The role of organizational factors in OSH management performance[1]

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Abstract: In this study, we examine if and to what extent a relationship exists between organizational factors and OSH (occupational safety and health) management performance measured by employees' behaviours and attitudes towards risks among different age groups. To answer this question, a survey of 1524 employees was conducted. The respondents were asked to assess organizational factors related to occupational safety and health OSH in their enterprises, their mental resources, unsafe behaviours, and their attitudes towards risks and injury and non-injury incident experiences.

The findings of the structural equitation modelling show that there is a strong and statistically significant relationship between organizational factors, safe behaviours and employees' attitudes towards risks. Critical ratio analyses show that there are statistically significant differences in the regression weights for the 3 age groups between organizational factors at the individual level and top management commitment. The relationship between employees' attitudes towards OSH and accident experiences is weak. The strongest relationship is among the youngest employees (under 35 years old), and the weakest is among the oldest employees (45 and above).

Key words: management commitment, employees' participation, awareness and training, motivation, unsafe behaviours, attitudes towards risks, accidents

1. Introduction

A number of researchers have already found that organizational factors play a key role in risk prevention (Khosravi et al., 2014; Shannon et al., 1997; Skład, 2015). Some of the researchers note the importance of systematic analyses in the risk prevention policies of enterprises (Skogdalen and Vinnem, 2011; Øien, 2001). However, Skład (2015) stresses

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that there is no common definition of organizational factors in the literature on OSH (occupational safety and health), and this term is used differently by different authors. These factors mainly include elements of occupational safety and health management systems and safety culture and are directly linked to safety performance in enterprises.

Mohaghegh and Mosleh (2009) recognize the impact of organizational factors on employee behaviours (safe and unsafe attitudes). The impact is indirect. Employees' abilities, motivations and capabilities all act as mediators between factors and attitudes. Other authors stress that the safety climate can be a predictor of both safe and unsafe behaviours by employees (Brown et al., 2000; Seo, 2005). Brown et al. (2000) do not agree with the opinion that the dangerous behaviours of employees result only from the specific personality traits of individuals. They believe an organization is able to influence employees' attitudes towards using its resources. In addition, Salminen et al. (2013) show that both individual and organizational factors contribute to the accident process, but the influence of organizational factors is stronger than that of individual ones.

Authors indicate first that top management commitment and employees' participation are two basic organizational factors influencing both safe behaviour and, consequently, lowering frequency of occupational accidents. Geldart et al. (2010) show that lower lost-time frequency rates were associated with greater involvement of workers in decision-making and better managerial attitudes towards OSH. The importance of participative leadership for safety, reliability and worker satisfaction in being prepared for disturbances and coping with them adequately, especially during organizational changes towards increasing safety and reliability in the process industry, are shown by Zwetsloot et al. (2014). In addition, Vredenburgh (2002) shows that management practices reliably predict injury rates. Management leadership, along with several other factors, has been shown to influence employees' perceptions of the safety management system and consequently employees' safe behaviours by O'Toole (2002). Milczarek and Najmiec (2004) note that workers' safety priorities are significantly associated only with transformational leadership, not transactional leadership.

Milczarek and Najmiec (2004) note that younger workers have significantly lower safety climate ratings, and low co-worker safety priorities are associated with job type and education. According to Rundmo et al. (1998), management practices also have a direct impact on the development of employee attitudes. The direction of the impact is obvious: the more satisfied and involved the employees are and the more emphasis is placed on safety issues, the less risky their behaviour become. According to Sønderstrup-Andersen et al. (2011), time pressure, training, experience, risk perception, safety culture, culture and management are the factors most likely to influence the behavioural responses of individuals.

Tomás et al. (1999) confirm that employee behaviours contribute to accidents at work. They also note that particular behaviours are affected by variables such as the safety climate, superiors' and fellow employees' reactions to safety issues, employees' attitudes towards safety issues and the perceived level of workplace risk.

OSH management systems and a developed safety culture are usually shown as important factors shaping employees' behaviour and influencing safety level. However, effectiveness of the systems is still not so obvious. For example, according to Robson et al. (2007) and Thomas (2012), the results of research on the topic does not allow to clearly conclude whether the cor-

relation between implementation of the systems and OSH indicators exists or, at least, to define which elements of safety management systems are actually correlated with the level of safety.

The aim of the article is to investigate if and to what extent a relationship exists between organizational factors and OSH management performance measured by employees' behaviours and attitudes towards risks. The relationship between accident experience and employees' age is not obvious. Many studies suggest that older workers are less likely to experience occupational accidents than young workers (Laflamme, 1996; Ordysiński, 2013; Salminen, 2004); however, in some areas or for certain types of accidents, the relationship between the age and occupational accident rates can vary (Chi and Wu, 1997; Laflamme et al., 1996; Lin et al., 2008). In this study, the age of employees is taken into consideration.

2. Method

A survey questionnaire was conducted via face-to-face interviews by interviewers from the Central Statistical Office. The survey was conducted using 1,524 employees at 68 companies of different size and sector. For the survey employees employed in sectors with the highest risk of occupational accidents were selected, i.e. manufacturing (22 enterprises), wholesale and retail trade, repair of motor vehicles and motorcycles (18 enterprises), transportation and storage (6 enterprises), construction (4 enterprises) and others representing among others HORECA, health service, water and energy supply sectors and other services (18 enterprises). The respondents answered the questions using a five-point scale.

The following variables were defined on the basis of the data obtained from the survey:

- organizational factors, at the enterprise level (i.e. management commitment, employees' participation, awareness, training and motivation and communication),
- organizational factors at the individual level,
- mental resources,
- performance of OSH management system measured by unsafe behaviours; employees' attitudes towards risks; and accident experience.

The assessment of organizational factors with regards to their compliance with occupational safety and health regulations was based on the structure of typical certified safety and health management system (e.g. PN-N-18001: 2004, ISO 45001:2018) as well as safety culture questionnaire developed by Milczarek (2002). The following elements of the management system were assessed: management staff commitment, employees' participation, awareness-raising training and motivation, and communication about safety and health issues.

The assessment of organizational factors at individual level referred to employment and working conditions for individual worker that influence his job satisfaction (i.e. remuneration, job security, type of contract, working relationships with colleagues, working relationships with superiors, work-life balance, work type, working hours, and the level of occupational safety and health).

The assessment of mental resources was based on the Polish version of the questionnaire of the Work Ability Index developed by Kaija Tuomi et al. (1998) (Malecka-Dąbrowska et al., 2008). The questions relate to the individual characteristics of each employee that are recognized as vital from the point of view of risk taking (alertness, optimism, tendency towards depression).

The assessment of OSH management system performance, i.e. unsafe behaviours, employees' attitudes towards risks and accident experience was based on the above mentioned questionnaire for safety culture assessment. Unsafe behaviours were behaviours that could pose a threat to the health and life of employees meanwhile employees' attitudes towards risks meant actions taken by the respondents in response to the detected threats posed by other employees or third parties on the company premises. The respondents were asked to specify whether during the last three years they experienced occurrences of the different types of accident and, if so, with what frequency.

3. Survey results

3.1. Description of the group studied

In total, 56% (1,524) of respondents were male and 44% were female; 34% of those surveyed were under 35 years of age, 29% were aged between 35 and 44, and 37% were 45 years old or above. Thus the age structure of the studied group correspondents to the age structure of the employees' population in Poland in 2015 (Central Statistical Office, 2017). In regards to the length of service, just under 10% of respondents had been employed for up to 1 year, 26% for 1–4 years, and 24% for 5–9 years; 40% of those surveyed had 10 or more years of service.

In total, 60% of respondents performed blue collar jobs only or their jobs combined both blue collar and white collar tasks: among male and females respondents, this percentage was 74.5% and 39.5% respectively. The blue collar respondents fall into the following age groups: under 35 years of age—58%, 35–44 years of age—56%, and 45 years of age or above—63%.

Most respondents were employed under an employment contract, as follows: 69% for an indefinite period, 19% for a fixed period, and almost 12% of respondents included seasonal workers, temporary staff recruited from agencies and subcontractors hired under civil law contracts.

Table 1 below presents the average results of the survey relating to organizational factors at the enterprise level in general and in particular (i.e. management staff commitment, employees' participation, training and motivation, and communication about OSH issues), organizational factors at the individual level, and mental resources.

Table 1. Basic information concerning study variables

	Mean value	Median	1st quartile	3rd quartile
To what extent the appropriate activities are taken in the organization?				
Management commitment	3.87	4.00	3.50	4.50
Employees' participation	3.47	3.50	3.00	4.00
Training and motivation	3.85	3.86	3.43	4.29
Communication	3.79	3.75	3.25	4.25
Mental resources	3.70	3.67	3.00	4.33
Organizational factors at the individual level	3.93	4.00	3.56	4.33

	Mean value	Median	1st quartile	3rd quartile
How often unsafe behaviours are observed in the organization?				
Unsafe behaviours	2.89	2.83	2.33	3.33
How often positive attitudes towards risks are observed in the organization?				
Attitudes towards risks (positive)	4.06	4.17	3.50	4.83

S o u r c e: Author's own elaboration.

The results show that organizational factors at the surveyed companies are rated positively by the respondents. In fact, half of the respondents rated them above 3.74 (Table 1). Employees' participation in solving OSH-related problems received the lowest ratings, whereas the elements of OSH management of raising awareness and boosting motivation obtained the highest scores.

Unsafe behaviours were assessed according to an inverted scale, which means that the lower the rating, the better. The results show that half of the respondents rated their own behaviours positively (below 2.83, most of them at 2.5). Attitudes towards risks were also rated positively (average rating above 4). The most common rating was 5, i.e. the maximum one.

Employees aged 45–54 were the most satisfied with their organizational factors at the individual level. Employees with 1–4 years of service were the least satisfied with their organizational factors, and those with 10 or more years were the most satisfied. Young employees (under 35 years of age) and these with 5–9 years of service were the most alert and were offered the most mental resources. (Figures 1 and 2)

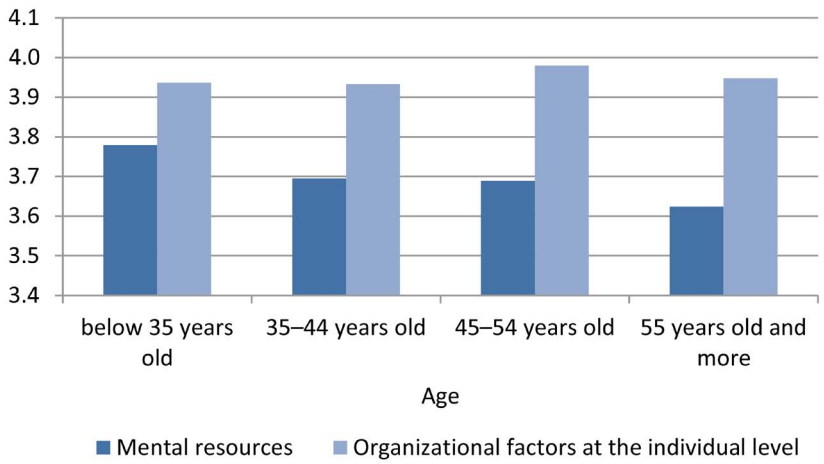

Figure 1. Mental resources and organizational factors at the individual level by age in the population studied

S o u r c e: Author's own elaboration.

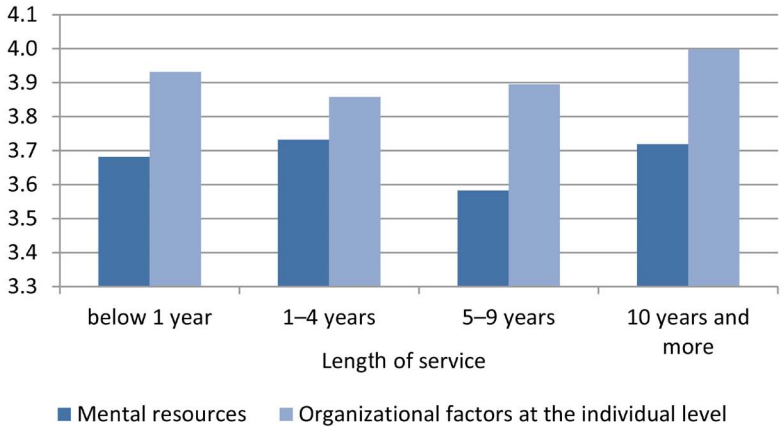

Figure 2. Mental resources and organizational factors at the individual by length of service in the population studied

S o u r c e: Author's own elaboration.

Most respondents (almost 94%) stated that they had not been involved in any accidents resulting in an absence from work, whereas 7% fewer respondents stated that they had not been involved in any minor non-injury incidents. Similarly, the number of respondents who were involved in at least one accident was higher for accidents that did not result in absence from work (9.7% and 4%, respectively) than for accidents that did result in absence (4.8% and 1.4%, respectively).

Over the 3 preceding years, almost 89% of respondents did not experience any non-injury incidents and 85% were not involved in dangerous occurrences where the risk of an accident was high. In total, 10% of the respondents experienced one accident or occurrence of this type. More were involved in dangerous situations than in non-injury incidents (3.5% and 1.7%, respectively).

3.2. Structural equation modelling

The model developed within the project consists of two parts. In the first part, a latent variable 'organizational factors' has been included. It is based on the following measurable variables being elements of organizational factors, i.e. management commitment, employees' participation, training and motivation, communication and organizational factors at the individual level.

The measurable variable 'mental resources' has not been statistically significant and, consequently, it has been excluded from the model.

In the second part of the model, a latent variable 'attitudes towards OSH' has been added. It is measured by measurable variables: 'employees' attitudes towards risks' and 'safe behaviours' (unsafe behaviour inverse). The relationship between the latent variable 'attitudes towards OSH' and measurable variable 'accident experience' has been included.

The developed model fits the data well, $\chi 2(19)=195.52$; $p<0.001$; CMIN/df=10.29; NFI=0.96; RMSEA=0.078 (Figure 3). All the regression weights and variances are statistically significant ($p<0.001$).

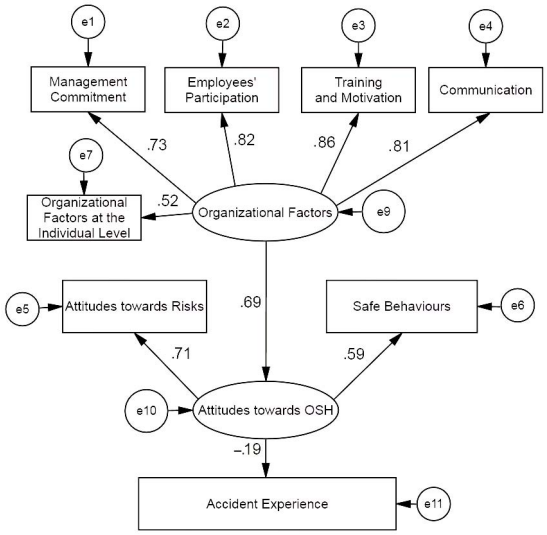

Figure 3. The path diagram (standardized regression weights)
($\chi 2(19)=195.52$; $p<0.001$; CMIN/df=10.29; NFI=0.96; RMSEA=0.078)

S o u r c e: Author's own elaboration based on Pęciłło, Skład and Grzeszkiewicz-Galwas, 2014–2016.

Apart from the 'organizational factors at the individual level' variable all other variables measure well latent variable 'organizational factor' (standardized regression weight above 0.7). The strongest weight is amounted for training and motivation and employees' participation.

The latent variable 'attitudes towards OSH' is measured better by 'employees' attitudes towards risks' than by 'safe behaviours' (regression weights 0.71 and 0.59, respectively).

There is a weak but statistically significant relationship between the latent variable 'attitude towards OSH' and 'accident experience' variable (standardized regression weight –0.19).

On the basis of the model (Figure 3), the model for three age groups (under 35, 35–44, 45 and above) has been developed. The regression weights for the models for three age groups are presented in Tables 2–4. The model fits the data well, $\chi 2(57)=285,14$; $p<0,001$; CMIN/df=5,002; NFI=0,94; RMSEA=0,052. All the regression weights for the youngest and medium age group (i.e., under 35 and between 35 and 44) are statistically significant ($p<0.001$). For the group aged 45 and above, the relationship between 'attitudes towards OSH' and 'dangerous occurrences' is not statistically significant ($p=0.17$). Other regression weights are statistically significant ($p<0.001$).

Table 2. Regression weights for a model for employees aged under 35

Variables	Direction of relation	Variables	Estimate	S.E.	C.R.	P
Attitude towards OSH	←	Organizational Factors	.465	.049	9.527	***
Employees' communication	←	Organizational Factors	1.096	.056	19.597	***
Organizational factor at the individual level	←	Organizational Factors	.600	.045	13.382	***
Management Commitment	←	Organizational Factors	.941	.053	17.863	***
Training and Motivation	←	Organizational Factors	.871	.038	22.766	***
Communication	←	Organizational Factors	1.000			
Safe behaviours	←	Attitude towards OSH	1.000			
Attitude towards Risks	←	Attitude towards OSH	1.459	.159	9.162	***
Accident Experience	←	Attitude towards OSH	–.531	.114	–4.636	***

S o u r c e: Author's own elaboration.

Table 3. Regression weights for a model for employees aged 35–44

Variables	Direction of relation	Variables	Estimate	S.E.	C.R.	P
Attitude towards OSH	←	Organizational Factors	.496	.053	9.375	***
Employees' communication	←	Organizational Factors	1.064	.057	18.800	***
Organizational factor at the individual level	←	Organizational Factors	.490	.044	11.138	***
Management Commitment	←	Organizational Factors	.822	.056	14.690	***
Training and Motivation	←	Organizational Factors	.828	.043	19.431	***
Communication	←	Organizational Factors	1.000			
Safe behaviours	←	Attitude towards OSH	1.000			
Attitude towards Risks	←	Attitude towards OSH	1.072	.119	9.042	***
Accident Experience	←	Attitude towards OSH	–.324	.092	–3.520	***

S o u r c e: Author's own elaboration.

Table 4. Regression weights for a model for employees aged 45 and more

Variables	Direction of relation	Variables	Estimate	S.E.	C.R.	P
Attitude towards OSH	←	Organizational Factors	.381	.052	7.285	***
Employees' communication	←	Organizational Factors	1.194	.053	22.451	***
Organizational factor at the individual level	←	Organizational Factors	.346	.038	9.126	***
Management Commitment	←	Organizational Factors	.999	.049	20.193	***
Training and Motivation	←	Organizational Factors	.801	.036	22.031	***
Communication	←	Organizational Factors	1.000			
Safe behaviours	←	Attitude towards OSH	1.000			
Attitude towards Risks	←	Attitude towards OSH	1.517	.207	7.328	***
Accident Experience	←	Attitude towards OSH	–.149	.107	–1.390	.165

S o u r c e: Author's own elaboration.

Critical ratio analyses show that there are statistically significant differences of regression weights for the 3 age groups between organizational factors and the following factors:

- organizational factor at the individual level for employees aged 45 and above and aged under 35 (C.R. = –4.3) as well as for employees aged 45 and above and 35–44 (C.R. = –2.5); the standardized regression weight = 0.59 for employees under 35, 0.55 for employees aged 35–44 and 0.41 for employees aged 45 and above,
- top management commitment for employees aged 45 and above and 35–44 (C.R. = –2.4); the standardized regression weight = 0.73 for employees under 35, 0.68 for employees aged 35–44 and 0.78 for employees aged 45 and above,

as well as between attitudes towards OSH and dangerous occurrences for employees aged 45 and above and under 35 (C.R. = 2.5); the standardized regression weight = –0.26 for employees under 35, –0.21 for employees aged 35–44 and –0.07 for employees aged 45 and above. The regression weight for employees group aged 45 and above is not statistically significant (p=0.07).

The results of the critical ratio analyses have been used in building the final structural modelling. The developed model fits the data well, $\chi 2(85)=360.5$; $p<0.001$; CMIN/df=4.2; NFI=0.92; CFI=0.94; RMSEA=0.046 (Figure 4).

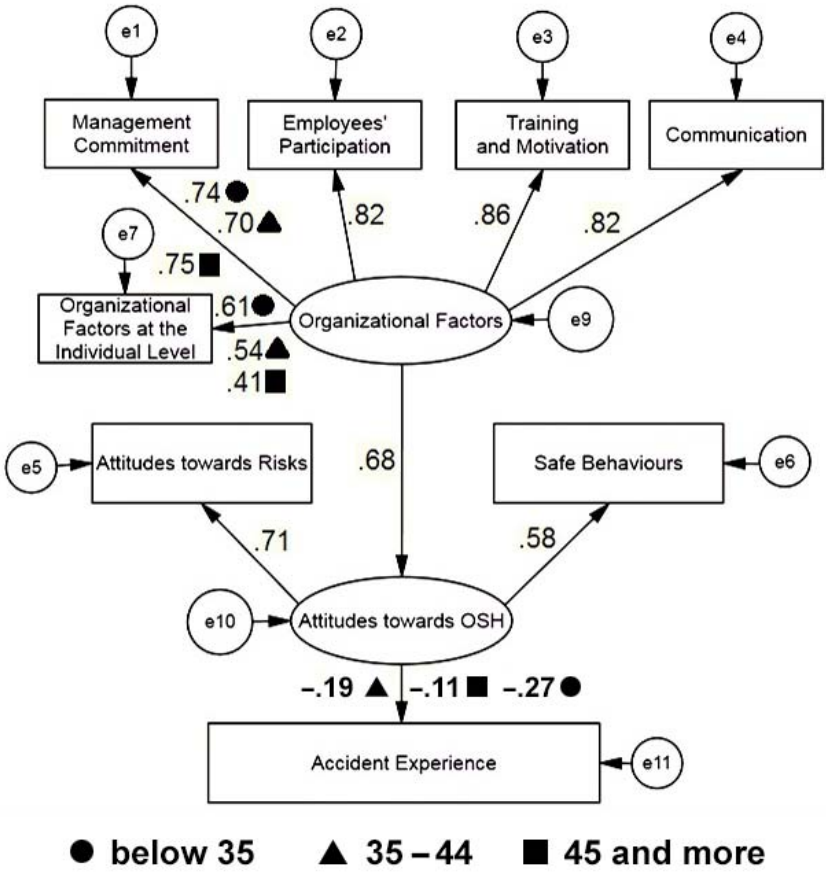

Figure 4. The path diagram (standardized regression weights) by age of employee $\chi 2(85)=360.5$; $p<0.001$; CMIN/df=4.2; NFI=0.92; CFI=0.94; RMSEA=0.046

S o u r c e: Author's own elaboration based on Pęciłło, Skład and Grzeszkiewicz-Galwas, 2014–2016.

In the final model, presented above, all regression weights and variances for all age groups are statistically significant. For employees aged under 35 and between 35 and 44, the weights are statistically significant at the level of $p<0.001$, except for the relationship between 'attitudes towards OSH' and 'dangerous occurrences', which is statistically significant at the level of $p<0.005$. For the group aged 45 and above, the regression weights are statistically significant at the level of $p<0.005$, except for the relationship between 'attitudes towards OSH' and 'dangerous occurrences', which is statically significant at the level of $p<0.05$.

Top management commitment is the strongest among oldest employees (45 and above) and the weakest in the middle age group (35–44). Organizational factor at the individual level is the strongest predictor of organizational factors among the youngest employees (under 35 years old) and the weakest among the oldest employees (45 and above).

The relationship between attitudes towards OSH and dangerous occurrences is strongest among the youngest employees (under 35 years old) and weakest among the oldest employees (45 and above), amounting to –0.27 and –0.11, respectively.

4. Conclusions

The main finding of the study is that organizational factors play a chief role in developing employees' attitudes towards OSH and their safe behaviours. The role of attitudes towards OSH is higher than the role of safe behaviours in accident experience prevention.

The findings of the structural equation modelling show that there is a strong and statistically significant relationship between organizational factors and safe behaviours and employees' attitudes towards risks (standardized regression weight 0.68, $p<0.001$). Critical ratio analyses show that there are statistically significant differences in the regression weights for the 3 age groups between organizational factors as a whole and (1) organizational factors at the individual level and (2) top management commitment ($p<0.001$). Both variables measure the decreases in organizational factors. Interpreting differences between a commitment to relationship management and organizational factors is difficult: the highest regression weight is for the oldest employees (45 and above), and the lowest is for middle-aged employees (35–44 years old). Organizational factor at the individual level is less important than other variables, and it varies among the different age groups: the younger the employees are, the more important this variable is. This situation likely results from the high expectations of young people and relatively worse job conditions offered by enterprises to young people. Mental resources based on optimism are not important for developing safe behaviours and attitudes towards risks among employees.

The findings obtained show that employees' safe behaviours and attitudes towards risks can be shaped via organizational factors, i.e. ensuring awareness of risk, effective communication, motivation and participation in activities aimed at improving safety and health among employees regardless of the employees' age. In other words, employees' safe behaviours and attitudes towards risks can be shaped by ensuring a culture of safety.

Attitudes towards risks based on employees' risk perception are more important for attitudes towards OSH than employees' own safe behaviours. The relationship between employees' attitudes towards OSH and accident experiences is weak. The strongest relationship is among the youngest employees (under 35 years old), and the weakest is among the oldest (45 and above). Still, the quite weak relationship should not be ignored. Each accident can result not only in costs that burden enterprises, employees, their families and society as a whole but also in suffering and a loss of the ability to work. A change in attitudes towards OSH by 1 contributes to a decrease in accident experiences by 0.2 standard deviations. It is important to bear in mind that the accident experience variable is skewed: 74% of respondents had not experienced any accident situation (standard deviation of 0.78); therefore, even small changes in accident experiences is important because these changes relate to a relatively small group of employees.

5. Discussion

The results of the research confirmed findings of the previous one (e.g. Salminen et al., 2013), showing that influence of organizational factors on the employees' behaviour is stronger than the influence of individual factors. Furthermore, in our study, in contrast to the previous one, individual factors like mental resources of employees do not play any role. At the same time the role of employees' age is rather neglected. Moreover, the results show that organizational factors applied at the company level influence the employees' behaviour stronger than organization factors applied at the individual level. Thus, the safety management at the company level may be a practical tool for shaping safe behaviours and attitudes towards occupational risks in the organization. The necessity of improving organizational factors and OSH management as whole is still a question of current importance. This is also reflected in the new standard ISO 45001:2018 that underlines the importance of development and improvement of OSH-related organizational processes in order to ensure effectiveness of OSH management system.

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Rola czynników organizacyjnych w zarządzaniu BHP

Abstrakt: Celem badania było sprawdzenie, czy i w jakim stopniu istnieje związek między czynnikami organizacyjnymi a wynikami zarządzania bezpieczeństwem i higieną pracy mierzonymi zachowaniami pracowników i postawami wobec ryzyka w różnych grupach wiekowych. Aby odpowiedzieć na to pytanie, przeprowadzono badania ankietowe wśród 1524 pracowników. Respondenci zostali poproszeni o ocenę czynników organizacyjnych związanych z: bezpieczeństwem i higieną pracy w ich przedsiębiorstwach, ich zasobami psychicznymi, niebezpiecznymi zachowaniami, a także ich postawami wobec ryzyka oraz doświadczeń związanych z niebezpiecznymi incydentami.

Wyniki modelowania strukturalnego pokazują, że istnieje silna i statystycznie istotna zależność między czynnikami organizacyjnymi, bezpiecznymi zachowaniami a postawami pracowników wobec ryzyka. Wyniki pokazują, iż istnieją statystycznie istotne różnice w trzech grupach wiekowych pod względem wysokości czynników organizacyjnych na poziomie indywidualnym a zaangażowania najwyższego kierownictwa. Natomiast zależności między postawami pracowników wobec BHP a wypadkami są słabe, najsilniejsze wśród najmłodszych pracowników (poniżej 35. roku życia), a najsłabsze wśród najstarszych pracowników (45 lat i więcej).

Słowa kluczowe: zaangażowanie kierownictwa, partycypacja pracowników, świadomość i szkolenia, motywacja, zachowania niebezpieczne, postawy wobec zagrożeń, wypadki