Z E S Z Y T Y N A U K O W E P O L I T E C H N I K I P O Z N A Ń S K I E J
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EXAMINING THE LEVEL OF SAFETY CLIMATE IN A CONSTRUCTION COMPANY

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According to statistical data, the main cause of accidents is inappropriate behaviour of an employee. The analysis of causes of accidents determined that it is due to the low level of work safety culture. The main aim of the presented research was the assessment of the influence of selected sociodemographic factors on the level of safety climate in micro and small construction companies. The research was carried out by means of an authorial survey questionnaire on a group of 48 employees. Out of the mentioned factors, age and seniority have the biggest influence on the level of safety climate in the examined companies. The analysis shows that in the group consisting of the youngest employees and the group consisting of employees with the least seniority preventive measures should be taken in order to raise the level of work safety culture.

Keywords: safety climate, survey research, construction companies

1. INTRODUCTION

In the report of the Chief Labour Inspector on the activity of The National Labour Inspectorate in 2014 in Chapter 9, "Eliminating near-miss accidents in construction", it was pointed out that most irregularities in the previous years were found on the premises of small and medium-sized companies. Therefore, in 2014 there was an emphasis put on assessing safety in those construction companies. The examination considered 4344 companies, which employed more than 45.8 thousand people. The majority of the companies constituted micro companies (73%) and small companies employing 10-49 people (24%). Only 3% of the examination considered companies employing more than 49 people (PIP, 2015).

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Figure 1 shows the number and kinds of safety violations occurring on the construction sites in 2014, which were ascertained during the examination conducted by The National Labour Inspectorate.

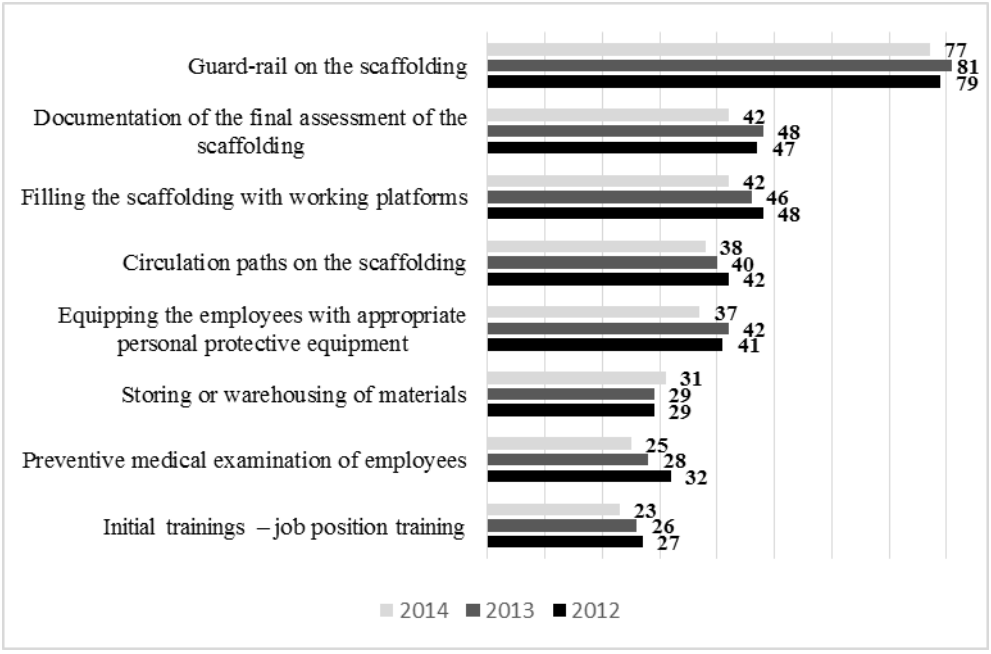

Fig. 1. Safety violations on the construction sites in 2012-2014 ascertained through examination by The National Labour Inspectorate (PIP, 2015)

What is worth pointing out is the juxtaposition of the causes of safety violations stated by the employers (they claimed that the main cause was economic difficulties) with the fact that approximately 78% of the irregularities was eliminated during the examination as a result of oral decisions. It means that the employers could have achieved it with just a little amount of resources and in a short period of time because the irregularities resulted from **organizational negligence**.

Other causes of negligence in terms of work safety that were stated by the employers or are conclusions of the inspectors include (PIP, 2015):

– excess of duties connected with running a business activity,
– unreliable performance of tasks by the work safety services,
– unemployment, employed people limit their demands and agree to worse working conditions,
– looking for savings through using other forms of employment than the employment relationship,
– employing people who have no previous experience in the construction industry,

– construction site managers have many functions (supervision of many construction sites by just one person),
– lack of appropriate equipment and lack of organizational training.

In many cases irregularities or mistakes eliminated during one stage of construction appeared during the further stage of the construction or on another construction site of the same employer.

This shows that there is a need for conducting short examinations concentrated on irregularities creating direct threats to life or health of the employees. Based on their experiences, inspectors claim that only short recurring examinations attain the expected effects resulting in the improvement of working conditions (PIP, 2015). According to The National Labour Inspectorate, the main causes of safety violations are the human factor and organizational mistakes. Which means there is a low level of safety climate in the construction companies.

2. LEVEL OF SAFETY CLIMATE IN CONSTRUCTION COMPANIES

2.1. Test group

The research was conducted in three construction companies operating mainly in the Lubusz Voivodeship. During research, there were 48 people employed in the companies (12 in company I, 21 in company II and 15 in company III). Only 16 out of those 48 had an employment contract, other people were seasonal workers – they had other forms of employment. The research considered all of the employees. The tested employees were aged 18 to 59 years, of which the majority comprised employees aged 20 to 39 years (Table 1). The vast majority of blue collar workers had either vocational education or secondary education (40 people). A higher education was attained by only the management board or the office workers (8 people).

Table 1. Characteristics of the observed group – employee age (own work)

Age	**18-19**	**20-29**	**30-39**	**40-49**	**50-59**
The number of employees	5 (10%)	14 (30%)	17 (35%)	8 (17%)	4 (8%)

Table 2. Characteristics of the observed group – seniority employee (own work)

Seniority in the company	**to 2 years**	**from 3 to 5 years**	**from 6 to 10 years**	**from 11 to 15 years**
The number of employees	7 (15%)	11 (23%)	18 (37%)	12 (25%)

2.2. Research method

The most common method of examining safety culture is survey questionnaires of various kinds. However, they are not universal tools. They are often dedicated to a certain trade (CIOP, 2011). The analysis of results is not unified either and requires vast specialist knowledge. Without quantitative research it is not possible to compare the levels of safety culture among companies or respective departments of a company. The tool created and used for research on the level of safety climate in a company is trying to fill that gap. The concept of a survey questionnaire on the level of safety climate emerged after the analysis of already existing questionnaires on the same topic; it was, then, checked in practice. The authorial survey concerns all the determinants of a high safety culture. The questionnaire concerns nine thematic groups (Gabryelewicz, Sadłowska-Wrzesińska, Kowal, 2015): I. Knowledge about work safety in the company, II. Values and beliefs, III. Communication in terms of health and safety at work, IV. Attitude towards health and safety services, V. My influence on work safety, VI. Superiors' attitude towards safety, VII. Attitude towards trainings in health and safety at work, VIII. Resilience to stress, IX. Motivation for safe behaviours. The survey consists of 27 questions (each thematic group has 3 questions). The assessment of answers was based on a five-point Likert scale (Likert, 1932). The generated figure created a Safety Culture Grid. The results referring to respective thematic groups are presented as percentages. The range of results is 0 – 100%. The survey ends with an imprint with basic questions concerning sociodemographic data.

2.3. Research results

General level of safety climate. Figure 2 shows the general level of safety climate. The lowest level of safety climate is in the category Motivation for safe behaviours (28%), the highest – My influence on safety (80%). It shows that employees are aware that they are predominantly responsible for work safety, however, the incentives are not sufficient for them to act in a safer manner. Construction workers also show great resilience to stress (76%). This result compared with the low result concerning Motivation for safe behaviours may suggest a tendency in workers to act in a risky way.

The level of safety climate and employee's age. Figure 3 and Table 3 show the level of safety climate depending on the age of an employee. The worst outcome was achieved by the youngest group of employees. All their results were low except for the category – Resilience to stress. Such a low level can be interpreted as a lack of experience in those employees which might also be a sign of youthful bravado and carelessness. In such cases, the management board and older and more experienced employees should play a major role. It can also be noticed that with

the increasing age of an employee, the level of safety climate increases too. Undoubtedly, this is proof that younger groups (together with those who just started their careers) need training. All the more so, that even in the category of questions concerning My influence on safety, the same employees achieved a very low result.

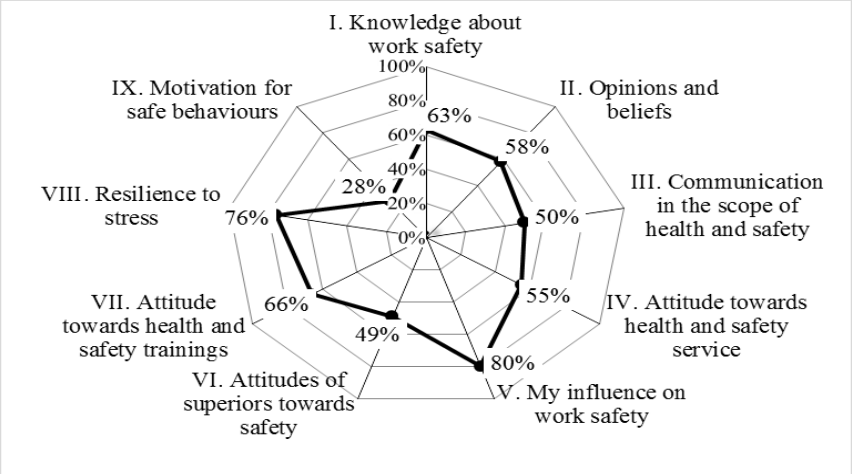

Fig. 2. Overall level of safety climate and the ratio of safety climate (own work)

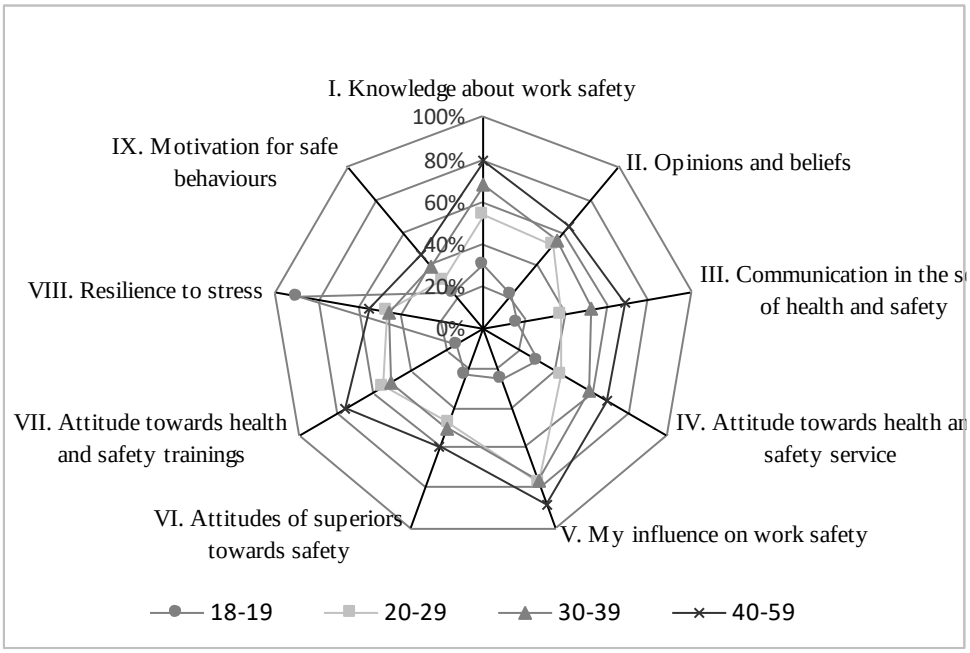

Fig. 3. The level of safety climate depending on the age of an employee (own work)

Table 3. The level of safety climate depending on the age of an employee (own work)

	18-19	**20-29**	**30-39**	**40-59**
I. Knowledge about work safety	30%	54%	68%	79%
II. Opinions and beliefs	21%	52%	55%	63%
III. Communication in the scope of health and safety	16%	38%	52%	68%
IV. Attitude towards health and safety service	29%	42%	58%	68%
V. My influence on work safety	25%	77%	76%	89%
VI. Attitudes of superiors towards safety	24%	47%	50%	59%
VII. Attitude towards health and safety trainings	14%	55%	50%	75%
VIII. Resilience to stress	89%	46%	45%	55%
IX. Motivation for safe behaviours	23%	29%	38%	45%

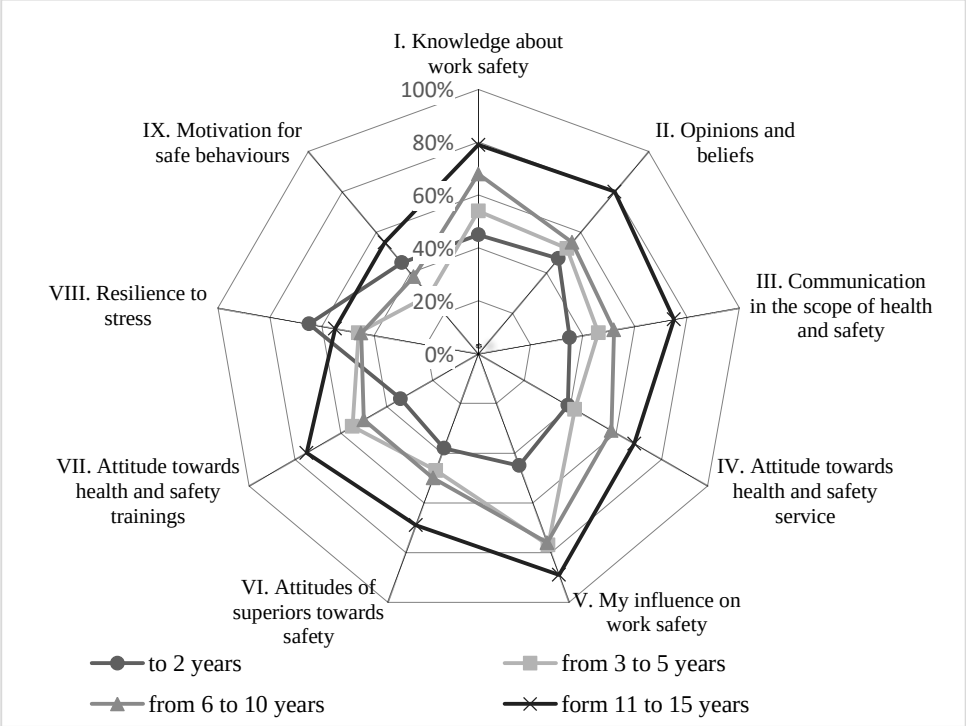

Fig. 4. The level of safety climate depending on the seniority of an employee (own work)

Table 4. The level of safety climate depending on the seniority of an employee (own work)

	to 2 years	**from 3 to 5 years**	**from 6 to 10 years**	**from 11 to 15 years**
I. Knowledge about work safety	45%	54%	68%	79%
II. Opinions and beliefs	47%	52%	55%	80%
III. Communication in the scope of health and safety	35%	46%	52%	75%
IV. Attitude towards health and safety service	39%	42%	58%	68%
V. My influence on work safety	45%	77%	76%	89%
VI. Attitudes of superiors towards safety	38%	47%	50%	69%
VII. Attitude towards health and safety trainings	34%	55%	50%	75%
VIII. Resilience to stress	65%	46%	45%	55%
IX. Motivation for safe behaviours	45%	29%	38%	55%

The level of safety climate and seniority. Figure 4 and Table 4 show the level of safety climate in nine thematic groups depending on the seniority of an employee. A conclusion can be drawn that seniority has an influence on the level of safety climate in a company. The experience gained in a construction company influences the increase in awareness of employees in terms of work safety. The weak point, however, is Motivation for safe behaviours – and that result is common for all of the groups, regardless of their seniority. It is noticeable how important is the role of the management board in maintaining safety. The behaviour of the employees might be predominantly based on the management board's behaviour.

2.4. Conclusions

The research results show that sociodemographic factors have an influence on the level of safety climate in the analysed construction companies.

The highest diversity occurs among employees depending on their age. The lowest level of safety climate was noticed in the youngest employees, in the age range of 18-19 years. Those employees show the lowest safety climate in all the thematic categories except for Resilience to stress – in which they achieved the highest result.

Such juxtaposition of results is not favourable for the companies employing said employees. They can demonstrate a tendency for high-risk behaviours. It was also pointed out that high diversity of the level of safety climate was strictly connected with seniority.

The lowest level of safety climate was achieved by the employees with the least seniority, whereas the highest level was achieved by those with the most seniority. The weakest category of all that determines safety climate was Motivation for safe behaviours. Regardless of age and seniority, this category reached the lowest result.

3. SUMMARY

Examining the level of safety climate in construction companies confirmed the conclusions which can be drawn from the activities of The National Labour Inspectorate. The weakest element in maintaining safety in construction companies is work organization and motivation for safe behaviours. The lack of appropriate supervision by the management board of the construction site, their negligence and deadlines are the causes of further negligence in work safety. These irregularities are caused not by financial, but organizational issues. An inappropriate attitude towards safety matters, disrespecting basic safety tasks by the management board both influence the attitude towards safety of all the employees, regardless of their post or position.

This confirms the rules of accident prevention worked out in 1931 by H. Heinrich (1959):

– recognition of motifs and reasons for taking risks and behaving in a dangerous way creates the basis for preventive actions,
– superiors are key figures in preventing accidents; they directly supervise an employee's behaviour,
– main method of preventing accidents is making other employees more aware, appropriate choice of trainings and staff and discipline.

Technical forms of securing safety are expensive but they give immediate results. Working on the psychosocial aspects of safety is cheaper but effects are not immediately noticeable. Undoubtedly, it is a long-term process and it should be continuous. The research shows that such actions serve a purpose.

The results of research presented in the article correlate with studies conducted in other parts of the world. The research conducted among 125 construction workers in New Zealand confirms a significant role of safety culture in shaping safe work conditions. Those studies show that there are relationships among organisational culture, culture of a particular work place and culture of a particular group of employees (Guo, Tak Wing, Gonzalez, 2016).

Also, the research performed at the Chinese Construction Company proved that: „A positive safety climate can improve employees' safety awareness and reduce workers' unsafe behaviours" (Zhou, Fang, Mohamed, 2011).

Measurements of safety climate were also performed at construction companies in Hong Kong (Choudhry, Fang, Lingard, 2009) – 1120 surveys were obtained

during research in 22 companies. The authors state e.g. that „The results suggest that safety climate can be used as an effective measure of assessing and improving site safety for projects under construction".

In other studies conducted also in Hong Kong (Fang, Chen, Wong, 2006), it was found that „Statistically significant relationships were found between safety climate and personal characteristics, including gender, marital status, education level, number of family members to support, safety knowledge, drinking habits, direct employer, and individual safety behaviour".

Another work suggesting the necessity of measuring and shaping the level of safety culture, treated as a factor that can determine the level of work safety at construction companies, is the report called „Building a Proactive Safety Culture in the Construction Industry". Its authors claim that „A proactive safety culture helps to save lives, retain workers, reduce claims and delays, and enhance productivity and profitability while strengthening the company's reputation" (Cesarini, Hall, Kupiec, 2013).

Measuring work safety culture as a determinant of work safety is becoming more essential and more popular. Various surveys, control lists are developed that measure the level of work safety culture. The level of work safety culture is a symptom thanks to which we are able to predict consequences of activities. Thus, measurements of work safety culture should be treated as a quantitative symptom model (cause and effect). A low level of work safety culture should be regarded as a symptom of low work safety, what results in an increased number and seriousness of work accidents. As a result, such a state can cause a higher number of occupational diseases of employees, a greater staff turnover, a lower quality of products or services.

At small construction companies, which often have to struggle with a lack of specialised protective equipment, strong competition and a lack of stability and continuity of orders, the level of safety culture has a decisive importance in providing not only work safety but also the quality of rendered services, timeliness of realisation and trust of customers.

Studies presented in the article can serve as tips for owners of construction companies in planning employment and additional training, addressed to specific groups of employees.

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BADANIE POZIOMU KLIMATU BEZPIECZEŃSTWA W FIRMIE BUDOWLANEJ

Streszczenie

Według danych statystycznych główną przyczyną wypadków przy pracy jest niewłaściwe zachowanie się pracownika. W analizie przyczyn wypadków określane jest to jako niski poziom kultury bezpieczeństwa pracy. Głównym celem zaprezentowanych badań była ocena wpływu wybranych czynników socjodemograficznych na poziom klimatu bezpieczeństwa w mikro i małych firmach budowlanych. Badania przeprowadzono za pomocą autorskiego kwestionariusza ankiety na grupie 48 pracowników. Z wybranych czynników socjodemograficznych wiek i staż pracy mają największy wpływ na poziom klimatu bezpieczeństwa w badanych przedsiębiorstwach. Z analizy danych wynika, że w grupie najmłodszych pracowników oraz w grupie pracowników z najniższym stażem pracy należy podjąć działania prewencyjne w celu podniesienia poziomu klimatu bezpieczeństwa pracy.

Słowa kluczowe: klimat bezpieczeństwa, badania ankietowe, firmy budowlane