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BARRIERS TO DEVELOPING A SAFETY CULTURE IN THE OPINION OF OCCUPATIONAL HEALTH AND SAFETY PROFESSIONALS

ABSTRACT

Aim: Identification of barriers to the development of a safety culture, determining their importance and detecting associations between them.

Methods: First, a critical and comparative literature analysis was used, followed by a quantitative empirical study. The quantitative analysis examined the frequency of occurrence as well as associations and connections between attributes. A survey was conducted on a sample of 105 people.

Conclusions: It was found that the most common barriers to the implementation of safety culture in the literature are: (1) lack of leadership and commitment of management, (2) lack of commitment and disregard by employees and (3) lack of understanding by employees. On the other hand, practitioners indicated (1) lack of leadership and commitment of management, (2) problems with communication and (3) lack of commitment and disregard by employees as the most important barriers. Therefore, two of the three most important barriers are the same in both cases and concern people: management on the one hand, and employees on the other.

Practical implications: A characteristic triad of barriers to developing a safety culture has been identified. In this way, a model approach to the problem was proposed. Understanding them and striving to eliminate them will allow for a more effective shaping of this area of organizational culture.

KEYWORDS: safety culture, barriers, occupational health and safety, occupational hazard

INTRODUCTION

Occupational safety is by some practitioners considered to be one of the measures of an organization's effectiveness (Biedrzycka, 2015). Developing a safety culture is believed to be one of the conditions and foundations of effective safety management (Lappalainen, 2017; Couto da Silva, Amaral, 2019). The concept of safety culture was adapted from the theory of organizational culture (Lappalainen, 2016; Batorowska, 2018). It is a fragment of this theory – a detailed explanation of hazard identification and protection against them. Organizational culture (Schein, 1990) encompasses three levels: (1) artifacts, which are formal and visible symbols; (2) values, which form the basis for normative judgments and the resulting actions and attitudes; and (3) cultural assumptions, i.e., unconscious assumptions about the nature of the reality and influencing its perception. It is widely recognized as an important factor in an organization's success (Schultz, Hatch, 1996; Scott-Cawiezell, et al. 2006).

By establishing desired values, norms, patterns of behavior, and perception of the world, it influences the strategy, relationships within the organization, as well as its identity and image (Lotko, 2022). It constitutes a framework (Ching, Druckman, 2007) for a shared understanding of reality (McAuley, Duberley, Johnson, 2007). Growing organically, it encompasses all areas of an organization's functioning. One of these is the sphere of security. Therefore, we talk about safety culture (Cooper, 2000; Boin, Schulman, 2008; Guldenmund, 2014), in particular – safety culture (Studenski, 2000; Lotko, 2022; SQD, 2022).

Effectiveness in ensuring safety is one of the most visible signs of organizational excellence (Gualardo, 2011). Achieving this goal requires, among other things, developing a proper workplace safety culture (Batorowska, 2018; Couto da Silva, Amaral, 2019). Developing this culture provides extensive benefits to the organization and its employees, but also encounters numerous challenges (Bond, 2008; Lappalainen, 2017; Aisheh, et al. 2021). Among the most significant limitations to the implementation and acceptance of safe work practices, alongside barriers related to safety policy and management, are cultural and behavioral barriers (Bond, 2008; Aboul, et al. 2012; Aisheh, et al. 2021).

Therefore, this article addresses the following three research questions:

Q1: *What are the barriers to developing a safety culture?*

Q2: *What is the rank of the barriers to developing a safety culture?*

Q3: *What associations exist between the barriers to developing a safety culture?*

Therefore, the aim of the study was formulated as follows: Identification of barriers to the development of a safety culture, determining their importance and detecting associations between them.

OPERATIONALIZATION OF SAFETY CULTURE IN THE LIGHT OF LITERATURE RESEARCH

The term *safety culture* was introduced in 1986, following the accident at the Chernobyl nuclear power plant (Lardner, 2003) and the Space Shuttle Challenger disaster (Boin, Schulman, 2008; Antonsen, 2012). After these catastrophes the concept of safety culture began to be interpreted primarily as a source of implicit, presumed understanding of employee health and safety

management, and more broadly, of the organization's comprehensive safety (Cooper, 2000). It is an important factor in determining the perception of safety issues and its level (Battaglia, Passetti, Frey, 2015; Couto da Silva, Amaral, 2019). It constitutes a component of organizational culture that is assumed to have a strong influence on employee attitudes and behaviors regarding safety issues (Lotko, 2022; Studenski, 2000).

The understanding of organizational culture, and thus safety culture, varies depending on its location within the selected scientific management paradigm: (1) functionalist, (2) interpretive, or (3) postmodern. These paradigms were adopted as a synthesis of the classifications proposed by Burrell and Morgan (1979) and Schultz and Hatch (1996). The functionalist tradition is based on the belief that organizational culture is embedded within an organization as a subsystem, similar to, for example, an organizational structure or information system. Its purpose is to support the development of organizational goals and values defined by management (Guldenmund, et al. 2010). The functionalist approach assumes that culture exists on a continuum, meaning that an organization can have a good or poor safety culture (Wiegmann, et al. 2002, Lappainen, 2017).

In the interpretive research approach, the researchers believe that organizational culture is a system of shared symbols and meanings that serves as a means for all actors in an organization to interpret their collective identity, beliefs, and behaviors (Smircich, 1983; McAuley, Duberley, Johnson, 2007). Culture is an entity that exists independently, to which people must adapt, and which is difficult, if not impossible, to change (Lappainen, 2017). In turn, the authors writing in the postmodernist movement assume that organizational culture is diverse and fragmented rather than harmonized and based on shared values and norms (Haukelid, 2008; Schultz, Hatch, 1998). Organizational culture, understood in this way, is a certain stage of entropy.

To better understand safety culture, Wiegmann (2002) conducted a comprehensive literature review. They defined safety culture as a concept defined at the group level, defined by shared values, influencing organizational members, reflected in the organization's willingness to grow and learn from mistakes, and relatively enduring, stable, and resilient to change. Pigeon (1991) further describes safety culture as a set of beliefs, norms, attitudes, roles, and social and technical practices that minimize the exposure of organizational actors

and external contractors to conditions deemed unsafe or harmful. According to this author, safety culture is an expression of a given community's attitude toward risk, threats, and safety, as well as an appreciation of the values considered important in this area. Cieślarczyk (2011), on the other hand, views safety culture as a way of thinking about safety and recognizing its value for both individuals and the organization as a whole. Continuing this argument, it can be assumed that the safety culture in an organization consists of three areas (Oleszak, Oleszak, 2016):

1. Attitudes towards safety.
2. Generally accepted standards of safety conduct.
3. Values attributed to health and life.

Safety culture is built on employee engagement, fostering a sense of belonging, and education – knowledge transfer.

This article assumes that safety culture represents a lasting value and prioritization of safety issues by individuals and groups at every level of the organization. It refers to the degree to which organizational participants engage in and accept responsibility for safety, work to communicate and improve safety issues, and strive to adapt and modify behaviors based on experience, especially negative experiences (learning from mistakes) (Lotko, 2022). This applies particularly to work, hence the term occupational safety culture (Studenski, 2000; Oleszak, Oleszak, 2016). Many authors recognize various barriers to implementing occupational safety culture. This study summarizes these barriers, summarizes them, and identifies the most common ones.

Organizational culture comprises the values, beliefs, norms, and underlying assumptions shared by an organization's members; these elements shape the perception of organizational reality and influence behavior (Schein, 2010). A specific dimension of this is safety culture, which encompasses safety-related values, attitudes, beliefs, and behavioral patterns, as well as the significance the organization attaches to safety in its day-to-day operations (Cooper, 2000). Consequently, fostering a safety culture requires not only formal procedures and safety management systems but also consistent management commitment, effective leadership, and the creation of an environment conducive to safe employee behavior (Skład, 2015; Pilbeam et al., 2016). A lack of leadership

and management commitment can pose a significant barrier, as the way management demonstrates the importance of safety through its decisions and actions shapes employee attitudes and participation in safety initiatives (Clarke, Ward, 2006; Pilbeam et al., 2016). Communication is an equally vital element, encompassing the dissemination of information regarding hazards and safety rules, as well as the opportunity to report issues and engage in open dialogue between employees and management; deficiencies in this area can lead to ambiguity and conflict regarding safety rules and procedures (Zara et al., 2023). Furthermore, safety culture depends on employee engagement, as its sustainability requires active staff participation rather than mere formal compliance with safety system requirements (Clarke, Ward, 2006; Skład, 2015). Consequently, barriers may arise from a lack of employee engagement, as well as from the ignoring or non-observance of safety rules – factors that signal a discrepancy between declared organizational values and actual behavioral patterns (Cooper, 2000). Thus, a lack of management commitment, insufficient communication, a lack of employee engagement, and the disregard for safety rules should be viewed as interconnected barriers to the development of safety culture; their presence can hinder the transformation of formal safety requirements into genuine, ingrained organizational behavioral patterns.

This perspective aligns with the literature, which identifies management commitment, communication, leadership, and employee engagement as key organizational factors linked to workplace safety. At the same time, research on safety culture indicates that its various dimensions are interdependent, for instance employee engagement is linked to management commitment, and communication can foster employee engagement.

RESEARCH METHODOLOGY

The study applied two methods: critical and comparative literature analysis and statistical data analysis. First, a library search was conducted in Google Scholar. The search was conducted for the phrase *safety culture barriers*. For this phrase, publications from the first three pages of results were included. The search was conducted on May 22, 2024. Nineteen studies were selected

and analyzed based on their substantive content. This identified barriers to developing a work safety culture found in the literature.

Next, practitioners' perceptions of these barriers were verified through an empirical survey. This part of the study was conducted using a survey technique on a sample of 105 participants. It was conducted during the 6th National Forum of Occupational Health and Safety Services, held from September 3-5, 2024, in Warsaw. A printed questionnaire was distributed. It listed the barriers identified on the basis of the literature review. Participants were then asked to select the three most important and then rank them: 1 (most important), 2, or 3. The collected data were analyzed quantitatively. Frequency and association analyses were conducted. Statistical analysis of the collected data was performed in Statistica 13.0 using the *Sequence, Association and Link Analysis* procedure.

IDENTIFICATION OF BARRIERS TO DEVELOPING A CULTURE OF OCCUPATIONAL SAFETY (Q1)

As a result of the library query conducted to identify barriers to the development of safety culture, the results presented in Table 1 were obtained.

As a result of the literature review, 10 barriers to developing a safety culture were identified. The analysis of the data in Table 1 shows that the most frequently cited barriers in the literature are:

1. Lack of leadership and management commitment (present in 10 studies).
2. Lack of involvement and ignorance of employees (in 7 studies).
3. Lack of understanding by employees (in 6 studies).
4. Economic barrier meaning lack of resources, e.g. money, time (also in 6 studies).
5. Inappropriate work organization (in 5 studies).

In this way, a solution to research question Q1 was proposed. The identified barriers provided the basis for designing a survey questionnaire, later used in the empirical study.

Table 1. *Barriers to developing a culture of occupational safety – results of a library survey*

Barrier/ Author(s)	Communication problems	Lack of leadership and management commitment	Lack of understanding by employees	Complexity of changes	Lack of commitment and ignorance of employees	Inability to resolve conflicts	Improper work organization	Economic barrier (lack of resources)	Unawareness of risk	External factors (competition, customers)
Batorowska (2018)					X				X	
Battaglia et al. (2015)				X						
Couto da Silva, Amaral (2019)		X	X	X				X		
Czernecka, Butlewski (2016)		X					X	X		
Drake et al. (2015)		X			X				X	
Duijm, Goossens (2006)	X	X			X	X				
Etchegaray et al. (2020)		X								
Gabryelewicz, Wrzesińska (2016)		X					X	X		
Koziński (2018)		X			X	X	X			
Lingard, Holmes (2001)			X							
Livorsi et al. (2016)			X		X		X	X	X	
Łakomy, Nowacki, Ociecek (2016)		X	X	X						
Mahmoudi et al. (2014)		X								
Schneider, Stempowska, Kalemba (2017)	X									
Simon, Leik (1999)		X			X					
Studenski (1996)			X		X				X	
Sunindijo (2015)								X		X
Zecevic et al. (2017)	X						X	X		
Zeng et al. (2007)			X	X						
Number of occurrences	3	10	6	4	7	2	5	6	4	1

Source: Prepared by the authors.

DETERMINING THE RANK OF BARRIERS TO DEVELOPING A SAFETY CULTURE (Q₂)

The analysis revealed that practitioners identified a lack of leadership and management commitment (21% of responses), communication problems (20%), and employee disengagement and ignorance (15%) as the most important barriers. The frequency distribution of responses for all barriers is shown in Figure 1.

Fig. 1. *Frequency distribution of responses obtained from the empirical study for all barriers*

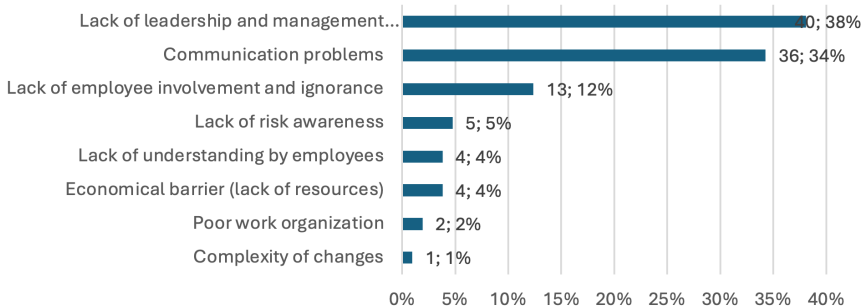


Source: Prepared by the authors.

It should be noted, that during analysis, initially (Figure 2) the denominator used to calculate the shares was 315 (3 ranked answers per respondent times 105 respondents); in other words, the percentage of times a given barrier was cited was determined regardless of the position at which it was indicated. In contrast, the subsequent figures present percentages that take the rank into account (as indicated in their captions), meaning the denominator used in those cases was 105.

Analysis of the data presented in Figure 1 shows that the frequency of occurrence for the remaining barriers is clearly and fairly steadily decreasing, with unawareness of risk still exceeding 10%. Figure 2, on the other hand, presents the frequency distribution of responses for the barrier considered most important by respondents (the one assigned the highest rank of 1).

Fig. 2. *Frequency distribution of responses obtained from the empirical study for the first barrier (rank 1)*



Source: Prepared by the authors.

Based on the analysis of the data presented in Figure 2, a conclusion was drawn confirming the previous observation. The two barriers most frequently cited as the most important were a lack of leadership and management commitment (38% of responses) and communication problems (34%). (Interestingly, communication problems are rarely identified as a culture barrier in the literature – they were present in only three studies examined as part of the library search.) These barriers should be considered critical to implementing a safety culture. Third in importance, but much less frequently cited, is employee lack of commitment and ignorance (12%). The remaining variables received significantly lower frequencies. Figure 3 presents the frequency distribution of responses for the barrier considered second most important by respondents (the one they assigned a rank of 2).

Analysis of the data in Figure 3 shows that the second most common barrier cited by respondents was a lack of employee engagement and ignorance (17% of responses), followed by a lack of leadership and management commitment (16%). The next most common reasons were poor work organization (15%) and communication problems (14%). It is noteworthy that these four barriers occurred with very similar frequencies.

Fig. 3. *Frequency distribution of responses obtained from the empirical study for the second barrier (rank 2)*



Source: Prepared by the authors.

Figure 4 presents the frequency distribution for the barrier identified by respondents as the third most common (the one they assigned a rank of 3).

Fig. 4. *Frequency distribution of responses obtained from the empirical study for the third barrier (rank 3)*



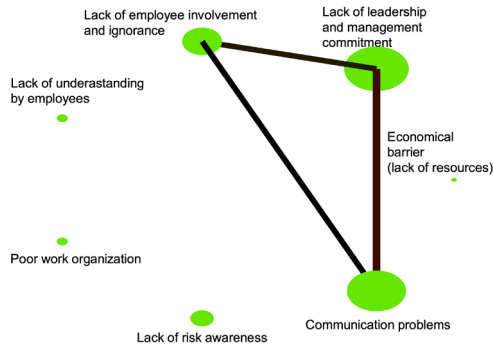
Source: Prepared by the authors.

Based on the analysis of the data in Figure 4, it was found that the third most common barrier identified by respondents was a lack of risk awareness (21% of responses), followed by employee disengagement and ignorance (16%). The next six barriers had very similar frequencies. This led to the proposed solution to research question Q2.

DETECTING ASSOCIATIONS BETWEEN BARRIERS TO DEVELOPING A SAFETY CULTURE (Q3)

To deepen the analysis, we considered the connections (associations) between barriers. These are presented in the network diagram in Figure 5.

Fig. 5. Network diagram of connections between barriers



Source: Prepared by the authors.

In Figure 5, the size of the bond indicates the relative support for each element, the line thickness indicates the relative support for the two elements, and the brightness of the color indicates the relative growth of the elements. Considering the relative support for each element, it can be seen that the most common barriers are a lack of leadership and management commitment, communication problems, and employee disengagement and ignorance. The remaining barriers can be considered insignificant. Continuing the analysis, Table 2 presents popular sets of barriers and association rules.

Regarding association, three classic association rules were employed (Agrawal et al., 1993; Hämmäläinen, 2014): support, confidence, and lift (or increase). These three measures must be interpreted collectively, as each addresses a different question.

First, support indicates how frequently A and B occur simultaneously within the entire dataset; it reflects the frequency of co-occurrence of the studied characteristics or barriers across the sample. Thus, it is a measure of the rule's scope rather than its strength. The obtained values represent the percentage of all studied cases characterized by the simultaneous presence of both

barriers. The literature does not specify a single minimum threshold for support values (Agrawal et al., 1993); however, the values obtained here should be considered high.

Table 2. *Popular barrier sets and association rules*

Barrier sets	Number of items	Number of occurrences	Support [%]	Trust [%]	Increase
(Lack of leadership and management commitment; Communication problems)	2	33	31,43%	50,00	0,85
(Lack of leadership and management commitment; Lack of employee involvement and ignorance)	2	24	22,86%	36,36	0,80
(Lack of commitment and ignorance of employees; Communication problems)	2	25	23,81%	52,08	0,88

Source: Prepared by the authors.

Then confidence answers the question: How often does B occur in cases where A is present? The data indicate the percentage of cases where barrier A and barrier B occurred simultaneously. Confidence is a directional measure (Agrawal et al., 1993). The values obtained can be considered relatively high. Notably, the association rule under study does not imply a causal relationship, but merely the co-occurrence of barriers.

Finally, lift (or increase) is the measure used to determine whether two safety culture barriers co-occur more frequently than would be expected based on their independent occurrence. It is defined as the ratio of the confidence of $A \rightarrow B$ to the support of B (Agrawal et al., 1993). Values of this measure greater than 1 indicate a positive association; a value of 1 signifies statistical independence between the variables; and values less than 1 indicate co-occurrence that is less frequent than would be expected under independence. Indeed, the *increase/lift* parameter values obtained for all pairs are less than unity. Consequently, based on this measure, one cannot claim the existence of positive association rules.

In summary, based solely on support and confidence values, one might conclude that the barriers under study co-occur relatively frequently. However, the lift metric alters the interpretation of this result. High absolute co-occurrence values do not imply that the barriers are more strongly linked than their individual frequencies of occurrence would suggest. Thus, the results do not

confirm a positive association between any of the analyzed pairs of barriers, despite their relatively high absolute frequency of co-occurrence.

Based on the analysis of the data presented in Table 2, it can be concluded that the most common two-element association of barriers is a lack of leadership and management commitment paired with communication problems. Thirty-three such co-occurrences were identified. The former barrier also frequently co-occurs with employee disengagement and ignorance, creating a total of 24 associations. In turn, employee disengagement and ignorance create an association with communication problems. Twenty-five such associations were observed. These relationships are clearly visible in Figure 5, where the three variables under consideration form a distinct triangle with sides composed of thick lines, indicating high relative support for each variable. No more than two-element sets of barriers were identified. Taking into considerations the obtained values of the three association measures (trust, confidence, increase/lift) together, the results do not confirm a positive association between any of the analyzed pairs of barriers, despite their relatively high absolute frequency of co-occurrence. This forms the answer to the research question Q3.

DISCUSSION OF RESULTS AND MANAGERIAL IMPLICATIONS

The proposed identification of the most important barriers to implementing a safety culture provides managers with a solid starting point for taking action to eliminate or at least partially eliminate them. The barrier most frequently cited in the literature is a lack of leadership and management commitment. Many studies analyzing safety culture emphasize the importance of safety management system components, including management and leadership style, which promote trust and open communication and ensure that safety is prioritized (Nygren, 2018; Aisheh, et al. 2021). The authors (Kulchartchai, Hadikusumo, 2010; Roughton, Mercurio, 2002) provide detailed findings regarding barriers in this regard from the perspective of two groups: managers and line workers. On the management side, these include fear of job loss, one-way communication, lack of support, conflicting priorities (for example, management focusing on production efficiency rather than safety), reluctance

to take responsibility for change, and a hostile *us versus them* attitude. Other authors (Boczkowska, Niziołek, 2016) raise the objection that management actions consist solely in passively reporting accidents in accordance with regulatory requirements, while simultaneously neglecting deeper analyses of their causes. The importance of leadership in developing a safety culture has been empirically confirmed in many contemporary studies (Mullen, Thibault, Kelloway, 2024; Dodoo, Surienty, Al-Samarraie, 2023; Baquero, 2023). Therefore, leaders should be sought and enabled to take action in the field of developing the culture of work safety (Wojakowska, 2021). This has been noted before and expressed in the slogan *Like leader, like health and safety* (Kozela, 2016). Operational guidelines in this area can be found in numerous studies on leadership development (e.g., Kelloway, Nielsen, Dimoff, 2016; Daniel, 2018; Carnegie, 2023; Baporikar, 2024). In particular, it is recommended that leaders build relationship security, vision, authenticity and commitment, a value system, employee participation, and also their responsibility (Daniel, 2018), define training needs, promote pro-safety behaviors (including leading by example) (Roughton, Mercurio, 2002), and develop communication, credibility, action orientation, and accountability (Krause, Weekley, 2005).

Subsequently, a lack of employee engagement and ignorance were identified. This barrier applies to line staff. These barriers are significant because the literature emphasizes that the primary cause of occupational accidents is the human factor (Mahfuth, et al. 2018; Konopka, 2021). Many researchers suggest that occupational safety should increasingly focus on employee behavior (Hayes, Novatsis, Lardner, 2008; Christian, et al. 2009). Other researchers (Pratt, Fosbroke, Marsh, 2001) emphasize that the best technique for developing workplace safety is changing staff attitudes and behaviors (Stasiła-Sieradzka, Dobrowolska, 2016). The obstacles attributed to line workers (Kulchartchai, Hadikusumo, 2010; Roughton, Mercurio, 2002) include fear of responsibility for changes, lack of support from senior management, lack of time, work overload, and communication problems.

Okonkwo et al. (2023) also proposes numerous strategies. Education regarding the perception and understanding of safety culture seems particularly important (Quian, Vaddiraju, Khan, 2023; Oleszak, Oleszak, 2016). Shaping appropriate attitudes towards safety is also crucial (Stasiła-Sieradzka,

Dobrowolska, 2016). Applicable regulations focus employees' attention on threats and provide guidelines on how to respond to them. However, the most important aspect is the internalization of regulations and standards, meaning their full understanding and conscious adoption as rules of conduct relevant to safety. Then, they are perceived as necessary and desirable. They become internal regulators of behavior, not requiring the use of external control mechanisms (Studenski, 2000). Consequently, they become components of culture (Guldenmund, 2014). The need to engage employees in occupational health and safety matters is also emphasized by practitioners (Federowicz, 2017). When it comes to communication problems in organizations, they are disruptions to effective communication (Frydrychowicz, 2009). They include three main groups (Woźniak, 2015; Reimann, 1974; Sypniewska, 2015):

1. Individual (including interpretative, biological, personality, and intellectual barriers).
2. Social (cultural, affiliative, social control, and institutionalization of information).
3. Technical (related to the functioning of information channels and the quality of the information itself).

To eliminate barriers in communication, it is recommended to apply the following principles (Woźniak, 2015): variability, intelligence, taking into account the situational and socio-cultural context, skillful use and interpretation of verbal expressions and non-verbal signals, use of knowledge and experience appropriate to the situation, and high level of ethical behavior, above all, trust.

Many other organizational barriers, including those related to developing culture, and ways of addressing them have been collected in the literature (Roughton, Mercurio, 2002; Gualardo, 2011). In particular, the authors recommend a strategy implemented in the following steps (Gualardo, 2011):

1. Reality check – identifying what *isn't working*.
2. Exceptional focus on the problem.
3. Informing senior management.
4. Engaging senior management.
5. Establishing expectations and accountability.
6. Measuring and monitoring progress.

7. Implementing strategic, long-term planning and decision-making to prevent future barriers from recurring.

It is also worth noting that, according to popular belief, culture cannot be imposed by any top-down, formal regulations (Schein, 1990; Grote, 2012; Lappainen, 2016). Therefore, instead of artificially regulating safety culture, organizations should carefully consider and try to understand the basic assumptions that may constitute culture-forming factors or barriers to developing culture, which are important for ensuring safety (Alvesson, 2002; Grote, 2012).

CONCLUSIONS

As a result of the study, barriers to developing a safety culture were identified through literature analysis, and their ranks and associations were determined based on empirical research. The results revealed that:

1. Within the scope of research question Q1: In the literature on the subject, the authors indicate the following as the most common barriers to developing a culture safety: lack of leadership and commitment of management, lack of commitment and ignorance of employees, as well as lack of understanding by employees.
2. Within the scope of research question Q2: The empirical study showed that health and safety practitioners consider the lack of leadership and management commitment, communication problems, as well as the lack of commitment and ignorance of employees as the most important barriers.
3. Within the scope of research question Q3: Analyzing the relationships between barriers revealed that the most common set is a lack of leadership and management commitment, along with communication problems. Still, taking into considerations the obtained values of the three association measures (trust, confidence, increase/lift) together, the results do not confirm a positive association between any of the analyzed pairs of barriers, despite their relatively high absolute frequency of co-occurrence.

Guidelines for managers developed on the basis of identifying the above-mentioned barriers, determining their ranks and the associations between them should prove helpful in effectively developing a safety culture.

The identified barriers can be viewed as the opposite of those elements that the literature identifies as the foundation of a mature, proactive safety culture. Contemporary approaches to workplace safety indicate a gradual shift away from a reactive management model, where organizational efforts focus primarily on analyzing accidents and responding to incidents that have already occurred, towards a proactive approach aimed at anticipating hazards and preventing them from materializing (Reason, 2016). In this context, safety is no longer viewed solely as a matter of procedures and controls but becomes an integral part of organizational management, requiring active leadership and unequivocal commitment from top management (Pilbeam et al., 2016). A key element of this transformation is the development of open safety communication, which facilitates the flow of information regarding hazards, incidents, and irregularities between employees and management, while fostering mutual trust (Zwetsloot et al., 2017). At the same time, organizations with a mature safety culture leverage insights gained from accidents, near-misses, and daily work practices as a foundation for organizational learning and the continuous improvement of safety management methods (Reason, 2016; Zwetsloot et al., 2017). This approach shifts the focus from the retrospective analysis of past failures to the identification of warning signs, the monitoring of system operating conditions, and the use of leading indicators that enable intervention before an accident occurs (Hollnagel, 2018; Xu et al., 2023). Creating an environment in which management actively promotes safety, employees participate in hazard identification, and communication and the sharing of experiences form the basis for continuous improvement thus takes on particular significance (Pilbeam et al., 2016; Xu et al., 2023). It can therefore be concluded that the evolution of safety culture is shifting from a model focused on accident response toward one in which leadership, communication, organizational learning, and proactive risk management create a mutually reinforcing system for preventing adverse events.

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