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Methodology of Analysing the Accident Rate in the Construction Industry

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Abstract

The article presents the methodology of analysing and evaluating the accident rate in the construction industry, which consists of five stages: the identification of sources of data on accidents at work and the acquisition of research material, the classification of research material, the formulation of a computer knowledge base, the creation of a model which simulates the course of the complex process of an accident and also the execution of calculations and analysis of obtained results. An example of analysis of an accident process with 130 accidents at work was also provided.

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Keywords: construction industry, accident at work, accident rate, scenarios of accident rate development.

1. Introduction

Occupational safety in specific sectors of the economy is mainly evidenced by the number of severe and fatal accidents. In Poland in 2014, 88,000 accidents at work occurred in all sectors of the economy, in which 263 people were killed. The construction industry has a very high place in the ranking of individual sectors with regards to the accident rate. In 2014 this ratio was equal to 7.68 injured people per 1,000 workers. This value is higher than the accident rate obtained for all sectors of the national economy, which was equal to 7.45 injured people per 1,000 workers

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[1]. Therefore, the subject of the accident rate in the Polish construction industry should be considered as important and there should be a lot of attention devoted to it.

2. Description of the research problem

Information regarding accidents at work is published by state institutions. This is mostly statistical data on accidents in various sectors of the economy. From these publications we can find out e.g. how many people were injured in accidents at work in the construction industry, how many people were injured at a construction site and other places, how many people at the time of the accident were using a machine and also how many people were electrocuted. On the basis of this data, however, any conclusions about the most probable course of accidents and situations on a construction site, which pose the greatest risk to workers, cannot be drawn. This is because the relations that exist between specific data sets are not known [2].

Detailed information about the course of an accident can be found in the accident-investigation protocol drawn up by the labour inspector after its occurrence. Based on this information, the course of a single accident at work can be reconstructed. However, knowledge of a single accident is not enough to draw conclusions about the sustainable features of the phenomenon of the accident rate. Such conclusions can be drawn on the basis of results obtained from research on an appropriately numerous set of accidents.

The objective of the carried out study was to develop a methodology of the analysis of the accident rate in the Polish construction industry, which enables the most probable mechanisms of formation and development of accident situations to be defined. Based on preliminary research and analysis of accident protocols the following assumptions were made:

- The accident rate is a mass phenomenon and the state of safety in specific sectors of the economy is not determined by a single accident but by the set of accidents that occurred within a specified period of time, and also information which resulted from analysis of this set.
- Accidents at work happen at certain moments of time and create a chain of events that can be analysed as a complex discreet process.
- Each accident occurs according to a specific scenario.
- Appropriately directed analysis of a process that consists of many accidents will enable to be defined the space of possible scenarios of accident situation development, the probability of occurrence of certain scenarios and also scenarios with the highest probability of occurrence.

3. Methodology of research

Original methodology of the analysis of the development trend of the accident rate in the construction industry was developed and consists of the following stages:

- Stage I – the identification of sources of data on accidents at work and the acquisition of source documents.
- Stage II – the selection of a representative set of documents and their analysis. Classification of the obtained data and information.
- Stage III – formulation of a knowledge base on accidents at work.
- Stage IV – creation of a model of the development trend of the accident rate which is based on graph theory.
- Stage V – studies on the model and analysis of obtained results.

The general scheme of the proposed methodology of analysis is shown in Figure 1.

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