to implement the necessary work organization measures to get rid of construction site hazards prior to starting work and ensure a safe and healthy work environment.

The majority of employers do not sufficiently assess the importance of their employees' health and safety. By reducing financing assigned to ensuring workplace health and safety at work, they fail to implement occupational risk assessment and employee training measures as well as purchase of collective and personal protective equipment. However, the company revenue is not saved or increased, since in case of an accident or occupational illness construction work is stopped; worker productivity and job satisfaction decrease (suddenly or

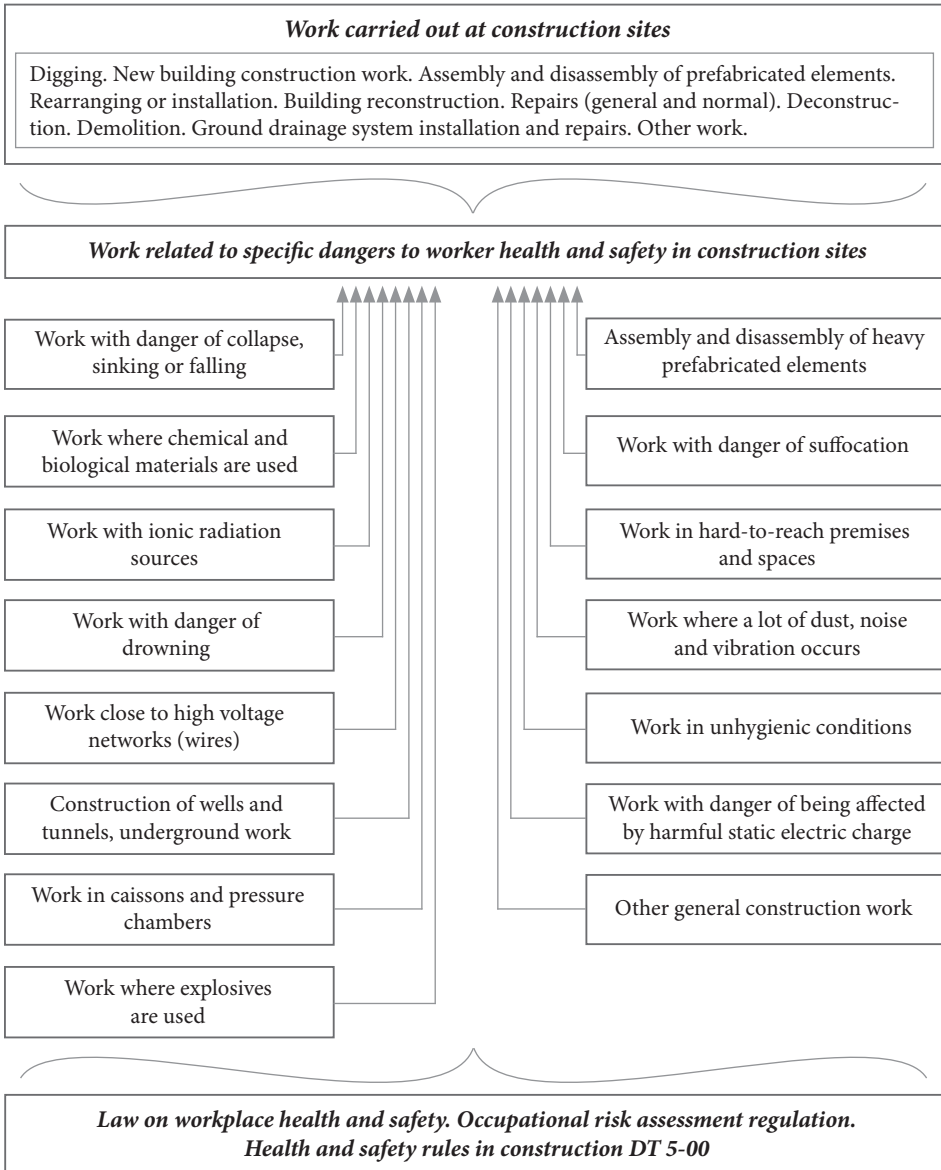


Fig. 1. Potential dangers when working at construction sites and their legal regulation

gradually). The company does not make a profit; what is more, it can even face financial and reputation losses.

In order to ensure worker productivity and good quality work, it is necessary to take care of the workers' safety at work. To implement this, it is obligatory to possess a good knowledge of legal regulations in the construction sector. The legal regulations of workplace health and safety in the construction sector specify the obligatory requirements for workplace health and

safety while carrying out construction work. As early as the building design stage the building design health and safety coordinator should ensure that before construction site setup begins, worker health and safety requirements at respective construction sites are specified in the building technical project, and the specific measures ensuring workers' health and safety are specified (or will be specified in the nearest future) in the construction work technological project. Furthermore, the above mentioned specialists should ensure that for all the stages of building design and project development, principles of accident and occupational illness prevention as well as standard legal act requirements concerning worker health and safety are assessed.

Even in the absence of legal acts specifying reasons for making health and safety an integral part of the employer's company management system, health and safety requirements are obvious, since work productivity, quality and safety are interrelated issues. The prevention of injuries and illnesses at work should be the most important goal of every large, medium or small company. There is one more important reason for adhering to work health and safety requirements: the costs incurred due to accidents and illnesses. Thus, the prevention of work-related accidents and occupational illnesses in construction companies is very important and relevant for Lithuania today.

3. Research goals and methods

The goals of this research are to assess the current state of workplace health and safety in Lithuanian construction sector, European Community workplace health and safety strategy; analyze standard legal acts ensuring workplace health and safety in the construction sector. To achieve these goals, it was necessary to:

- analyze and summarize previous research;
- assess the current state of workplace health and safety in Lithuania's construction sector;
- assess the European Community workplace health and safety strategy (2007–2012): improving work quality and productivity;
- carry out an analysis of standard legal acts regulating the construction sector.

In order to achieve the above goals, selection, polling, and statistical methods were used. To assess the requirements and the impact of implementing the EU Directive 89/391/EEC on the requirements for measures of improving workplace health and safety, an anonymous questionnaire-based survey was carried out. The questionnaires included questions aimed at clarifying both the benefit and difficulties in the implementation of standard legal acts ensuring workplace health and safety in construction sector.

The main objective of the survey was to obtain the characteristics of the population researched (general population). For this purpose, selective observation, as a partial variant of non-continuous observation, i.e. when only the units of the part analyzed are researched, was selected. In this research, one of the random selection methods – block selection – was used. This kind of selection allows achieving meaningful results based on comparatively small samples. This is relevant when dealing with large general populations and fully matches the research goals.

4. Analysis of accidents in the construction sector

According to the data from the Department of Statistics to the Government of the Republic of Lithuania, at the beginning of 2009, 5,476 functioning construction companies were registered (6.7% of all companies operating in the country), with 120.6 thousand employees (9% of all employees in all the country's companies). 2,809 companies (33.5% of all that violated laws in the country) committed violations of standard legal acts on workplace health and safety 1,6768 times (36.3% of all violations in the country). 69% of violations were committed by companies with 10–249 employees. In the Republic of Lithuania, small and medium construction companies prevail, accounting for over 99% of all construction companies in the country (Annual reports of the Department of Statistics to the Government of the Republic of Lithuania 2009).

In 2007, the majority of work-related accidents happened in construction (671), mining industry (606), fishing industry (550), transportation (505), manufacturing industry (461); fatal cases occurred in construction (23), transportation (20), agriculture and forestry (13), electricity, gas and water supply sectors (4). In 2007, 85%, and in 2006, 86% of fatal work-related accidents occurred in companies dealing with main (construction, manufacturing, transportation, agriculture and forestry, trade, electricity, gas and water supply) economic activities (Annual reports of the State Labor Inspectorate of the Republic of Lithuania 2007).

According to statistical data, with the increasing volumes of work, the construction sector became one of the most dangerous ones in terms of workplace safety and health (Fig. 2). 24% of all fatal cases at work have been registered at construction sites; over one third of the heavily injured at work are construction workers. 71% of construction workers that died at work and around 50% of those who experienced serious injuries did not have qualifications specified in their contracts.

In Lithuania, there are 3 times as many fatal accidents at work in construction as in the other EU countries, while the number of lesser accidents comprises only one tenth compared with other EU member countries.

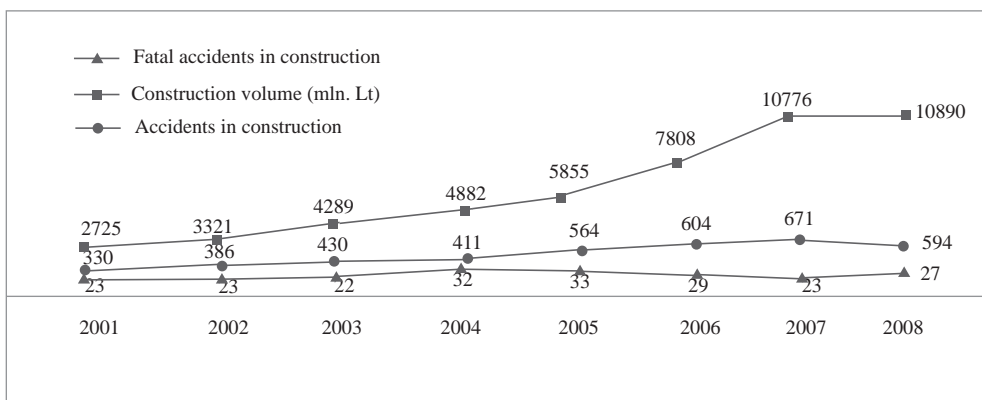


Fig. 2. Trends in construction work volumes and accidents at work in Lithuania

Although a slight tendency of a decrease in the number of serious and fatal accidents at work has been observed during the two last years in Lithuania, the average of deaths at work per 100,000 employees is still high in comparison with the EU average. According to data from 2007, 7.4 people out of 100,000 die at work in Lithuania (the number is 5.1 without traffic accidents), compared with 4 as the EU average, and 2 in Scandinavia.

The analysis of the causes behind work-related accidents at construction companies has revealed that around 60% of accidents occur due to badly organized work at heights, failure to follow standard legal act requirements; around 25% occur due to causes related to using unsafe equipment/tools as well as their improper maintenance; 7% of the cases occur due to workplaces not meeting various legal act requirements; 4% due to workers not having been sufficiently trained and instructed; another 4% of cases occur due to failure to use protective equipment at work.

The analysis of data on accidents in construction companies shows that the main causes are failure to comply with standard legal acts as well as badly organized work, failure to use safety measures at work and employee absent-mindedness.

The analysis of law violations reveals (Fig. 3) that 35% of all observed violations are in the area of employment law, and 65% are related to workplace health and safety. Out of 10.242 companies inspected for workplace health and safety, 8.392 or 82% violated legal acts on workplace health and safety 46.189 times. Out of all the companies inspected that violated laws on workplace health and safety, one third were construction companies, which also comprised 36% of all cases registered. (Annual reports of the State Labor Inspectorate of the Republic of Lithuania 2009).

Companies mostly violated the laws in setting up work places, using work tools, providing their employees with personal protective equipment as well as instructing employees on health and safety. A rather great number of the workers injured can be explained not only by failure to comply with workplace health and safety requirements, but also by the lack of knowledge of standard legal acts. In 429 cases, due to incompatibility with standard legal acts, 463 work

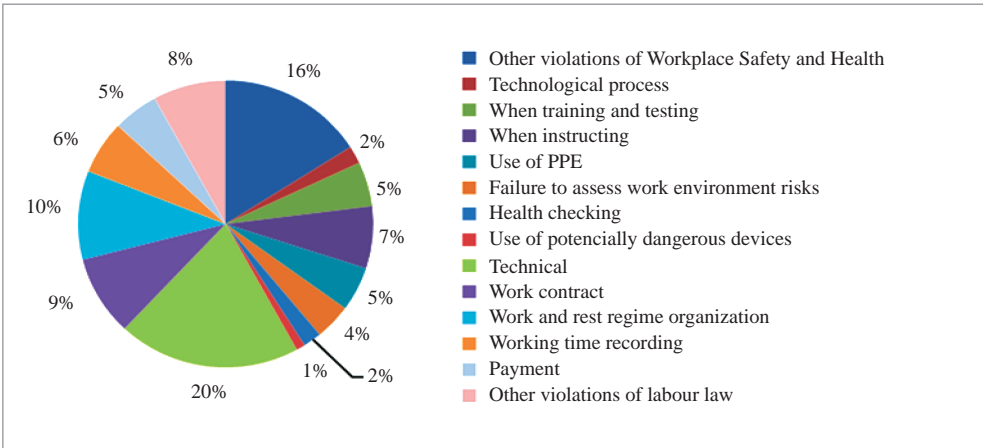


Fig. 3. The structure of legal act violations in Lithuania

tools were forbidden to us as well as 82 potentially dangerous devices; furthermore, work of 181 construction subdivisions was suspended as well as 2.217 work places (Fig. 4).

Although EU laws and directives were adopted in 1996, i.e. the legal basis was created to ensure workplace health and safety at work on the national level, the findings of the State Labor Inspectorate of the Republic of Lithuania show that a safe and healthy work environment and accident prevention are not priorities for employers.

5. Legal regulation of construction

One of the objectives of Lithuanian construction sector development strategy until 2012 is creating a legal act and normative document system for regulating the construction business compliant with the EU requirements and based on the best practices of the world.

Construction work should be organized in a way that throughout the construction process (building construction), the safety of workers would be ensured, thus striving to avoid/reduce the number of accidents and occupational illnesses. In order to ensure safe work at construction sites it is necessary to possess a good understanding of the whole system of standard legal acts regulating the construction sector (Fig. 5).

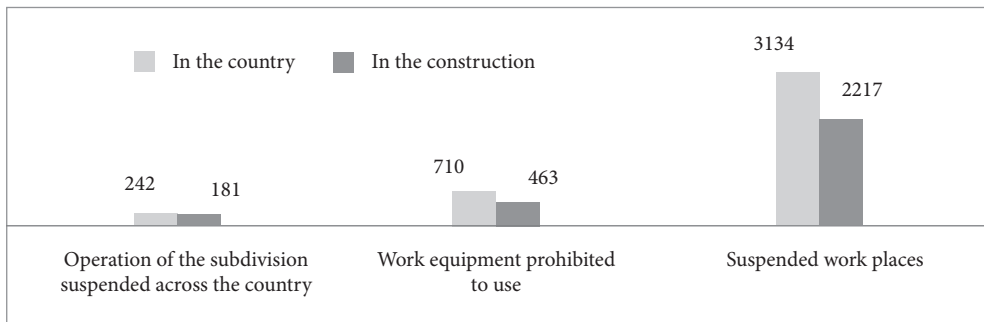


Fig. 4. Indices of violations in work organization and technical violations in construction in 2007

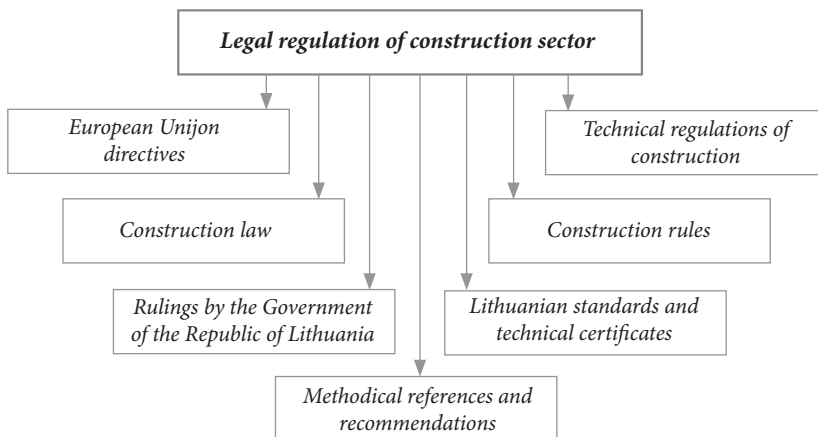


Fig. 5. Legal regulation of the construction sector

European Union directives are Community legal acts obligatory to the EU member countries, the requirements of which need to be incorporated into the national laws of each member country within a given period of time.

Lithuanian standards (according to the International Organization for Standardization ISO), these are documents agreed upon by an approved institution, specifically, the Lithuanian Department for Standardization; they specify general rules, references or properties of products, processes and services suitable for repeated use but not necessarily obligatory. Furthermore, Lithuania prepares and approves its national standards; it also adopts European and international standards.

Technical certificates are documents prepared and approved following the order of a government-accredited institution. These are prepared when no corresponding Lithuanian or European standards exist, or when such standards are not planned to be developed.

Construction law is a legal act passed by the state government that legally regulates social relations.

Construction rules are documents that specify ways and methods of implementing technical regulations and are approved by ministries, government agencies, other state institutions or legal persons, and officially registered in a government-accredited institution.

Rulings by the Government of the Republic of Lithuania are documents that specify the rules of behavior for a specific group of persons. These are based on laws and are dedicated to make them more specific and implementable.

Technical regulations of construction are documents that define the properties of a product or service, including application provisions. They are obligatory to comply with. Some of legal acts issued by a government-accredited institution specify technical requirements directly or by referencing standards or rules.

Methodical references and recommendations are documents announced by companies, science and study institutions and applied voluntarily; they recommend methods for implementing technical regulations. Regulations are obligatory to all legal and physical persons whose activities are regulated by law. Rules, Lithuanian standards and technical certificates are applied voluntarily, except in cases where technical regulations or other legal acts specify that respective rules, standards and certificates are obligatory. It is clear that Lithuanian standards and technical certificates, which are referenced in the design or contracting contracts, are obligatory to the contract parties.

In 1989 many EU directives introduced amendments to the provisions related to work conditions in the manufacturing sector. Employer responsibilities were increased, new obligations were included for employees, and risk assessment regulations were renewed.

When Lithuania joined the EU on May 1, 2004, EU legal act precedence over other legal acts of the country came into force. Consequently, in case of a collision between provisions of EU laws and national laws, the respective provision of the EU law is always implemented, and the provisions of national law, no matter how important at national level, should be interpreted and implemented in a way that does not contradict the provisions of the EU law. Consequently, EU legal acts are applied directly and by themselves create rights and obligations for Lithuanian citizens and other subjects, without the necessity to be approved by acts from national institutions, i.e., ratification. According to this principle, the state of Lithuania

must eliminate obstructions to the implementation of these acts in its national law and create prerequisites for their implementation.

In the 1990s the legal regulation of workplace health and safety underwent drastic changes at the national level, too. When implementing Directive 89/391/EEC on the measures to improve workplace health and safety, on October 7, 1993, People's Safety at Work law was passed, which was succeeded by an amended Workplace health and safety law on July 1, 2003. When implementing the Lithuanian National law harmonization work program, occupational safety and health at work legal acts have been prepared /are being prepared according to the individual directives of part 1 of article 16 of the EU main Directive on health and safety at work, 89/391/EEC "On measures for improving workplace health and safety at work", which specify minimal health and safety requirements for work places, work equipment, personal protective equipment, employee protection from chemical, carcinogenic materials as well as other relevant acts.

The amendment to People's Safety at Work law – the Workplace health and safety law was passed by the Seimas of the Republic of Lithuania on October 17, 2000. This law included provisions of all the articles of the Directive 89/391/EEC. The law specifies not only the general workplace health and safety provisions, but also regulates work and rest times, specifies the main requirements for ensuring health and safety of young people, disabled people, pregnant women, women that recently gave birth as well as requirements for the work environment, workplace and work organization, specifies general employer/ employee rights and obligations, and the order of informing about accidents at work, occupational illnesses, their investigation and recording.

In terms of workplace health and safety, the 89/391/EEC Directive is the most important in the EU legal act system. It is complemented and extended by separate directives. In order to make the essence of the legal basis easier to understand for the participants of construction activities, the directives regulating the construction sector are divided into six separate groups (Fig. 6).

The first group: work places. Directives that regulate ensuring of workplace health and safety by proper construction site setup belong to this group.

Council Directive 92/57/EEC "On the implementation of minimum safety and health requirements at temporary or mobile construction sites", adopted on June 24, 1992, encouraged a new approach towards safety management starting with the building design stage and finishing with workplace health and safety control at construction sites. The provisions of Directive 92/57/EEC were included in the Provisions of construction site setup, which were approved by the minister of social security and labour and the minister of environment on January 15, 2008 by No.A1-22/D1-34. In these provisions, the most necessary requirements for temporary or mobile sites were specified: general most necessary requirements for work places, and special most necessary requirements for construction site setup inside and outside buildings.

On November 24, 1999 by No. 95, "Provisions for health and safety sign use at work places" were signed by the minister of social security and labour, which were prepared according to the Council Directive 92/58/EEC "On the minimum requirements for the provision of safety and/or health signs at work", adopted on June 24, 1992. These provisions specify the



Fig. 6. The EU directives that ensure workplace health and safety in Lithuanian construction sector

minimum requirements for safety and/or health sign meanings, form, colours and also the obligations of the employers to set these signs up in work places. The provisions also include requirements for marking containers and pipe systems with dangerous substances, fire safety equipment, obstacles and dangerous places, marking traffic roads and communicating by light, sound signals, hand gestures as well as verbal communication.

The second group: equipment. Directives that regulate using work-related equipment at work safely and ensuring that employees are provided with personal protective equipment are included in this group.

To implement Council Directive 89/656/EEC “On the minimum health and safety requirements for the use by workers of personal protective equipment at workplace”, adopted on November 30, 1989, the “Provisions for providing employees with personal protective equipment” were adopted when the minister of social security and labour signed No.A1-331. The provisions specify the obligatory requirements for using personal protective equipment at work and providing employees with this equipment: obligations of the employer to provide the employees with personal protective equipment, those of the employee to use the personal protective equipment, and the rules of storing and maintaining (cleaning, repairing) the protective equipment.

By ruling No. 102 on December 22, 1999, the minister of social safety and work approved the “General provisions for work equipment use”, which were prepared according to Council Directive 89/655/EEC “On the minimum safety and health requirements for the use of work equipment by workers at work” and complementing Directives 95/63/EC and 2001/45/EC. The minimum and obligatory requirements were specified for purchasing new work equipment as well as using the existing equipment. The provisions do not restrict the employers if they were to use an even stricter approach in this area, which would only guarantee better and more effective employee safety and health protection at work in terms of work equipment use.

The third group: inherent risks. The directive regulating workplace health and safety requirements when handling loads manually belongs to this group.

In compliance with the European Parliament and Council Directive 90/269/EEC “On the minimum health and safety requirements for the manual handling of loads where there is a specific risk of back injury to workers” passed on May 29, 1990, and with a view to improving workplace health and safety the “Requirements for workplace health and safety when handling loads manually” were adopted when the minister of social security and labour and the minister of health signed order No. A1-293/V-869 on October 23, 2006. Here the necessary requirements were specified for workplace health and safety when handling loads manually with dangers of back injuries.

The fourth group: factors. Directives regulating biological, chemical and physical factors that may result in a variety of risks to workers at construction sites belong to this group.

In order to implement the European Parliament and Council Directive 2000/54/EC “On the protection of workers from risks related to exposure to biological agents at work”, the “Provisions for employee protection from exposure to biological agents at work” were adopted when the minister of social security and labour and the minister of health signed order No. 80/353. In these, the minimum requirements for employee protection from risk of exposure

to biological agents were specified, and a list of activities where exposure to biological agents was likely was compiled.

In order to improve workplace health and safety and following the European Parliament and Council Directive 2002/44/EC “On the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (vibration)” passed on June 25, 2002, “Provisions for employee protection from risks of vibration” were adopted when the minister of social security and labour and the minister of health signed order No. A1-55/V-91 on March 2, 2004. In these provisions, the necessary requirements for protecting employees from risks to their health and safety arising from mechanical vibration were specified. The provisional requirements apply to any workplaces and employee activities, where a possibility of exposure to mechanical vibration and a risk to employee health is likely.

In order to implement the European Parliament and Council Directive 2003/10/EC “On the minimal health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise)” as well as to specify the requirements for workplace health and safety, the social security and labour minister and the health minister signed order No. A1-103/V-265 on April 15, 2005, by which the “Provisions for employee protection from noise risks” were adopted. In these, the necessary requirements for employee protection from risks to their health and safety (and especially hearing), caused by noise as well as measures for eliminating/reducing the noise risks were given.

In order to implement the European Parliament and Council Directive 2008/46/EC passed on April 23, 2008, which partly replaces Directive 2004/40/EC “On minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields)”, the “Provisions for employee protection from risks posed by electromagnetic fields” adopted on April 25, 2006 according to order No. A1-119 by the minister of social security and labour were amended and approved. In these, the necessary requirements are specified for employee protection from risks to their health and safety, which may arise from electromagnetic fields (from 0 Hz to 300 GHz), and the measures to eliminate/reduce risks arising from electromagnetic fields were planned. The hazards of electromagnetic fields in terms of workplace health and safety are associated with scientifically proven short-term negative effects on the human body due to the flow of induced currents through the human body, energy absorption and the presence of contact currents. These provisions do not specify requirements for employee protection from risks associated with long-term negative effects on the human body, nor those for protecting employees from risks arising from making physical contact with live wires.

In order to implement the EU Directive 90/394/EEC “On protection of workers from risks related to exposure to carcinogens at work”, Directive 97/42/EC which first replaced Directive 90/394/EEC, and later Directive 1999/38/EC (in this way including mutagen factors), “Provisions for employee protection from carcinogens and mutagens at work” were adopted by the minister of social security and labour and the minister of health by signing order No. 97/406 on July 24, 2001. The aim of these provisions is to specify the employer’s obligations in protecting employees from risks to their health and safety which may arise from exposure to carcinogens or mutagens; prevention measures to eliminate or reduce such risks, as well as requirements for determining and assessing such risks are specified.

In order to implement EU Directive 98/24/EC “On the protection of the health and safety of workers from risks related to chemical agents at work”, the “Provisions for employee protection from chemical agents at work” were passed by the minister of social security and labour and the minister of health by order No. 97/406 on July 21, 2004. These provisions aim at specifying the employer’s obligations in protecting the employees from risks that may arise due to exposure to chemical agents in the workplace or activities related to chemical agents.

In order to implement Council Directive 83/477/EEC “On the protection of workers from the risks related to exposure to asbestos at work” passed on September 19, 1983 (including amendments made on March 27, 2003 by the European Parliament and Council Directive 2003/18/EEC) and to specify requirements for health and safety of employees working with asbestos, “Provisions for working with asbestos” were adopted by the minister of social security and labour and the minister of health by order No. A1-184/V-546 on July 16, 2004. These provisions specify the requirements for employee protection from risks due to asbestos, prevention from health hazards caused by asbestos as well as maximum allowed values of asbestos dust concentration in the air of the workplace. If any activity should incur a risk of employees’ exposure to asbestos – containing substances or dust, it must be assessed by determining the nature and level of its impact on the employees.

In compliance with the European Parliament and Council Directive 1999/92/EC “On minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres” passed on December 16, 1999, with a view to specifying requirements for workplace health and safety, “Safety provisions for employees’ work in potentially explosive environments” were adopted by the minister of social security and labour by order No. A1-262 on September 30, 2005. In these provisions, the necessary requirements to be met for improving the protection of workplace health and safety were specified concerning work activities in potentially explosive environments at companies, organizations or other organizational structures.

The fifth group: employee groups. Directives regulating the protection of employee groups easily susceptible to harmful and dangerous work environment factors belong to this group.

In compliance with part 1 of article 278 of the Labour Code of the Republic of Lithuania, and with a view to implementing Council Directive 92/85/EEC “On the introduction of measures to encourage improvements in the safety and health at work of pregnant workers and workers who have recently given birth or are breastfeeding” passed on October 19, 1992, the Government of the Republic of Lithuania adopted “Harmful work conditions and dangerous factors for pregnant women, women who have recently given birth or are breastfeeding” by order No. 340 on March 19, 2003. Requirements for workplace health and safety in the workplace were specified, aimed at protecting pregnant employees and those who have recently given birth or are breastfeeding; these rights are included in the contract.

In compliance with part 2 of article 277 of the Labour Code of the Republic of Lithuania and with a view to implementing Council Directive 94/33/EC “On the protection of young people at work” passed on June 22, 1994, the Government of the Republic of Lithuania adopted “Work times, prohibited jobs and factors that are harmful or dangerous to health for persons under 18 years old”. On this list, requirements for workplace health and safety are specified,

whose implementation is aimed at protecting young people; furthermore, factors harmful and hazardous to young people's health are listed.

The sixth group: work time organization. The Directive regulating work time organization by ensuring safe and healthy work conditions for employees is included in this group.

In compliance with part 4 of article 144 of the Labour Code of the Republic of Lithuania and with a view to implementing Council Directive 93/104/EC "Concerning certain aspects of the organization of working time" passed on November 23, 1993, and the provisions of EU directives that specify working time peculiarities for specific areas of economic activity, the Government of the Republic of Lithuania passed the regulation "On the list of work activities, where up to 24 hour working days may be allowed, peculiarities of work and rest in the areas of economic activity, work and conditions in which a summed work time recording may be applied, and the order of applying summed work time recording in companies, institutions and organizations" by regulation No. 587 on May 14, 2003. Here work time organization peculiarities are enumerated, to be adhered to by the employer in order to ensure work safety and employee productivity.

Directive 89/391/EEC specifies the essential requirements to be applied in the construction sector. All of the construction sector participants need to carry out their obligations, i. e., assess health and safety hazards and monitor the integration of preventive measures into the whole of the organizational and architectural work throughout the construction and exploitation of a structure. The directive also specifies obligations for both employers who personally work at construction sites and independent workers to adhere to the same workplace health and safety requirements, use safe work equipment, introduce collective protective equipment as a priority, use personal protective equipment etc. These requirements ban dishonest competition practices among construction companies which might be detrimental to employee safety; moreover, they allow small companies participating in large construction projects to efficiently use their abilities without incurring additional costs.

An efficient and appropriate implementation of national legal acts on workplace health and safety, in which the Community's *acquis* (the EU *acquis* system statute-book: purpose, analysis and implementation of legal acts and documents) is adapted to national legislation is a prerequisite to be satisfied if comparable occupational health and work safety protection levels are to be achieved in all EU member countries.

6. Research results and analysis

The analysis of the companies' survey results revealed that currently the requirements of Directive 89/391/EEC on the measures of improving workplace health and safety are still not met by Lithuanian construction companies y:

- about 6% of Lithuanian construction company managers are not familiar with the requirements of the Directive;
- about 23% of Lithuanian construction companies do not assess risk factors;
- about 28% of construction sites are too slowly reorganized due to the problematic economic state of the construction companies.

The analysis of the companies' survey results showed that to implement the requirements of Directive 89/391/EEC, Lithuanian construction companies need additional funds, qualified employees, and specialist consulting. Taking into account their financial possibilities, state of the market and competition, Lithuanian construction companies should plan the following economic measures to implement the Directive:

- reduction of profit by the amount of funds required to implement the Directive;
- assigning of costs to production cost and the increase of construction costs;
- intermediate solution, i.e. reduction of profit and increase of production costs;
- assigning part of the sum accumulated in the Social Insurance fund, i.e., accidents at work and occupational illnesses insurance funds, (proportionally to the part of the construction sector in the economy) to implement the Directive, since these funds are also allotted to preventing accidents and occupational illnesses.

The survey revealed that the majority of Lithuanian construction companies encounter difficulties in ensuring workplace health and safety while implementing Directive 89/391/EEC requirements. The main problems are poor understanding of the legal basis, risk assessment, provision of employees with collective and personal protective equipment, training and informing the employees (Fig. 7).

In order to implement the requirements of Directive 89/391/EEC, construction companies need to plan their measures, set deadlines and devote necessary funding. All of the above would be easier to implement, if:

- Construction companies had a possibility to devote more attention to cooperation with science institutions in implementing the provisions of the 89/391/EEB Directive. This cooperation could take the form of themed scientific-practical seminars, extramural discussions, objective scientific research etc.
- According to the provisions for training, qualification improvement and assessment, as well as theoretical training programs, distance learning could be introduced. This would cut the training process organization and actual training costs.

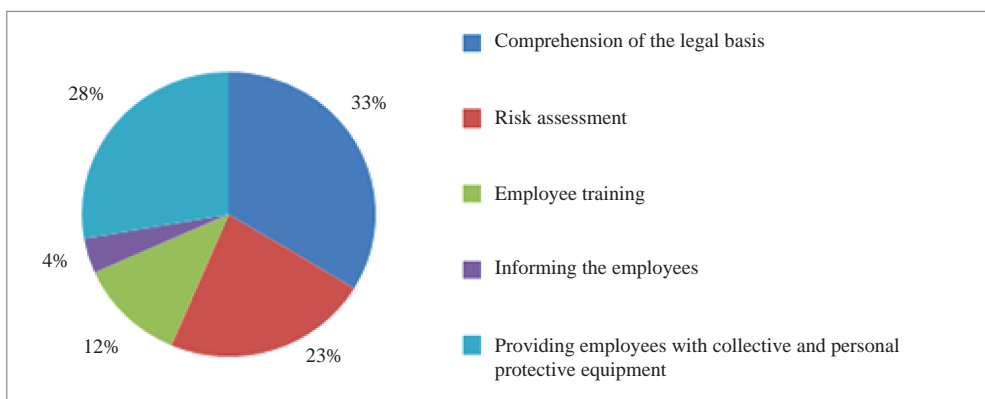


Fig. 7. Problems encountered by construction companies when implementing the requirements of the Directive

- More attention was devoted to informing the society about the state of workplace health and safety as well as changes occurring due to Lithuania's integration into the EU.
- An information dissemination system on workplace health and safety at construction sites was created.
- Measures planned in the Republic of Lithuania state health and safety program for 2007–2012 were implemented; a consulting system was developed ensuring a social dialogue between the Labour Inspectorate of the Republic of Lithuania and the employers.

In this research, the main measures of improving workplace health and safety in construction were determined based upon the results of analysis of the country's construction companies (Fig. 8).

Improvement of the legal basis for workplace health and safety. The analysis of construction companies determined that standard legal act requirements are not always easily understood and implemented.

Preparation of recommendations and descriptions. Research needs to be carried out on the experience of Lithuanian and foreign companies in their practice of ensuring safe work at construction sites. There is a lack of methodical recommendations on dealing with alcohol and psychotropic substances abuse by employees at work, as well as recommendations on measures to suspend employees. The majority of the construction companies surveyed experience a lack of recommendations on using, maintaining and controlling potentially hazardous equipment. A great part of employers fail to understand the importance of both occupational risk and educating/ training employees on health and safety. Construction work regulations and measures to improve prevention of accidents at work need to be developed.

Other measures of preventive activity in more efficient ensuring of workplace health and safety at construction sites. European informational campaigns aimed at risk assessment (according to the plans of the European Commission Senior Labour Inspector Committee and the European Agency for Health and Safety at work (Bilbao)) need to be held in Lithuania. Free themed seminars need to be held for employers, especially those from small and medium companies.

The companies surveyed have a positive view on the outcomes of implementing the Directive and hold that it will further improve employee health and safety protection at construction sites, as well as have a positive impact on work results and working culture.

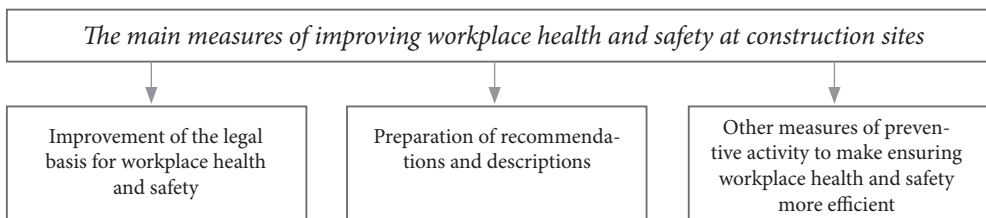


Fig. 8. The main measures of improving workplace health and safety at construction sites

7. Conclusions

1. As a result of the analysis of legal acts on workplace health and safety in the construction sector, a use model based on the nature of activity and possible dangers was developed.

2. Data analysis of accidents at construction companies shows that the main causes behind accidents are failures to comply with standard legal acts, organize work properly, use protective equipment at work; besides, employees' absent-mindedness plays a major role.

3. Although at the national level EU laws and directives were adopted in 1996, i.e., the legal basis was created to ensure workplace health and safety at work, the findings of the State Labor Inspectorate of the Republic of Lithuania show that a safe and healthy work environment and accident prevention have not become priorities for employers.

4. Directive 89/391/EEC is the most important in the EU legal act system in the area of workplace health and safety. It is complemented and extended by separate directives, based on part 1 of article 16.

5. The legal acts on workplace health and safety highlight the essential tendency: the employer has to ensure workplace health and safety in all work-related aspects. To ensure a decrease in accidents and occupational illnesses, it is necessary to adhere to the requirements of legal acts that regulate workplace health and safety.

6. The analysis of serious accidents at construction sites revealed that over two thirds of accidents occur due to improper work organization, lack of supervision and control, and failure to assess occupational risk. About 23% of construction companies do not carry out workplace risk assessment, thus increasing a possibility for an accident or an occupational illness to occur. Safety at work in construction companies remains a serious issue.

7. Some of the most important priorities in prevention work on health and safety are training, information and risk assessment. Employees that have not been trained in the standard requirements of work safety and hygiene tend to more often face increased risks and suffer injuries.

8. The experience of advanced countries shows, that implementation of scientific achievements in construction significantly improves workplace health and safety. In Lithuania, there is too little cooperation between construction companies and science institutions in this area. The participation of science institutions in addressing workplace health and safety problems would make the implementation of Directive provisions regarding construction sites easier for Lithuanian construction companies.

References

- Alinaitwe, H. M.; Mwakali, J. A.; Hansson, B. 2009. Organizational effectiveness of Ugandan building firms as viewed by craftsmen, *Journal of Civil Engineering and Management* 15(3): 281–288. doi:10.3846/1392-3730.2009.15.281-288
- Annual reports of the State Labour Inspectorate of the Republic of Lithuania (18 June 2008)*. [Retrieved October 17, 2009]. Available from Internet: <<http://www.vdi.lt/>>.
- Apanavičienė, R.; Liaudanskienė, R. 2008. Health protection and safety management in Lithuanian construction industry, in *7th International Symposium Economy & Business*, 13–18.
- Babichenko, J. S.; Babichenko, S. I. 2008. Analysis and modelling of work-related stress determinants in cross-cultural context, *Transformations in Business & Economics* 7, 3(15): 97–106.

- Dėjus, T. 2008. Accidents on construction sites and their reasons, in *9th International Conference: Modern Building Materials, Structures and Techniques* 1(3): 241–247.
- Department of Statistics under the Government of the Republic of Lithuania. Statistical data about accidents under construction (20 January 2009). [Retrieved February 17, 2009]. Available from Internet: <<http://db1.stat.gov.lt/statbank/default.asp?w=1280>>.
- Duijm, N. J.; Fievez, C.; Gerbec, M.; Hauptmanns, U.; Konstandinidou, M. 2008. Management of health, safety and environment in process industry, *Safety Science* 46(6): 908–920. doi:10.1016/j.ssci.2007.11.003
- Enshassi, A.; Mohamed, S.; Mustafa, Z. A.; Mayer, P. E. 2009. Factors affecting the performance of construction projects in the Gaza strip, *Journal of Civil Engineering and Management* 15(3): 269–280. doi:10.3846/1392-3730.2009.15.269-280
- Fung, I. W. H.; Tam, V. W. Y.; Tam, C. M.; Wang, K. 2008. Frequency and continuity of work-related musculoskeletal symptoms for construction workers, *Journal of Civil Engineering and Management* 14(3): 245–254. doi:10.3846/1392-3730.2008.14.15
- Giretti, A.; Carbonari, A.; Naticchia, B.; De Grassi, M. 2009. Design and first development of an automated real-time safety management system for construction sites, *Journal of Civil Engineering and Management* 15(4): 325–336. doi:10.3846/1392-3730.2009.15.325-336
- Giretti, A.; Carbonari, A.; Naticchia, B.; De Grassi, M. 2008. Advanced real-time safety management system for construction sites, in *25th International Symposium on Automation and Robotics in Construction, ISARC-2008*, 300–305. doi: 10.3846/isarc.20080626.300
- Hallowell, M. R.; Gambatese, J. A. 2009. Construction safety risk mitigation, *Journal of Construction Engineering and Management – ASCE* 135(12): 1316–1323. doi:10.1061/(ASCE)CO.1943-7862.0000107
- Hernaus, T.; Skerlavaj, M.; Dimovski, V. 2008. Relationship between organisational learning and organisational performance: The case of Croatia, *Transformations in Business & Economics* 7(2(14)): 32–48.
- Hola, B. 2009. Methodology of estimation of accident situation in building industry, *Archives of Civil and Mechanical Engineering* 9(1): 29–46.
- Idoro, G. I. 2008. Health and safety management efforts as correlates of performance in the Nigerian construction industry, *Journal of Civil Engineering and Management* 14(4): 277–285. doi:10.3846/1392-3730.2008.14.27
- Jorgensen, E.; Sokas, R. K.; Nickels, L.; Gao, W.; Gittleman, J. L. 2007. An English/Spanish safety climate scale for construction workers, *American Journal of Industrial Medicine* 50: 438–442. doi:10.1002/ajim.20457
- Juščius, V.; Snieška, V. 2008. Influence of corporate social responsibility on competitive abilities of corporations, *Inžinerine Ekonomika – Engineering Economics* (3): 34–44.
- Kazlauskaitė, R.; Bučiūnienė, I. 2008. The role of human resources and their management in the establishment of sustainable competitive advantage, *Inžinerine Ekonomika – Engineering Economics* (5): 78–84.
- Liudanskienė, R.; Ustinovičius, L.; Bogdanovičius, A. 2009. Evaluation of construction process safety solutions using the TOPSIS method, *Inžinerine Ekonomika – Engineering Economics* (4): 32–40.
- Lu, M.; Hou, X. L.; Zhang, W. Q.; Shi, W. 2008. Study on the health diagnosing for construction project, in *Proceedings of 2008 International Conference on Construction & Real Estate Management* 1 and 2: 211–213.
- Lopez, M. A. C.; Ritzel, D. O.; Fontaneda, I.; Alcantara, O. J. G. 2008. Construction industry accidents in Spain, *Journal of Safety Research* 39(5): 497–507. doi:10.1016/j.jsr.2008.07.006
- McDonald, M. A.; Lipscomb, H. J.; Bondy, J.; Glazner, J. 2009. Safety is everyone's job: The key to safety on a large university construction site, *Journal of Safety Research* 40(1): 53–61. doi:10.1016/j.jsr.2008.12.005

- Nielsen, J. 2007. Struggles for health and safety in the Danish construction industry, *International Journal of Occupational and Environmental Health* 13(1): 21–26.
- Reinhold, K.; Tint, P.; Tuulik, V.; Saarik, S. 2008. Innovations at workplace: improvement of ergonomics, *Inzinerine Ekonomika – Engineering Economics* (5): 85–94.
- Paslawski, J. 2008. Flexibility approach in construction process engineering, *Technological and Economic Development of Economy* 14(4): 518–530. doi:10.3846/1392-8619.2008.14.518-530
- Perera, B. A. K. S.; Dhanasinghe, I.; Rameezdeen, R. 2009. Risk management in road construction: the case of Sri Lanka, *International Journal of Strategic Property Management* 13(2): 87–102. doi:10.3846/1648-715X.2009.13.87-102
- Stankiuviienė, A. 2008. *Risk management and optimization of accidents at work in construction*. Doctoral dissertation. Vilnius Gediminas Technical University.
- Turskis, Z.; Zavadskas, E. K.; Peldschus, F. 2009. Multi-criteria optimization system for decision making in construction design and management, *Inzinerine Ekonomika – Engineering Economics* (1): 7–17.
- Vaidogas, E. R.; Juocevičius, V. 2008. Sustainable development and major industrial accidents: the beneficial role of risk-oriented structural engineering, *Technological and Economic Development of Economy* 14(4): 612–627. doi:10.3846/1392-8619.2008.14.612-627
- Vaidogas, E. R.; Juocevičius, V. 2009. Assessment of structures subjected to accidental actions using crips and uncertain fragility functions, *Journal of Civil Engineering and Management* 15(7): 95–104.
- Vegso, S.; Cantley, L.; Slade, M.; Taiwo, O.; Sircar, K.; Rabinowitz, P.; Fiellin, M.; Russi, M. B.; Cullen, M. R. 2007. Extended work hours and risk of acute occupational injury: a case-crossover study of workers in manufacturing, *American Journal of Industrial Medicine* 50: 597–603. doi:10.1002/ajim.20486
- Zavadskas, E. K.; Kaklauskas, A.; Turskis, Z.; Tamošaitienė, J. 2008. Selection of the effective dwelling house walls by applying attributes values determined at intervals, *Journal of Civil Engineering and Management* 14(2): 85–93. doi:10.3846/1392-3730.2008.14.3
- Zavadskas, E. K.; Vaidogas, E. R. 2008. Bayesian reasoning in managerial decisions on the choice of equipment for the prevention of industrial accidents, *Inzinerine Ekonomika – Engineering Economics* (5): 32–40.
- Zavadskas, E. K.; Vaidogas, E. R. 2009. Multiattribute selection from alternative designs of infrastructure components for accidental situations, *Computer-Aided Civil and Infrastructure Engineering* 24(5): 346–358.

DARBUOTOJŲ SAUGOS IR SVEIKATOS TEISĖS AKTŲ NAUDOJIMO MODELIAVIMAS LIETUVOS STATYBŲ SEKTORIUJE

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Santrauka

Statyba – viena iš didžiausių Europos pramonės šakų. Šio sektoriaus darbuotojų saugos ir sveikatos rodikliai yra vieni prasčiausių regione. Palyginti su kitų ES sektorių darbuotojais, statybose dirbantiems darbininkams kyla vidutiniškai dvigubai didesnė nemirtinų nelaimingų atsitikimų tikimybė. Siekiant sumažinti nelaimingų atsitikimų ir profesinių ligų skaičių statybų sektoriuje, per kelis pastaruosius dešimtmečius buvo priimta ir nuosekliai taikyta daug teisės aktų, leidusių pagerinti darbo sąlygas ES valstybėse narėse. Nors Lietuvoje įgyvendinti ES teisės aktai, tačiau statistikos duomenys byloja apie nelaimingų atsitikimų statybos sektoriuje augimą. Norint užkirsti kelią nelaimingiems atsitikimams ir profesinėms ligoms,

pagerinti darbo našumą, darbuotojų pasitenkinimą darbu, būtina imtis priemonių, užtikrinančių saugų darbą statybvietėse. Atsižvelgiant į tai, kad, vykdant įvairius statybos procesus, saugų darbą gali užtikrinti ne tik kolektyvinių bei asmeninių priemonių naudojimas, profesinės rizikos įvertinimas, darbuotojų instruktavimas ir mokymas saugos klausimais, nelaimingų atsitikimų bei profesinių ligų išvengimą gali garantuoti tinkamas darbų organizavimas ir darbo sąlygų sudarymas. Norint tinkamai užtikrinti saugų darbą statybose dirbantiems darbininkams, būtina išmanyti ir vykdyti norminius teisės aktus.

Reikšminiai žodžiai: darbuotojų sauga ir sveikata, nelaimingas atsitikimas, profesinė liga, statybų sektorius, statybos procesas, saugus darbas, teisės aktai.

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