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MODERN CHALLENGES IN HEALTH AND SAFETY AT CONSTRUCTION INDUSTRY

©Nurimbetov R., Dr. habil., Tashkent architecture and civil engineering institute
Tashkent, Uzbekistan, r.i.nurimbetov@mail.ru

©Zikriyoev A., Tashkent architecture and civil engineering institute
Tashkent, Uzbekistan, gishtimir@mail.ru

СОВРЕМЕННЫЕ ПРОБЛЕМЫ ОБЕСПЕЧЕНИЯ ЗДОРОВЬЯ И БЕЗОПАСНОСТИ В СТРОИТЕЛЬНОЙ ПРОМЫШЛЕННОСТИ

©Нуриμβетов Р. И., д-р экон. наук, Ташкентский архитектурно-строительный институт
г. Ташкент, Узбекистан, r.i.nurimbetov@mail.ru

©Зикриѐев А. С., Ташкентский архитектурно-строительный институт
г. Ташкент, Узбекистан, gishtimir@mail.ru

Abstract. A part of the research on the impact and interrelation between human factors and the safety of the working environment in the construction sector is presented. Labor in construction companies is often associated with a high risk of injury and, therefore, occupational safety is an important element of production efficiency in this area. The injured workers lost working days and financial costs affect the social and economic efficiency of the construction industry. Statistics indicate that occupational health and safety for modern research are current issues. Economic reforms in Uzbekistan envisage the creation of favourable and safe working conditions. From this point of view, ILO standards (Health & Safety) are really relevant for research and implementation in the construction industry of Uzbekistan. The purpose of this article is to analyze the implementation of best practices in the construction industry of Uzbekistan.

Аннотация. Представлена часть исследования влияния и взаимосвязи между человеческим фактором и обеспечением безопасности рабочей среды в строительном секторе. Труд в строительных компаниях зачастую связан с большим риском получения травм и поэтому безопасность труда является важным элементом эффективности производства в этой сфере. Пострадавшие рабочие, потерянные рабочие дни и финансовые затраты влияют на социальную и экономическую эффективность строительной отрасли. Статистика указывает, что охрана труда и техники безопасности для современных исследований — это актуальные вопросы. Экономические реформы в Узбекистане предусматривают создание благоприятных и безопасных условий труда. С этой точки зрения, стандарты МОТ (Health&Safety) действительно актуальны для исследования и внедрения в строительную отрасль Узбекистана. Целью настоящей статьи является анализ внедрения передового опыта в строительной отрасли Узбекистана.

Keywords: health and safety, hazard, injury, innovative aspects, developed countries, development strategy.

Ключевые слова: здоровье и безопасность, опасность, травма, инновационные аспекты, развитые страны, стратегия развития.

Introduction

The today the construction industry is becoming one of the fastest growing industries in the world. This sector is characterized by the high production volume of construction materials and building as a result of the growing share of the world GDP structure. The modern world economy faces with 13% of total GDP for compensation or expenses are directed to the sustainable development of construction infrastructure. It is worth mentioning that by 2020, the network will increase by 4.8 trillion, and seven years later, with 7.2 trillion dollars expected that 15% of the world GDP will be achieved [1].

In the last 20 years, the demand for industry sectors has increased as a result of population growth in the regions. Today in Uzbekistan large-scale work is carried out in the construction industry with the purpose of urban development, provision of housing to the population and further development of social infrastructure. Particularly, the construction sector in these sectors is characterized by the highest human health and safety [2].

Based on the experience of developed countries, the most recent achievements in the construction industry are the introduction of the latest achievements of the industry, achieving productivity based on quantity and quality indicators. In particular, the improvement of the foundations of national legislation, the creation of favourable and safe working conditions through the scientific organization of the work process, and the protection of the legitimate rights of each employee working in this field. The goals of Health and Safety programs are to be creating safe and healthy working conditions. In this context, the implementation of the International Labor Organization's "Specific risk protection" program in our country plays an important role in ensuring the safety of the workers of the construction industry [3].

Methodology / Methods

Identify the main study variables, secondary data collection instruments, statistical observation and grouping have been used in the research process.

At the moment economic integration of Uzbekistan to the international community is intensifying, the health and safety of workers in the construction industry in line with international standards and standards are one of the priorities of the practical implementation of the principles of the President Sh. M. Mirziyoyev's "Universal interests". Therefore, reforming the construction industry in the aforementioned direction on the basis of the "introduction of modern international construction standards" in accordance with the Concept of Development Strategy of the country up to 2035 plays a great role in achieving the set objectives [4]. Particularly in the Annex 2 of the Decree of the President of the Republic of Uzbekistan "On measures to improve the rating in the Annual Report of the World Bank and International Finance Corporation" of February 5, 2019, further improve the quality of control quality in construction the specific priorities for 2019–2022 will be justified by the fact that this issue is of great importance today.

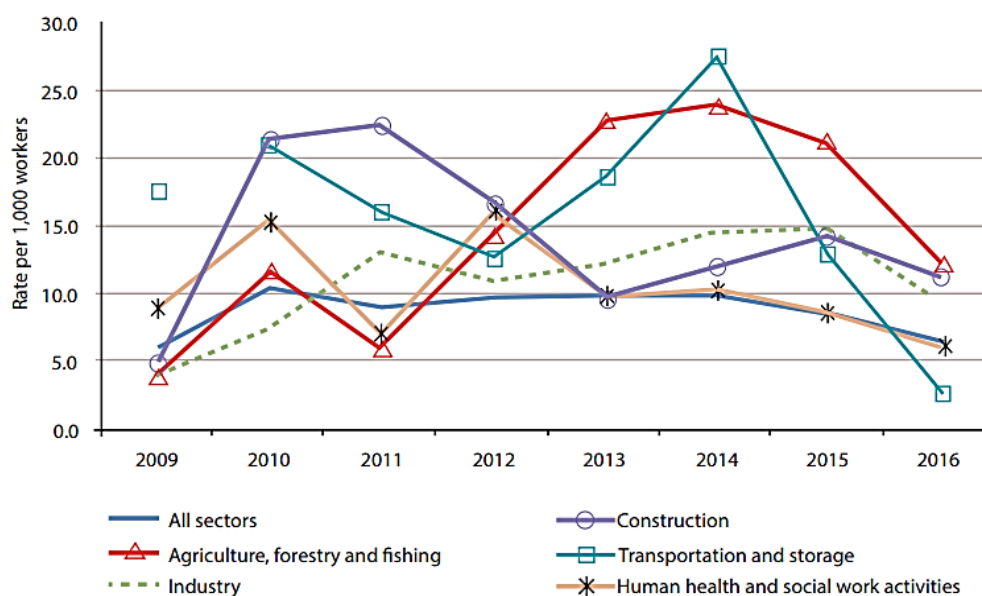
Result

Main findings of the study are analyses of the Health and Safety accident rate, implementing new approaches to reduce or "zero rates" accident program, comparing with the major economies of the world and outcome some innovative methods increasing investment attractiveness of Uzbekistan in the world. According to this organization official data, about 270 000 000 \$ accidents occur every year in the world. With direct labour activity up to 2 000 000 \$, the worker died with total 160 000 000 \$. During the course of the work, the patient was crippled with occupational diseases. According to researchers, the total loss has led to the loss of around 4% (1.25 trillion\$) of global gross domestic product per year [5]. Nearly 6 500 000 people work at approximately 252,000

construction sites across the nation on any given day. The fatal injury rate for the construction industry is higher than the national average in this category for all industries.

This research was concerned with potential hazards for workers in construction however, the results should be applicable also as followings:

- ✓ Falls (from heights);
- ✓ Trench collapse;
- ✓ Scaffold collapse;
- ✓ Electric shock and arc flash/arc blast;
- ✓ Failure to use proper personal protective equipment;
- ✓ Repetitive motion injuries [6].



Source: Summary of Workplace Injury, Illness and Fatality Statistics, p. 19.

Figure 1. A rate of injuries per 1,000 workers in selected sectors, 2009-2016 (CSO).

As for Figure 1 indicates the construction industry is one the major high accident risk sector of all industry. By 2011 we can see the highest level of the cases and over the year reducing the accident by the professional implementation of the H&S regulation by ILO. The construction sector plays an important role in providing a construction such as buildings, industrial complexes, roads, dams, drainage systems and other infrastructure. In this case, the building industry provides a wide range of activities with the manufacturing of building materials and services. Attracting a large number of human resources and skilled workers is obviously a hard process. In terms of health and safety, various authors refer to the unity of the industry as a basis for arguing or comparing with other sectors. The nature of the industry, is high foraugmented, poses big challenges among Uzbekistan and other countries.

In particular, the United States, the United Kingdom, the European Union and Southeast Asia have been following the international standards for the safety of human life in the construction industry. The UN Industrial Development Organization's Sustainable Industrial Development Report (2018) states that the industrial production process mainly involves staffing, technology, working conditions, primarily focusing on the issues of human security [7].

This phenomenon is a global issue and both the developed and developing countries are struggling to solve this problem. In the developed countries new legislation have been introduced in the past 30–40 years and shown substantial improvement in the construction industry. Health and safety, productivity and quality, has set a target to reduce the almost all accident or hazards at the workplace.

Table 1.
 BREAKDOWN OF OCCUPATIONAL ACCIDENTS BY GEOGRAPHICAL REGIONS

<i>Region</i>	<i>Africa</i>	<i>America</i>	<i>Asia</i>	<i>Europe</i>	<i>Oceania</i>	<i>Total</i>
<i>Labor force</i>	413,329,046	479,990,599	2,093,134,505	364,546,703	19,486,718	3,370,487,570
<i>Total employment</i>	397,013,885	433,527,137	1,953,718,973	326,139,450	18,118,018	3,128,517,463
<i>Fatal</i>	320	1,916	2,694	4,079	188	9,197
<i>Non-Fatal</i>	25,434	966,221	121,256	1,921,644	98,980	3,133,535
<i>Fatal Rate</i>	71,882	24,579	271,949	11,017	1,074	380,500
<i>Fatality Rate</i>	17,39	5,12	12,99	3,02	5,51	11,29
<i>Lower Limit</i>	51,343,960	17,556,317	194,249,063	7,869,606	767,040	271,785,986
<i>Upper limit</i>	89,851,931	30,672,033	339,932,172	13,600,463	1,316,209	475,372,807
<i>Average</i>	70,597,946	24,114,175	267,097,755	11,134,918	1,041,625	373,986,418

Source:

<http://www.icohweb.org/site/images/news/pdf/Report%20Global%20Estimates%20of%20Occupational%20Accidents%20and%20Work%20related%20Illnesses%202017%20rev1>.

The number of fatal and non-fatal occupational accidents of the 5 geographical regions is presented in Table 1. Asia had the highest number of fatalities among the 5 regions and constituted more than 70% globally. The Asian fatal occupational rate was 12.7 per 100,000 persons in the labor force which was lower than Africa which had the highest fatality rate of 16.6 per 100,000 persons in the labor force. Europe had the lowest fatality rate among the 5 regions, with a rate of 3.61.

Table 2.
 ACCIDENT RATE KEY FIGURES OF WORKERS (2017/18) [8]

<i>Country</i>	<i>Suffering from related illness</i>	<i>Killed at work</i>	<i>Occurred injuries</i>	<i>Lost days</i>	<i>Estimated cost</i>
UK	1.4 mln	144	71,062	30.7 mln	19.4 bln USD
US	2.8 mln	991	354,674	58.3 mln	2.2 trillion USD
Canada	1.65 mln	312	240,682	29.5 mln	29.8 bln USD
European Union	1.099 mln	145	2,507.651	x*	539 bln USD
World	12 mln	2.3 mln	340 mln	x*	4 trillion USD

Comment: * — temporarily not applicable.

Source: <https://www.statista.com/statistics/675588/workplace-accidents-and-deaths-annually-worldwide>.

The overall measurement results are summarized in Table 2 and discuss that major G7 countries such as US, UK, Canada, European Union and total world countries statistics data about accidents. To verify this approach accident in construction sites can be caused due to several reasons, falls and slips, followed by struck by an object are compared with estimated cost, lost time period and major suffering from different hazards at the construction site.

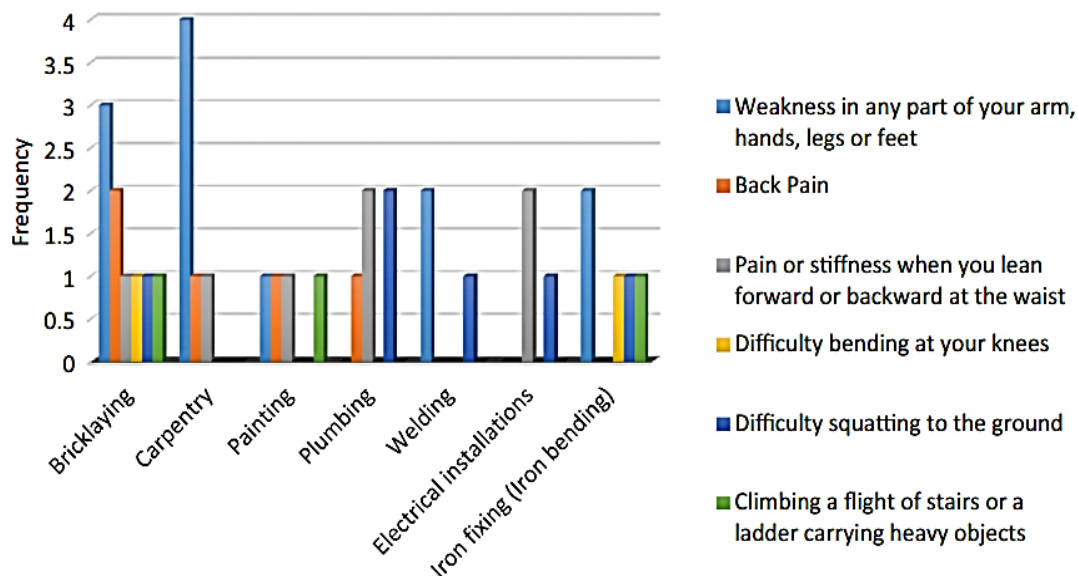


Figure 2. Trade of workers at the construction site.

Figure 2 presented the Musculoskeletal Disorders among craftsmen. A breakdown of the musculoskeletal symptoms experienced by the craftsmen are weakness in any part of the arm, hands, legs or feet (12), back pain (5), pain or stiffness when you lean forward or backward at the waist (7), difficulty bending the knees (2), difficulty squatting to the ground (6) and climbing a flight of stairs or a ladder carrying heavy objects [9].

This data emphasizes that most injure causes during the occupational working area. It gives us Lost Time Injury Frequency Rate, (LTIFR) calculations measure the number of lost-time injuries per million hours worked during an accounting period.

The severity of an injury is not considered in the number.

The LTI definition excludes pre-existing conditions that weren't sustained during the reporting period.

$$\frac{\text{(Number of lost time injuries in the accounting period)}}{\text{(Total hours worked in accounting period)}} \times 1,000,000$$

The OSHA Recordable Incident Rate (or Incident Rate) is calculated by multiplying the number of recordable cases by 200,000 and then dividing that number by the number of labour hours at the company.

$$IR = \frac{\text{Number of OSHA Recordable Cases} \times 200,000}{\text{Number of Employee labor hours worked}}$$

For example, a company has 17 full-time employees and 3 part-time employees that each work 20 hours per week. This equates to 28,400 labour hours each year. If the company experienced 2 recordable injuries, then the formula works like this:

$$\text{IR} = \frac{2 \times 200,000}{28,400} \qquad \text{IR} = \frac{400,000}{28,400} \qquad \text{IR} = 14.08$$

What is now known is that for every 100 employees, 14.08 employees have been involved in a recordable injury or illness.

EFFECTS OF OCCUPATIONAL HEALTH HAZARDS*

Table 3.

<i>Effect</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean score</i>	<i>Std. deviation</i>	<i>Ranking index</i>
Reduces worker's productivity	4	5	4,97	.169	1st
Threatens the livelihood of construction workers	4	5	4,74	.443	2nd
Drains the income of workers	3	5	4,69	.583	3rd
Results in poor work environment	3	5	4,43	.665	4th
Absenteeism	3	5	4,09	.507	5th
Result in workers' dissatisfaction	2	5	4,00	.542	6th
Causes loss of skilled / experienced workers	3	5	3,94	.639	7th
Causes disability	2	5	3,54	.741	8th
Leads to illness	2	5	3,43	.979	9th
Leads to loss of life	2	5	3,37	1.031	10th

Table 3 showed some cause and effect of hazard on construction project environment such as reduces employee's productivity, threatens the livelihood of construction workers, drains the income of workers, results in poor work environment, absenteeism, results in workers' dissatisfaction, causes loss of skilled / experienced workers, causes disability, leads to illness and leads to loss of life. Further analysis of the data can provide inferential decisions about health conditions of craftsmen in relation to their trade and the commitment or provisions by the contractors to the wellbeing of the craftsmen.

Driving to or from work is not normally considered work-related unless the company requires the employee to drive or be transported to a specific location for a specific business purpose. The following flowchart is a simplified version to assist companies in determining work-relationship. Safety in the workplace is compulsory for construction industry enterprises, although they have a partial impact on their continued costs but have overall advantages over productivity and productivity. At present, many employers in the construction industry are trying to prevent accidents at work sites and ensure employee safety.

The originality of our solution lies in the fact that most accidents are not made conscientiously but can be seen as a result of the need for security training courses who started their operations for the first time.

According to the report of the United Nations Industrial Development Organization (UNIDO) on the safety of life of the construction industry in 2018, 600,000 employees fell into depression, 500,000 were diseased and 13.5 bn. US dollars were damaged. At the same time, the injuries sustained by 600,000 people, severe injuries of 71.1 employees and deaths of 144 employees resulted in 7.1 bn. Damage to the US dollar. As a result, 2017 lost 30.7 million working days, of

which 12,000 had lung diseases and 2595 people were diagnosed with pulmonary tuberculosis due to various dust and adverse conditions. As a result of these indicators, construction companies' employees received 21 billion sums in total. In the US dollar, the damage was covered [11].

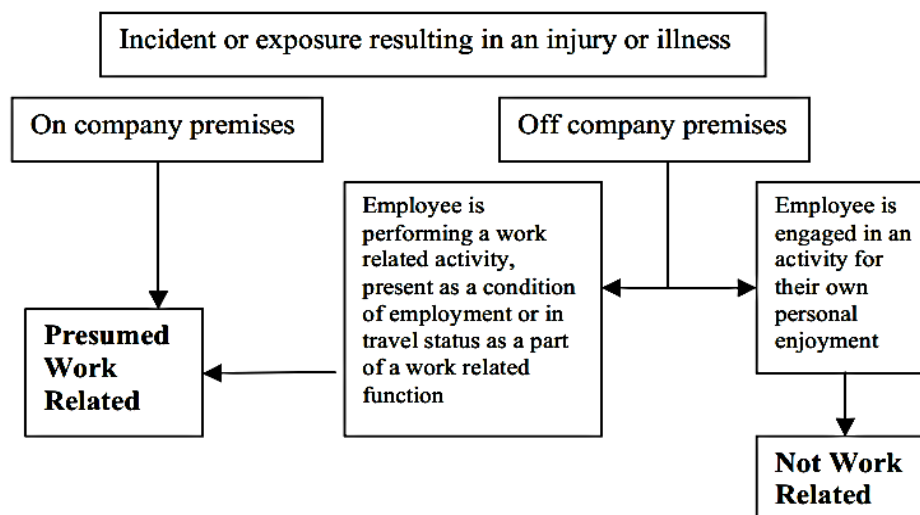


Figure 3. Cause and Effect of Health and Safety at workstation.

From Table 3, these ratings were then made for the ten stimuli to which the subject had been exposed those aspects with related percentage is extremely high level [12].

ASPECTS AFFECTED BY INADEQUATE HEALTH AND SAFETY

Table 3.

Aspects	No Response (%)
1. Cost	72.3
2. Environment	66.0
3. Productivity	87.2
4. Quality	80.8
5. Schedule	57.4
6. Client Perception	68.1

Discussion

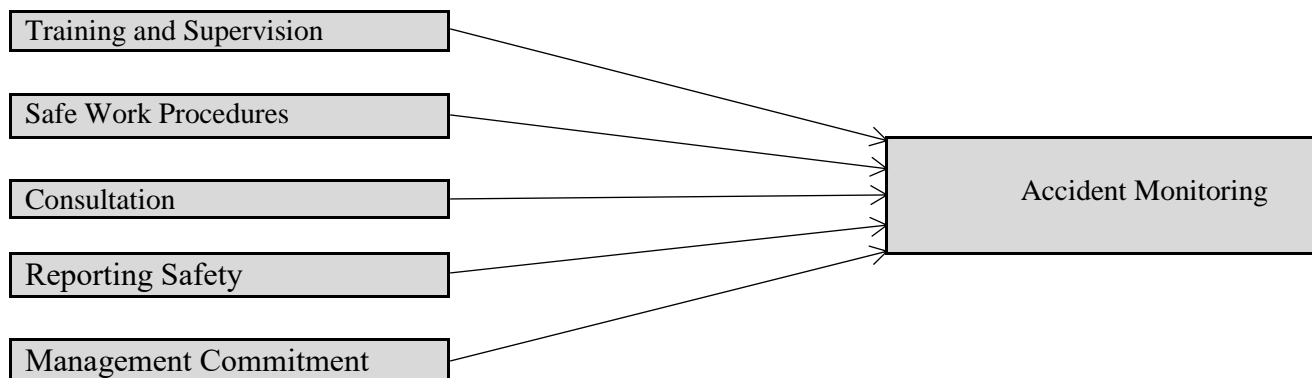
One of the urgent tasks is “Priorities of the social sector development” in the Action Strategy for five priority areas of the Republic of Uzbekistan for 2017–2021. Also, in line with the concept of administrative reform in the country, the establishment of the State Committee of the Republic of Uzbekistan for Industrial Safety in order to improve the management system in the field of industrial safety and to ensure effective state control is also important from the point of view of enhancing the qualification of safety inspectors of construction industry, taking into account the rapid development of techniques and technologies is calculated [13].

On February 4, 2019, the delegation of Uzbekistan met with Vice President of the World Bank and International Labor Organization in Washington, US. According to the meeting, triple cooperation program in three spheres signed. The main thing is under the regulation of ILO the second section is promoting best working places and conditions are upcoming innovations at the field of H&S in Uzbekistan.

The findings suggest that this approach could also be useful for we can implement tested world class Health and Safety regulations as following ways in Uzbekistan:

- written health and safety policy at the construction site;
- written health and safety rules at work;
- written programmer either standard or customized work process;
- project plan which indicates specific actions due to the nature of the projects;
- safety inspection monitory during the work with a certain penalty system.

Health and Safety Practical Regulation



We have addressed not only the performance of this research has dealt with health and safety practices of safe work environments but also training and supervision, safe work procedures, consultation, reporting safety and management commitment as an independent variable and injury management as a dependent variable. Eligibility criteria required individuals to have received as follows:

- Training and Supervision.
- Safe Work Procedure.
- Consultation.
- Reporting Safety.
- Management Commitment.
- Injury Management.

We have also considered the consequences of a systematic application of Health and Safety protocol or guidelines are needed to ensure such regulation obtain the best effectiveness during the construction work:

- Concept and feasibility.
- Design and planning.
- Tender/selection stage.
- Construction phase.
- Moving into the new site.

This paper is a modest contribution to the ongoing discussions about construction 10 OSHA standards which most frequently required for the contractors and subcontractors at a construction site:

- Scaffolding.
- Fall protection (scope, application, definitions).
- Excavations (general requirements).

- Ladders.
- Head protection.
- Excavations (requirements for protective systems).
- Hazard communication.
- Fall protection (training requirements).
- Construction (general safety and health provisions).
- Electrical (wiring methods, design and protection).

Conclusion

Summing up the results it is evident that this study has shown the researcher has explored and identified the relationship between safety and health practices of safe work environments (includes training and supervision, good management system, safe work procedures, consultation, reporting safety and inspection commitment) at a construction site. Adopted President Decree of Uzbekistan and other Regulations are directed to reduce accident rate while all investment attractiveness connected with the World Bank Doing Business Index. For the development of the recent sector reforms by optimization and modernization of the application of world-class standards of Health and Safety Act in Uzbekistan is really influences the effectiveness of the workplaces in the country.

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