



## ORIGINAL ARTICLE


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## A multivariate approach towards the measurement of active employee participation in the area of occupational health and safety in different sectors of the economy

**JEL Classification:** C38; J28; D20

**Keywords:** *employee participation; health and safety management; safety culture; synthetic measure of active employee participation; factor analysis; sectors of the economy; factor analysis and principal component analysis*

### Abstract

**Research background:** Despite a dynamically growing exploration of broadly understood employee participation, there is still space left for more in-depth or new analyses in this area, and occupational health and safety (OHS) serves as a good example in this respect. In empirical studies, employee participation in the field of occupational health and safety is not treated as a separate element of ensuring safety in the organisation, but only as a minor element of occupational health and safety management, or as just one of the elements building a safety culture.

**Purpose of the article:** The aim of the paper is to propose a synthetic measure of active employee participation in OHS taking into account the depth and scope of this participation. A comparative analysis of the level of active participation of OHS at medical facilities and in other sectors of the economy was also performed.

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**Methods:** The theoretical model for active employee participation in OHS was tested by means of a survey using the PAPI (Paper & Pen Personal Interview) method. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used. The developed construct (characterised by an adequately high level of validity and reliability) was used in a comparative analysis of medical institutions with other sectors of the economy with the use of the Mann–Whitney U test.

**Findings & value added:** This research fills the theoretical gap in the model approach to participation in OHS. It has been found (EFA and CFA analyses) that active employee participation in OHS consists of one dimension (15 items). The model for active employee participation in OHS and the universal measurement scale developed and validated in this study represent a step forward towards the effective and reliable measurement of employee participation. In addition, the research has shown that the level of active employee participation in OHS at medical facilities is lower than in other sectors of the economy. The added value of this paper results from the approach to measuring employee participation in OHS which takes into account the depth and scope of this participation. The tool is consistent with international regulations and standards in the field of OHS, and thus can be used in other countries to assess active employee participation in OHS, regardless of the size and profile of the company or the sector of the economy.

## Introduction

The paper raises a very important research problem in the context of ensuring safety in the workplace, as accidents at work entail significant human, social and economic costs. Therefore, efforts should be made to eliminate them by ensuring safety in all workplaces (Gonzalez *et al.*, 2022; Bellés-Obrero *et al.*, 2021; Fontaneda *et al.*, 2019). Despite the development of the principles of systemic quality management (ISO 9001, 2015), and more so of occupational health and safety management systems based on OHSAS 18001 standards (2007) and ISO 45001 standards (2018), the implementation of behaviour-based safety (BBS) programmes, and the growing popularity of initiatives to build a safety culture, accident statistics in the world have remained the same for years. According to the International Labour Organisation (ILO), an estimated 2.78 million employees die each year as a result of accidents at work and occupational diseases, and an additional 374 million employees suffer from non-fatal accidents at work. This means that every day 7,500 people die from unsafe and unhealthy working conditions. Worldwide lost working days are estimated to account for almost 4% of global GDP, rising to 6% or more in some countries (Khairuddin *et al.*, 2022; Silva *et al.*, 2021; ILO, 2019). It should be emphasised that a safe workplace is conducive to the development of entrepreneurship and different sectors of the economy (Roszko-Wójtowicz *et al.*, 2019; Matuszewska-Pierzynka, 2018).

According to the International Labour Organisation (ILO), Occupational Health and Safety (OHS) is the discipline concerned with the prevention of work-related injuries and illnesses, as well as with the protection and promotion of workers' health (ILO, 1998). The Occupational Health and Safe-

ty Management System (OHSMS) is part of the global organisation management system. It aims to anticipate and prevent health and safety hazards that may occur in the organisation through actions such as planning, implementation, measurement and evaluation, review and improvement. Such systems are powerful tools that can help organisations control and manage risk, improve workplace health and safety conditions, create safer and healthier workplaces, and build a safety culture (Lee *et al.*, 2020; Mohammadfam *et al.*, 2017). Key OHSMS dimensions include employee impact, employee participation, management support, as well as other organisational aspects of the risk management process (Dahler-Larsen *et al.*, 2020).

Research concerning the relationship between employee participation and results related to OHS is quite limited. Researchers (Bayram, 2020; Mullen *et al.*, 2017; Butler & Park, 2005) proved that both an active role played by senior managers in OHS and employee inclusion in decision making were of crucial importance to reducing injury rates. Representative participation is associated with direct and indirect positive effects on employee health, i.e. a reduction in the number of work-related injuries and diseases (Mygind *et al.*, 2006; Reilly *et al.*, 1995) or better enforcement of regulations (Pike *et al.*, 2021; Walters & Wadsworth, 2020; Coutrot, 2009; Walters & Nichols, 2007). There are studies confirming that strong and visible leadership positively impacts the creation of the right climate for safety (Zhao *et al.*, 2022; Lee *et al.*, 2019; Cooper, 2015; Skeepers & Mbohwa, 2015). Many scholars point out that in the process of stimulating creative and innovative types of employee behaviour it is crucial to create a working environment promoting the exchange of thoughts and autonomy of activities, thus employee participation (Mao *et al.*, 2022; Isaksen, 2022; Nguyen *et al.*, 2022; Hunter *et al.*, 2007).

An issue of employee participation in the area of OHS was raised by researchers, but only as a minor element of occupational health and safety management (Ghahramani & Salminen, 2019; Skład, 2019; Hrenov *et al.*, 2017; Cooper, 2015; Skeepers & Mbohwa, 2015; Paas *et al.*, 2015a, 2015b; Vinodkumar & Bhasi, 2011; Coutrot, 2009; Walters & Nichols, 2007; Mygind *et al.*, 2006; Butler & Park, 2005; Reilly *et al.*, 1995; Gevers, 1983). Other researchers looked for a relationship between compliance with OHS regulations and individual elements of OHS participation, i.e. providing information, employee voice (Hu *et al.*, 2020; Burke *et al.*, 2002).

Employee participation is an important OHSMS element, though the question of assessing and measuring participatory management remains open. You can only manage what you measure and control, hence the use of occupational safety indicators is inevitable for proper OHS management. In the scientific literature, the classic division of safety indicators comprises

leading and lagging indicators (Botti *et al.*, 2022; Ali *et al.*, 2022; Shaikh *et al.*, 2021; Peçiño, 2020; Jain *et al.*, 2018). Earlier studies recognised the need to include aspects related to employee participation among the leading indicators (Moore *et al.*, 2022; Ali *et al.*, 2022; Shaikh *et al.*, 2021; Ferrari *et al.*, 2020; Zwetsloot *et al.*, 2020). The approach to measuring the level of employee participation in matters related to health and safety at workplace in other publications is very diverse, as it is not holistic. According to Moore *et al.* (2022), employee participation encompasses three issues: participation in OHS working/project team meetings, setting OHS goals, and assistance in implementing and planning OHS training. Zwetsloot *et al.* (2020) indicates the percentage of real actions taken as a result of suggestions/ideas regarding OHS improvements reported by employees as a measure of participation. Using the Fuzzy-AHP method, Ferrari *et al.* (2020) took into consideration three aspects in the group of participation-related indicators: participation of employees in health and safety decision making, participation in health and safety meetings, and the number of employees who are aware of safety measures. Shaikh *et al.* (2021) takes into account two aspects of communication and employee participation in general. Another problem is the fact that the assessment of participation is often made by the management, not the employees themselves (Moore *et al.*, 2022). As indicated, the literature recognises the important role of employee participation in the area of OHS management and building OHS culture. Unfortunately, the aspect of assessing and measuring the level of participation seems quite superficial and it does not take into account the depth and scope of participation. This paper fills the existing research gap and broadens the knowledge pertaining to employee participation in occupational health and safety.

The added value of this paper results from the approach to measuring employee participation in OHS which takes into account the depth and scope of this participation. The depth of participation is related to the form of employee participation in the area of occupational health and safety, starting from the simplest of them, which is informing, through consulting, to shared decision making. The scope of employee participation applies to broadly understood health and safety issues in which employees are involved, e.g. in the area of occupational health and safety training, workplace risk assessment, selection of protective measures, particularly dangerous tasks, investigation of the causes of accidents at work, etc. The tool proposed in the paper is consistent with international regulations and standards in the field of OHS, and thus can be used in other countries to assess active employee participation in OHS, regardless of the size and profile of the company or the sector of the economy.

In addition, the added value of the research results from the fact that the conducted questionnaire survey was addressed to regular employees in contrast to other studies, where the assessment of employee participation in health and safety at workplace is expressed through the subjective assessment of the management. By nature, this has the characteristics of the rhetoric of success, and it distorts the image of real employee participation (Moore *et al.*, 2022).

The aim of the paper is to propose a synthetic measure of active employee participation in OHS taking into account the depth and scope of this participation. The goal encompasses two research hypotheses presented in the Research Methodology section. The empirical study was carried out with the use of a proprietary questionnaire survey among employees in various sectors of the economy. The research results made it possible to create a universal synthetic measure to assess the level of active participation of employees in occupational health and safety in two areas: consulting and co-deciding.

The paper consists of four main parts preceded by the Introduction and ending with the Conclusions. The Literature Review focuses on issues related to employee participation in the area of occupational health and safety, defining the forms, depth and scope of participation. In the subsequent section, we develop a model of OHS participation (Figure 2). The Research Methodology section defines the research hypotheses, discusses the stages of research, presents the structure of the developed research tool in the form of a questionnaire, and describes the analysed sample of respondents. In the next section, we develop the construct of active participation and the scale on which to measure it, and then demonstrate its validity and reliability (EFA and CFA analyses). The construct was used in comparative analysis of medical institutions with other sectors of the economy with the Mann–Whitney U test. In its last section, we present the final conclusions and conduct a discussion concerning the findings of other authors. Finally, we present the limitations and possibilities of future research.

## **Literature review**

Employee participation can be defined as any process in the workplace that allows employees to exert some influence on their work and the conditions in which they work (Ghani & Malik, 2022; De Reuver *et al.*, 2021; Markey & Hodgkinson, 2003). Participation has a large variety of forms and meanings including: employee participation (Hosseini & Sabokro, 2022; Dibben *et al.*, 2022; Dundon *et al.*, 2022; Llorens-Serrano *et al.*, 2022; De Reuver

*et al.*, 2021; Sirianni, 1987), self-management (Llorens-Serrano *et al.*, 2022; Appelbaum *et al.*, 2001), codetermination (Breitling & Scholl, 2022; Vitols, 2021), and employees' voice (Hosseini & Sabokro, 2022; Dibben *et al.*, 2022; Ghani & Malik, 2022; Child, 2021; Kim & Leach, 2020; Song *et al.*, 2018; Dundon *et al.*, 2004).

There is a clear arbitrariness as to using concepts considered to be synonyms, i.e. communication, participation, cooperation, informing, co-decision making, or employee voice. Employee voice refers to the individual representation of working conditions, as well as to problem solving in a 'consultative' management mode (Hosseini & Sabokro, 2022; Child, 2021). The term 'employee voice' is important for two reasons. Firstly, it brings a number of positive effects for employees and organisations, such as improving the efficiency of the organisation, increasing the efficiency of management, stimulating creativity, and identifying potential opportunities. When making the right strategic decisions, the management of the organisation often needs many perspectives in the form of information from lower-level employees. Secondly, employee voice protects employees from several negative emotions such as resentment, anger, or dissatisfaction. If left unaddressed, these feelings can inhibit their creativity, motivation and, ultimately, performance (Ghani & Malik, 2022; Kim & Leach, 2020; Song *et al.*, 2018; Ahmad *et al.*, 2017; Li *et al.*, 2016).

Informing is a passive approach to participation, while active forms include consultation, decision-making, and the functioning of self-managing teams (Baran & Sypniewska, 2020; McCabe & Lewin, 1992). Baran and Sypniewska (2020) have proven that active employee participation is more effective than passive. This trend of active participation in occupational health and safety remains within the area of research interests of the authors of the paper.

The effectiveness of employees' participation and their impact on the quality of working conditions can be analysed in two dimensions: the scope and depth of participation (Dundon *et al.*, 2022; Llorens-Serrano *et al.*, 2022; Ben Rehouma, 2020). The depth of participation is the degree of influence that employees and/or their representatives are allowed, treated as a continuum, from a 'lack of commitment' through 'receiving information', 'joint consultation', and 'joint decision-making' (Ben Rehouma, 2020; Child, 2021; Markey *et al.*, 2014; Blyton & Turnbull, 2004), to even sharing power with employees — empowerment (Cierniak-Emerych & Piwowski-Sulej, 2017). Therefore, this is not just a dichotomy between a lack of commitment and full involvement of people in making the decisions that affect them.

We also distinguish forms of direct and indirect participation (Dibben *et al.*, 2022; Llorens-Serrano *et al.*, 2022; Child, 2021; Ben Rehouma, 2020; Baran & Sypniewska, 2020; Kandathil & Joseph, 2019). A direct form of participation is the participation of front-line employees, taking the floor and making decisions (Grieco & Bripi, 2022; Nawakitphaitoon & Zhang, 2021; Dibben *et al.*, 2022; Appelbaum *et al.*, 2001), also through actions in informal, short-lived groups or formalised, autonomous work teams (Grieco & Bripi, 2022; Ben Rehouma, 2020; Marchington, 2009; Markey & Hodgkinson, 2003), in quality circles, as well as in individual consultations with employees, direct (face to face consultation) or indirect (arm's length consultation). An especially important form of direct participation is authorisation delegating, usually divided into delegation to teams and delegation to individual employees (Child, 2021; Skorupińska, 2013). This creates autonomous teams, or autonomous individuals capable of making decisions, both of which are important from the point of view of empowerment theory. The European Foundation for the Improvement of Living and Working Conditions views direct participation, in turn, as opportunities provided by the management or initiatives supported by the management for consultation and/or delegation of responsibilities in the workplace (Geary & Sisson, 1994). Indirect participation occurs when employees are represented by other persons, such as trade unions (Harley *et al.*, 2005), or health and safety committees. In this type of involvement, delegates represent employees, which means that participation primarily takes on an advisory or consultative character. This kind of employee participation is, therefore, distanced from the idea of empowerment (Manzoor *et al.*, 2019; Cierniak-Emerych & Piwowar-Sulej, 2017). The literature review conducted has proven the positive impact of direct participation (Llorens-Serrano *et al.*, 2022) on improving health protection in the workplace.

Employee participation in the field of health and safety (Wilkinson *et al.*, 2010) defines the extent to which employees can influence and control OHS management issues in the workplace, through information exchange, joint consultation, and joint decision-making.

Safety participation can refer to voluntary safety activities that employees participate in, such as attending voluntary safety meetings and voicing safety concerns which reflect a more discretionary effort that employees invest to support overall safety in the team or organisation (Hu *et al.*, 2020).

Forms of involvement (also a degree of participation) can refer to whether employees could influence OHS management by information sharing, joint consultation and joint decision making (Rahmi & Ramdhan, 2021; Trask *et al.*, 2021; Masso, 2015; Wilkinson *et al.*, 2010). The follow-



ing five arguments supporting participatory management of OHS (Masso, 2015; Gevers, 1983) remain valid and are the starting point for methodological research: (a) employee engagement in a discussion over the working environment and conditions at work; employees are informed about risks in order to increase their risk awareness; (b) there is improvement in the dialogue between employees and managers, cooperation in promoting safety and safe practices at work; (c) since employees are experts on their work, their specialist knowledge and knowledge of finding solutions can lead to more adequate measures; (d) since decisions of an organisation directly influence employees' working environment and conditions at work, employees have an inalienable right to be associated with decisions affecting them; (e) equal partnership of employees and their employer, which recognises reciprocal interests, is considered as indispensable to improve safety.

An issue of employee participation in the area of OHS was raised by researchers but only as a minor element of occupational health and safety management (Bayram, 2020; Mirza *et al.*, 2022; Zhao *et al.*, 2022; Erbaş, 2022; Tear *et al.*, 2020; Hu *et al.*, 2020; Lee *et al.*, 2019; Ghahramani & Salminen, 2019; Skład, 2019; Lyu *et al.*, 2018, Wang *et al.*, 2018; Shen *et al.*, 2017; Hrenov *et al.*, 2017; Cooper, 2015; Skeepers & Mbohwa, 2015; Masso, 2015; Paas *et al.*, 2015a, 2015b; Vinodkumar & Bhasi, 2011; Coutrot, 2009; Walters & Nichols, 2007; Mygind *et al.*, 2006; Butler & Park, 2005; Reilly *et al.*, 1995; Gevers, 1983). Researchers also analyse the aspect of employee participation in occupational health and safety as one of the many dimensions building a safety culture (Znajmiecka *et al.*, 2022; Tear *et al.*, 2020).

In the literature, the issue of employee participation in the area of occupational health and safety is one of many elements included in theoretical models that are used to assess, among others, cause-and-effect relationships between factors describing the functioning of individual areas of the organisation and relationships that are conducive to building a safe working environment. In their theoretical model, Zhao *et al.* (2022) have shown that safety leadership has a positive impact on both the safety climate and employee participation. Lee *et al.* (2019) conducted research on the impact of empowering leadership on safety-related behaviours. In that model, he distinguished, among the five dimensions, participatory decision-making and informing. When examining safety behaviour in the organisation, Lee *et al.* (2019) also took into account the participation of employees in the field of occupational health and safety. In their two-dimensional model of work efficiency, in addition to compliance with OHS rules, Hu *et al.* (2020) also included employee participation in OHS. Studies conducted by researchers (Ghahramani & Salminen, 2019; Paas *et al.*, 2015a; 2015b) using the



MISHA method (Method for Industrial Safety and Health Activity Assessment) included in one of the four modules called participation: communication and training, employee participation, and communication aspects. Vinodkumar and Bhasi (2011) in a survey addressed to employees, examined their attitude towards six good practices relating to OHS management in the organisation. These included employee engagement, communication, and safety feedback.

Finally, it should be emphasised that studies are usually conducted among representatives of management personnel and employees of OHS services. This means that they often self-assess their activities and engagement in OHS (along the lines of success rhetoric), which is not confronted with any ordinary employees' assessment (Moore *et al.*, 2022; Heras-Saizarbitoria & Boiral, 2015; Heras-Saizarbitoria *et al.*, 2013; Levine & Toffel, 2010; Paas *et al.*, 2015a, 2015b).

Each theoretical model comes down to specific issues or research questions, which then provide the basis for the construction of indicators allowing for the assessment of the degree of employee participation in occupational health and safety. It is desirable that the questionnaire should include questions whose answer variants are presented on a Likert scale, preferably a five-point scale (Hu *et al.*, 2020; Lee *et al.*, 2019; Vinodkumar & Bhasi, 2011). There are different categories of safety indicators in the scientific literature. Leading and lagging indicators are two conventional categories of safety indicators adopted in management sciences. Leading indicators provide information to support the response to dynamically changing conditions allowing to achieve the desired safety outcomes, such as avoiding an adverse event or reducing a risk factor. Lagging indicators describe the tangible results of the safety strategy, e.g.: the number of adverse events such as injuries and accidents at work (Botti *et al.*, 2022). They measure the effectiveness of the OHS management process in the past, not the characteristics of current OHS management and leadership processes. Leading indicators complement lagging indicators and have predictive value; they are valuable for improving safety management and leadership, e.g.: by intervening in risky situations before safety or health is adversely affected (Jain *et al.*, 2018). In comparison to lagging indicators, the use of leading indicators is encouraged. The use of leading indicators has been shown to be more useful in preventive action than the use of lagging indicators (Pećićlo, 2020).

The study of the level of employee participation in OHS proposed by the authors of this paper is based on partial leading indicators. Additionally, a synthetic measure of active employee participation was built. Assessing employee participation with the use of this measure allows you to monitor

the level of employee involvement in health and safety matters and can support preventive actions in any organisation.

### **The conceptual and theoretical model of employee participation in OHS — theoretical background**

There is a gap in the theory for modelling OHS employee participation in terms of analysing its scope and depth. That is why we have developed a conceptual and theoretical model for participation in OHS based on theoretical foundations related to employee participation as well as legal and normative OHSAS/ISO 45001 requirements (Figure 2).

We make a distinction between three levels of participation depth: information, consultations and co-decisions (shared decision-making). For each of these levels, we indicate the scope of participation resulting from legal regulations (in red) and the requirements of OHS management standards (in blue)

In the provisions of law, we find two levels of OHS participation, i.e., informing and consulting, and their scope imposed on the employer is illustrated in Figure 2. (in red). It should be emphasised that the provisions of law in force in Poland are adapted to European law and international conventions, therefore they can be a universal point of reference (EU-OSHA, 1989; ILO, 1981).

In the case of standard OHS management systems ISO 45001 (2018) and OHSAS 18001 (2007), employee participation in OHS was given a higher rank. The commitment of the top management to ensuring broad employee participation at the design, implementation, and maintenance stages of all components of this system is a prerequisite for success (Karanić *et al.*, 2022; Algheriani *et al.*, 2019). The standard requires that the top management should ensure during the implementation of the health and safety policy that employees and their representatives are consulted and informed about all aspects of health and safety related to their work. In the process of communication, the institution should also take into account the involvement of workers in consultations concerning OHS activities conducted with them or their representatives, in particular: programmes and procedures for conducting audits, identifying hazards and assessing occupational risks, investigating all incidents (accidents at work, occupational diseases, and potential accidental events), agreeing on an OHS policy along with the organisation's commitment to raise qualifications, and taking into account the role of employees and their involvement in OHS actions (He-

ras-Saizarbitoria *et al.*, 2020; Laksana *et al.*, 2020; Uhrenholdt Madsen *et al.*, 2020).

Therefore, the ISO 45001/OHSAS 18001 standard distinguishes three levels of employee participation: information, consultations, and shared decision making. In our opinion, this tripartite employee participation entitles us to refer to the concept proposed by other researchers (Wilkinson *et al.*, 2010; Blyton & Turnbull, 2004; Dachler & Wilpert, 1978).

By combining legal and normative requirements, we have developed a conceptual and theoretical model for employee participation in OHS (Figure 2).

The scope of legal obligations in the area of employee information and consultation is extensive, and elements related to strategy/policy, incident investigation, and the review of the management system required by ISO 45001 and OHSAS 18001 cover these areas.

## **Research methods**

### *The employee OHS participation elements — a preliminary list*

In the first stage (Figure 1), the initial conceptualisation of the participation model was tested in a qualitative study to assess the content and face validity of the list of model items. For this purpose, an expert panel was appointed, consisting of seven members with many years of experience in the health and safety area (Table 1). Each of the experts received a full set of 30 items for assessment as shown in Figure 2, including 15 items in the Consultations category and three items in the Co-decision category. All the experts (1) accepted the division into three levels of employee participation in occupational health and safety, (2) considered as appropriate the assignment of individual issues to particular levels of participation, and (3) confirmed the need to conduct broader empirical research with regard to the assessment of employee participation in the Consultations and Co-decisions categories. Therefore, the research presented focuses on these two categories.

Table 2 shows three main components of the model, for each of the components, different subcomponents were identified.

Since our purpose was to develop a construct and a scale of active employee participation in OHS, we developed a research tool, i.e., a questionnaire. In the questionnaire, only deeper levels of participation were taken into account — namely, consultations and co-decision making. It was due to the fact that they are the most important from the point of view of em-

ployee activity, which significantly simplified our study and shortened its execution time. The interview questionnaire contained 15 substantive questions on employee Consultations (12 questions), Co-decision (3 questions), and a metric form.

- Cons 1. extremely dangerous tasks,
- Cons 2. list of tasks carried out by at least two workers,
- Cons 3. changes to work organisation and workstation equipment,
- Cons 4. introducing new medical procedures/technological processes,
- Cons 5. introducing new chemical substances and their mixtures,
- Cons 6. occupational risk assessment process and informing employees about risk,
- Cons 7. designating employees to perform OHS services,
- Cons 8. designating employees to give first aid,
- Cons 9. designating employees to act in case of fire and carry out evacuation,
- Cons 10. principles of allocating PPE, work clothes and boots to employees,
- Cons 11. employee training in OHS (programmes, training forms),
- Cons 12. programmes and procedures related to OHS audits / inspections,
- Co-Dec 13. in developing OHS policy / strategy,
- Co-Dec 14. in assessing occupational risk,
- Co-Dec 15. in investigating causes of accidents at work, occupational illnesses and near misses.

The items listed above characterise specific aspects of employee participation. The response format was based on a five-degree ordinal scale from 1 to 5, where 1 means no participation and 5 means full employee involvement (consultations, shared decision-making). We decided to assess direct participation in OHS.

#### *Data collection and sample*

In order to assess the level of employee participation in the area of OHS, in accordance with the research model (Figure 2), we formulated the following research question:

*Is it possible to develop a scale for measurement active participation in OHS, characterized by an appropriate level of validity and reliability?*

Additionally, the following specific hypotheses were verified in this paper:

**H1:** *Accurate measurement of active employee participation in OHS requires distinguishing two areas: Consultations and Co-decision making.*

**H2:** *The level of active participation in the area of OHS in healthcare is the same as in other sectors of the economy.*

The study used convenience sampling (Dudovskiy, 2022). The research was conducted in October — December 2019 using the PAPI (Paper & Pen Personal Interview) method. The respondents were employees who were not part of the management or OHS services. We deliberately surveyed regular employees due to the fact that, as other authors point out (Hrenov *et al.*, 2017; Paas *et al.*, 2015a, 2015b), asking management personnel and employees of OHS services is biased in principle. The management personnel usually positively self-assess their activities and engagement (success rhetoric), which is inaccurate, as it is not confronted with ordinary employees' assessment.

We surveyed 301 employees, 289 of whom were qualified after verifying the correctness and completeness of the data provided: 94 persons from healthcare units, and 195 from other sectors of the economy (including 49 respondents representing the industrial processing sector, 15 — financial and insurance activities, 14 — the construction sector, 10 — trade and repair of motor vehicles, 10 — transport and warehouse management, 6 — public administration, 5 — education, 86 — other sectors). The employees under study represented companies with no management system in place or where one or several standardised management systems were implemented. The most prevailing system to have been implemented in the surveyed companies was the Quality Management ISO 9001 (48%), followed by the Environmental Management ISO 14001 (21%), and the occupational health and safety management system ISO 45001 or OHSAS 18001 (13%).

## **Results**

### *Exploratory Factor Analysis (EFA)*

To validate the OHS participation measurement models, especially their generalisability across different sectors of the economy, the sample was split into two subsamples: the healthcare sector (N=94), and other sectors

of the economy (N=195). We employed a rigorous process to purify and validate the measurement scale items, as advocated by Gerbing and Anderson (1988) and Hair *et al.* (2014). Next, an exploratory factor analysis (EFA) was performed on each subsample to assess the properties of the initial measures (15 items in total). All calculations were performed in IBM SPSS, version 26.

The exploratory factor analysis (EFA) was performed using the principal component factor analysis (PCA) with Varimax rotation. First, the usefulness of data from the research sample for factor analyses was checked using Bartlett's sphericity test and measures of the adequacy of the Kaiser-Meyer-Olkin sample selection (KMO index). In all the groups, the value of the Bartlett sphericity test shows that the elements are mutually correlated and suitable for isolating common factors. Similarly, the high KMO statistic allows you to legitimately use an exploratory analysis to isolate factors. The conducted EFA has identified one factor which includes all the items.

For this one-dimensional scale, the value of Cronbach's alpha coefficient is high.

Table 3 shows the final solution for all items based on of Varimax rotation.

All sub-samples load consistently on one common factor and not as expected on the two sub-components proposed: consultations and co-decision making.

### *Confirmatory Factor Analysis (CFA)*

Based on the results of the exploratory factory analysis (EFA), a confirmatory factor analysis (CFA) was performed in SPSS Statistic across the entire sample (N=289). The combined sample was chosen as this study aims to develop a universal model measuring employee participation with respect to different sectors of the economy. The initial measurement model tested included all the 15 items suggested by the conducted EFA.

To perform the confirmatory factor analysis, and therefore to verify threshold conditions, index values of correlations between variables were determined (Table 4).

The investigation of the results obtained with the confirmatory factor analysis indicates that one factor should be identified within a scale of consulting employees about OHS, based on the group of all the 15 variables (Table 5). Factor loading values are high and for the one component amount to from 0.828 to 0.738, explaining 60.38% of variance. The reliability of the entire questionnaire, calculated using the Cronbach alpha coef-

ficient, is 0.953. The obtained result confirms good diagnostic properties of the questionnaire (Table 6).

The performed factor analysis allowed us to develop one synthetic measure consisting of 15 items.

The weights assigned to particular variables are similar, therefore it is possible to aggregate variables (items), e.g. by calculating the average value.

In summary, the confirmatory factor analysis (CFA) made it possible to develop a simple construct assessing the level of employee involvement in OHS matters based on one factor. Therefore, hypothesis H1 has not been confirmed by the results of empirical research which show that items assigned to Consultations and Co-decisions should form one synthetic measure. However, referring to the literature review, it ought to be emphasised that hypothesis H1 is consistent with the theoretical premises which indicate that Consultations and Co-decisions should be treated as separate areas in research on the active participation of employees in occupational health and safety.

#### *The level of active employee participation in OHS in healthcare facilities compared to other companies: A comparative analysis*

To verify hypothesis H2 — The level of active participation in the area of OHS in healthcare is the same as in other sectors of the economy — and to compare the level of participation in OHS of healthcare workers with workers in other entities, we conducted a comparative study on two groups.

Group 1 — 94 companies from the healthcare sector,

Group 2 — 195 companies from other sectors of the economy.

Due to the fact that the condition of normal distribution of the studied variables was not met and the groups were of different sizes, it was not possible to use strong statistical tests. Therefore, we used the non-parametric Mann–Whitney U test in the analysis. The results are shown in Table 7.

The analysis using the Mann-Whitney U test showed that statistically significant differences were noted. In companies from the healthcare sector, the level of active employee participation in OHS is lower than in other sectors. Therefore, hypothesis H2 has not been confirmed.

The level of active participation in the healthcare sector was median 2.0 (average 2.3), while in other sectors of the economy the median was 2.8 (average 2.8).



It was also noted that for the variables responsible for the consultations, Cons 1–12, the level of active participation was higher than for Co-dec 13–15 variables.

Based on the conducted research (including 289 employees, each representing a different organisation), a unique approach to employee participation in OHS put forward in this paper has permitted the creation of a synthetic measure. The resulting construct can serve as a useful assessment tool in the area of OHS, i.e. employee consultation and employee co-decision. This is the answer to our research question.

## **Discussion**

In this paper, we have proposed a synthetic measure of active employee participation in OHS constructed on the basis of an original model which was created based on an extensive literature review and which is consistent with the guidelines of international law and the standards of ISO 45001/OHSAS 18001. Our model classifies OHS participation levels in an orderly manner in accordance with the guidelines of participation theory (Dundon *et al.*, 2022; Ben Rehouma, 2020; Child, 2021; Llorens-Serrano *et al.*, 2022; Wilkinson *et al.*, 2010). The results of our research can be treated as an extension complementing Masso's (2015) research, who also defined three levels of participation, i.e. information, consultation and co-decision. Masso combined information and consultation into one group, while we have adopted the term of active participation encompassing consultations and co-decision making. Our research is more complete because Masso (2015), like other authors, practically included the problem of employee participation in one survey question.

The review of the literature has shown that the aspects related to the participation of employees in the area of occupational health and safety, or the questions asked by the researchers, are formulated in a very general way. The questions are often very laconic, e.g. Are the employer's safety-related activities consulted with employees? (Znajmiecka *et al.*, 2022); Does the safety manager instruct the personnel? (Ghahramani & Salminen, 2019; Paas *et al.*, 2015a, 2015b); Does the employee usually participate in consultations or decision-making regarding employment relations and working conditions matters? (Lee *et al.*, 2019); Does the management promote employees' involvement in safety matters? (Vinodkumar & Bhasi, 2011). Only in a few cases can you find precise wording referring to specific areas of occupational health and safety, e.g. I was involved in the process of assessing occupational risk related to my work station (Znajmiecka *et al.*,

2022); Employees actively participate in safety and health training by identifying needed training topics, assisting with development and delivery of training, and assisting with on-the-job training and mentoring of new employees (Moore *et al.*, 2022).

Moreover, in the literature, aspects of OHS participation are reduced to just a few questions/issues covered by an assessment (usually on a Likert scale), e.g. Moore *et al.* (2022) defined three questions, Znajmiecka *et al.* (2022) defined four questions, and Vinodkumar and Bhasi (2011) in their questionnaire reduced the entire area of employee participation in OHS to five assessed issues of OHS participation. As the researchers in the aforementioned models do not distinguish between active and passive OHS participation, the above-presented sets of few questions include both categories: consultation and information. Researchers do not take into account the highest level of participation, i.e. co-decision.

In our model of active participation (consultation and co-decision), we have included a total of 15 partial indicators relating to specific OHS issues. In addition to the previously mentioned issues related to occupational health and safety training and occupational risk assessment, our model also encompasses: the establishment of occupational health and safety services, particularly dangerous tasks, chemical substances, and the allocation of personal protective equipment.

Our comparative analysis of medical institutions in relation to other sectors of the economy has shown that there are significant differences between the two groups. In medical facilities, the level of employee participation is lower than in other branches of the economy. Data available in Eurostat show that the incidence rate in the sector of human health activities is higher than the EU average value of the indicator calculated for all types of activities. The results of our research are in line with the conclusions formulated by (Bayram, 2020; Mullen *et al.*, 2017; Mygind *et al.*, 2006; Butler & Park, 2005; Reilly *et al.*, 1995) that employee participation correlates with reducing accident rates and improving well-being in the workplace.

Moreover, our research has shown that the level of employee participation in consultations is higher than in co-decision making. Thus, the findings of our research are consistent with the results obtained by Cierniak-Emerych and Piwowar-Sulej (2017), who found that interest in lower participation forms prevailed among the respondents/employees.

Our analysis has indirectly supported research (O'Donoghue *et al.*, 2011) which indicates that employee participation is not implemented well or on a large scale. Researchers demonstrated employees' scepticism towards the commitment and support of management, and argued that em-

ployee participation was illusory and aimed only to formally certify the implementation of the policy and of employers' own goals.

Starting from the theory of participation, we assumed that employee participation in OHS was not an independent, bottom-up initiative of employees, but a conscious action of the management to include employees in the management of the company through information, consultation and co-decision. Thus, our approach towards analysing active employee participation in OHS differs significantly from that of Hu *et al.* (2020), who state that safety participation refers to voluntary safety activities that employees participate in, such as attending voluntary safety meetings and voicing safety concerns.

The Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) used in our research were also applied in other studies related to OHS participation (Bayram, 2020; Hu *et al.*, 2020; Lee *et al.*, 2019; Bayram *et al.*, 2021). However, those analyses were not focused solely on assessing employee participation in health and safety at workplace. Employee participation in OHS was only one of many occupational health and safety factors analysed in the model. For example, in the Empowering Leadership model, (Zhao *et al.*, 2022) developed scales of deep and surface compliance in OHS (Hu *et al.*, 2020). Based on the achievements of other authors, we used the same group of multidimensional statistical analysis tools to build a universal measure of active participation. Thus, we have expanded the area of application of the CFA and EFA methods in research in the field of occupational health and safety. The choice of a five-point Likert scale was purposeful and justified due to the fact that, first of all, this scale is commonly used in surveys in the area of OHS (Moore *et al.*, 2022; Hu *et al.*, 2020; Lee *et al.*, 2019), and it also allows the respondent to gradate the level of their own involvement in occupational health and safety in the workplace.

This study provides two major contributions to the research on active employee participation in the OHS area: one is a framework describing the construct of active employee participation and the other an instrument for measuring it. The added value of the presented research results from a comprehensive, psychometrically sound, operationally valid measure of participation in OHS.

This analysis and comparative study contribute to the theory of a participatory approach towards occupational health and safety as an important element of occupational safety management and leadership, as well as an atmosphere and culture of safety.

## **Conclusions**

The extensive literature review concerning active employee participation and methods of its measurement in the organisation allowed for the construction of a theoretical model which was the basis for the development of an original research tool in the form of a questionnaire. Individual questions in the survey allowed for the identification of 15 leading indicators on the basis of which a synthetic measure was constructed to assess the level of active participation, including consultations in the field of health and safety and co-decisions.

The conducted review of the literature confirms that many researchers approach the issue of assessing employee OHS participation quite freely. The source of the problem is that researchers in the assessment of participation take into account only selected elements of participation, and additionally, the way of defining individual issues is very diverse and general. The observed discrepancies in the operationalisation of concepts make it difficult to make comparisons between the results of research by different authors, and sometimes such comparisons are even unfounded. This diversity was an inspiration for the authors of the paper to build a universal model of active participation of employees in health and safety at workplace. The proposed research tool can be used to assess the active participation of employees in the area of occupational health and safety, regardless of the size and profile of the company or the sector of the economy. The tool is consistent with international regulations and standards in the field of OHS, and thus can be used in other countries to assess active employee participation in OHS.

The issue of employee participation in OHS was identified by researchers, yet not as a separately categorised research problem but only as a minor element of occupational health and safety management. Our findings bring a new perspective on employee participation in occupational health and safety. The paper fills this cognitive gap and broadens the knowledge pertaining to employee participation in occupational health and safety.

We constructed a conceptual model of this involvement based on legal requirements and OHSAS standards taking into account both the depth and scope of employee participation in OHS.

The advantages of this tool result from its practical usefulness. Thanks to systematic measurements of the level of active employee participation in health and safety at workplace, analyses can be made in terms of the effectiveness of changes introduced in the organisation. Managers, having a measurement tool at their disposal, can monitor the effects of the solu-

tions they introduce in terms of increasing safety in the workplace and improving work comfort.

The theoretical model of active employee participation in OHS and the synthetic measure developed and validated in this study represent a step forward towards the effective and reliable measurement of employee participation.

The research is not without limitations, and the results should be interpreted with some caution. In particular, due to convenience sampling, the sample does not reflect the structure of the general community. Undoubtedly, conducting larger-scale research and cohort studies will generate more accurate results and point to more optimal solutions.

Our model included questions that may be inadequate for some sectors of the economy (questions regarding e.g. medical procedures / technological processes, new chemical substances and their mixtures), hence we plan to modify the questions in the future to make them more universal. It is worth considering the possibility of extending the model to incorporate factors related to mental health.

The conducted research should be considered as a pilot study and a starting point for further research on the analysed phenomenon which would benefit from further development, taking account of a lower level of participation, i.e. informing. In addition, it is worth seeking the answer to the question of why the level of employee participation in health and safety is low in the healthcare sector. Employee participation in OHS is a condition necessary for the successful implementation of OHS management system and establishing a highly developed safety culture correlated with a level of safety in the company. The use of the model we propose, by measuring and identifying factors which determine a high level of employee involvement in OHS, will allow the management not only to assess compliance with legal and system requirements, but also to take adequate and effective steps in the area of safety for all members of the organisation.

In the future, the study of the relationship between the level of employee participation in the field of OHS and productivity (especially in the manufacturing industry) can be analysed. The EFA and CFA analyses conducted indicate that active employee participation can be aggregated to one factor both in the health care industry and other sectors of the economy. Larger studies in other sectors will allow us to assess whether our model is universal. Based on the proposed methodology, the authors plan to conduct empirical research with employees from different countries.

In the era of ageing societies in both Europe and Poland, it would be particularly interesting to examine organisations which employ personnel over 50 years old. This professional group will become more numerous

with each passing year. It is worth considering the needs of people with disabilities and ailments when organising safe and ergonomic workplaces. This particular vocational group seems to be still outside the scope of study and researchers' interest.

There is, therefore, space for more in-depth or new analyses in this area, and they will form a subject of our further research.

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## Annex

**Table 1.** Expert profiles

Expert	Working experience	
	Years	Position / competences
Expert 1	24	Auditor ISO 45001/OHSAS 18001 Systems, OHS Trainer Inculcator of OHS Systems
Expert 2	18	OHS specialist OHS trainer
Expert 3	15	OHS specialist Auditor ISO 45001/OHSAS 18001 Systems, OHS Trainer
Expert 4	25	OHS specialist OHS trainer
Expert 5	20	Inspector of National Labour Inspectorate Expert in labor law
Expert 6	20	court expert in the field of OHS OHS specialist
Expert 7	23	Inspector of National Labour Inspectorate OHS trainer

**Table 2.** Empirically identified components and model items

Components	Sub-components	Number of identified items
Informing	Informing in OHS law	13 items
	Informing in OHS system	2 items
Consultation	Consultation in OHS law	1 items
	Consultation in OHS system	11 items
Co-decision making	Co-decision making in OHS law	0 items
	Co-decision making in OHS system	3 items

**Table 3.** Exploratory factor analysis — Varimax rotation

Code	Variables	Healthcare sector (n=94)	Other sectors (n=195)	Total (n=289)
		VE=67.00 $\alpha = 0.964$ Barlett's 1372.581 (df = 105, p <0.000) KMO = 0.931	VE=57.46 $\alpha = 0.946$ Barlett's 2137.770 (df = 105, p <0.000) KMO = 0.928	VE=60.83 $\alpha = 0.953$ Barlett's 3426.066 (df = 105, p <0.000) KMO = 0.946
Cons 1.	extremely dangerous tasks,	-0.82570	-0.773211	-0.794494
Cons 2.	list of tasks carried out by at least two workers,	-0.79718	-0.789871	-0.800284
Cons 3.	changes to work organization and workstation equipment,	-0.81411	-0.777853	-0.799293
Cons 4.	introducing new medical procedures/technological processes,	-0.81335	-0.727849	-0.750445
Cons 5.	introducing new chemical substances and their mixtures,	-0.82032	-0.713855	-0.741789
Cons 6.	occupational risk assessment process and informing employees about risk,	-0.85626	-0.746518	-0.788339
Cons 7.	designating employees to perform OHS services,	-0.86181	-0.807977	-0.828527
Cons 8.	designating employees to give first aid,	-0.80946	-0.713654	-0.755257
Cons 9.	designating employees to act in case of fire and carry out evacuation,	-0.83987	-0.768039	-0.799141
Cons 10.	principles of allocating PPE, work clothes and boots to employees,	-0.83357	-0.724149	-0.756319
Cons 11.	employee training in OHS (programs, training forms),	-0.78714	-0.744885	-0.764010
Cons 12.	programs and procedures related to OHS audits / inspections,	-0.81838	-0.758875	-0.771336
Co-Dec 13.	in developing OHS policy / strategy,	-0.79249	-0.709259	-0.738011
Co-Dec 14.	in assessing occupational risk,	-0.81323	-0.811776	-0.810976
Co-Dec 15.	in investigating causes of accidents at work, occupational illnesses and near misses,	-0.79124	-0.791036	-0.794437

Notes: VE: variance explained. KMO - Kaiser-Meyer-Olkin Measure of Sampling Adequacy, B-Bartlett's test of Sphericity, N=289

**Table 4.** Index values of correlations between variables

	Cons 1	Cons 2	Cons 3	Cons 4	Cons 5	Cons 6	Cons 7	Cons 8	Cons 9	Cons 10	Cons 11	Cons 12	Co-Dec 13	Co-Dec 14	Co-Dec 15
Cons 1	1														
Cons 2	0.74	1													
Cons 3	0.66	0.71	1												
Cons 4	0.59	0.67	0.66	1											
Cons 5	0.64	0.63	0.60	0.62	1										
Cons 6	0.58	0.59	0.63	0.55	0.58	1									
Cons 7	0.63	0.66	0.62	0.60	0.59	0.64	1								
Cons 8	0.48	0.54	0.58	0.54	0.52	0.59	0.57	1							
Cons 9	0.53	0.61	0.58	0.54	0.48	0.61	0.63	0.81	1						
Cons 10	0.58	0.54	0.55	0.52	0.59	0.52	0.58	0.53	0.59	1					
Cons 11	0.51	0.51	0.56	0.47	0.52	0.59	0.57	0.62	0.66	0.64	1				
Cons 12	0.54	0.52	0.53	0.52	0.51	0.56	0.61	0.56	0.60	0.64	0.71	1			
Co-Dec 13	0.56	0.49	0.54	0.49	0.48	0.56	0.59	0.49	0.52	0.44	0.45	0.51	1		
Co-Dec 14	0.61	0.56	0.58	0.53	0.48	0.63	0.69	0.53	0.59	0.55	0.56	0.62	0.79	1	
Co-Dec 15	0.61	0.56	0.55	0.49	0.47	0.57	0.67	0.49	0.61	0.59	0.59	0.62	0.69	0.76	1

Notes: N=289

**Table 5.** Factor load values for items in the scale

Variable	Factor loadings (None) (raw data 289) Extract :	
	Main components (Marked loads >. 700000)	
	Factor1	
Cons 1		-0.794494
Cons 2		-0.800284
Cons 3		-0.799293
Cons 4		-0.750445
Cons 5		-0.741789
Cons 6		-0.788339
Cons 7		-0.828527
Cons 8		-0.755257
Cons 9		-0.799141
Cons 10		-0.756319
Cons 11		-0.764010
Cons 12		-0.771336
Co-Dec 13		-0.738011
Co-Dec 14		-0.810976
Co-Dec 15		-0.794437
VE: variance explained		0.608340

Note: N=289

**Table 6.** Confirmatory factor analysis

Summary. scale: Average = 39.5260 Std. = 16.6277 N valid: 289 (raw data 289) Alpha Cronbach's: .953356 Standardized alpha: .953883 Average cor. between items: .584716						
Variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Scale Std. Deviation if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Cons 1	37.10381	240.3352	15.50275	0.756502	0.662010	0.949839
Cons 2	37.06228	239.5809	15.47840	0.765069	0.699996	0.949647
Cons 3	36.61592	241.1431	15.52878	0.764490	0.642622	0.949695
Cons 4	36.76125	242.3340	15.56708	0.711124	0.580720	0.950818
Cons 5	37.02422	241.8714	15.55221	0.703036	0.590789	0.951012
Cons 6	36.67820	239.5885	15.47865	0.751136	0.589594	0.949953
Cons 7	37.15917	239.1927	15.46585	0.794716	0.655357	0.949023
Cons 8	36.48443	238.0491	15.42884	0.719664	0.706712	0.950794
Cons 9	36.66090	236.1411	15.36688	0.767906	0.753164	0.949621
Cons 10	36.62976	238.5584	15.44534	0.719144	0.584853	0.950773
Cons 11	36.39792	241.5545	15.54202	0.729878	0.643554	0.950415
Cons 12	36.86505	240.9887	15.52381	0.734716	0.620775	0.950311
Co-Dec 13	37.50865	248.2499	15.75595	0.691722	0.679714	0.951315
Co-Dec 14	37.25951	242.9949	15.58829	0.771364	0.758956	0.949665
Co-Dec 15	37.15225	241.5754	15.54270	0.753664	0.687539	0.949923

Note: N=289

**Table 7.** Results of the Mann–Whitney U Test among respondents employed in companies outside the healthcare sector (Group 2) and among the healthcare sector respondents (Group 1)

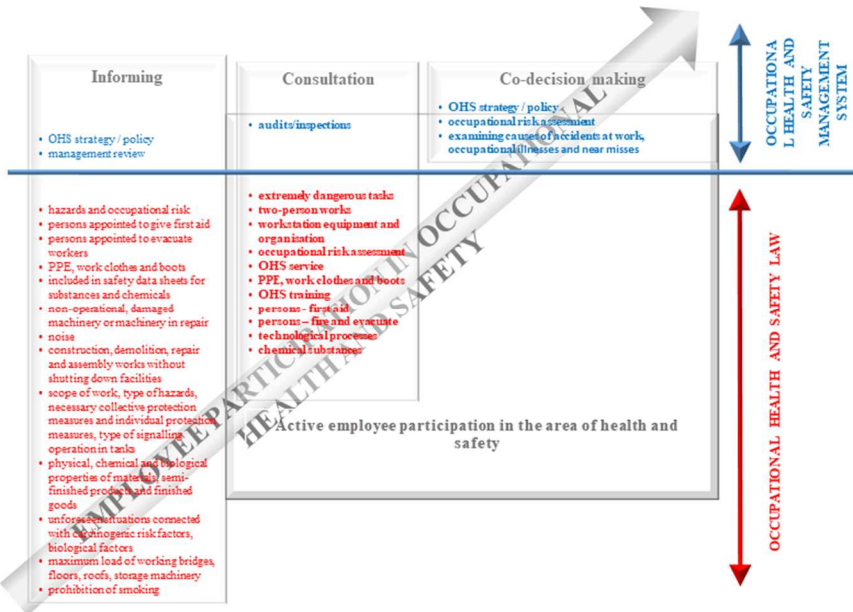
Mann–Whitney U test (with continuity correction); the marked results are significant (p < 0.05)									
	Rank sum Group 1	Rank sum Group 2	U	Z	p	With correction	p	N valid. Group 1	N valid. Group 2
Active Employee Participation OHS	11009.0	30896.0	6544.0	-3.9373	0.00001	-3.9385	0.0001	94	195

Note: N=289

**Figure 1.** The development process



**Figure 2.** The conceptual and theoretical model for research on employee participation in OHS



Source: based on Niziołek & Boczkowska (2021).