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HUMAN CAPITAL AS THE FOUNDATION OF OCCUPATIONAL SAFETY CULTURE IN AN ORGANIZATION

Sebastian KUBASIŃSKI

Poznan University of Technology, Institute of Safety and Quality Engineering;
sebastian.kubasinski@put.poznan.pl, ORCID: 0000-0001-6417-6150

Purpose: The purpose of this paper is to explore and analyze the relationship between human capital and occupational safety culture in manufacturing organizations, with particular emphasis on identifying the most influential dimensions of human capital.
Design/methodology/approach: The study adopts an exploratory case study approach combining quantitative survey data with interpretative analysis. Data were collected from 68 employees in two manufacturing companies using a proprietary questionnaire covering four dimensions of human capital and a synthetic assessment of safety culture. Correlation and regression analyses were applied as supportive tools.
Findings: The results indicate a positive relationship between human capital and safety culture. The relational and leadership dimensions were identified as the most influential, highlighting the role of communication, trust, and leadership practices. The role of competencies appears more complex and potentially indirect.
Research limitations/implications: The study is limited by a relatively small sample size and the exploratory nature of the research. Future studies should include larger samples and further validation of measurement tools.
Practical implications: Organizations should treat human capital as a strategic resource in safety management, with particular emphasis on leadership development and strengthening workplace relationships.
Social implications: Strengthening human capital contributes to improved employee well-being, organizational trust, and the overall quality of the work environment.
Originality/value: The paper contributes to the resource-based view by conceptualizing safety culture as an outcome of human capital configuration and identifying key dimensions influencing its development.
Keywords: human capital, safety culture, leadership, resource-based view, occupational safety.
Category of the paper: Research paper.

1. Introduction

Contemporary organizations operating in highly volatile environments and facing increasing regulatory requirements increasingly view occupational safety not only as an area of regulatory compliance, but also as an element of strategic management. The literature shows a shift from a reactive model focused on accident analysis to a proactive model based on prevention, participation, and building a mature safety culture (Bisbey et al., 2019a; Kubasiński, 2024).

At the same time, within the field of strategic management, the Resource-Based View (RBV) has developed as one of the dominant theoretical perspectives, assuming that sustainable competitive advantage results from the effective use of valuable, rare, inimitable, and organizationally embedded resources (Barney, 1991a). In this context, human capital plays a key role as an intangible resource encompassing knowledge, skills, experience, relationships, and employee attitudes (Gerhart, Feng, 2021a; Lubis, 2022).

In parallel, the literature on occupational safety emphasizes that safety culture is not merely the result of formal systems and procedures, but is shaped by leadership, communication, and employee involvement (He et al., 2019a). In particular, leadership is identified as a critical factor influencing employees' safety-related behaviors and the internalization of safety values (Pedrosa et al., 2025a).

Despite the growing body of research on safety culture and occupational health and safety management systems, the relationship between human capital and the maturity of safety culture remains insufficiently explored. Existing studies tend to focus either on leadership or safety climate, while relatively little attention is paid to human capital as a multidimensional construct integrating competencies, relationships, leadership, and organizational commitment.

Adopting a resource-based perspective allows safety culture to be interpreted as the result of the configuration and quality of human capital within an organization. This means that formal occupational safety management systems (e.g., ISO 45001:2018) can only be effective when supported by adequately developed human resources and social mechanisms.

This issue is particularly important in manufacturing companies, where the complexity of processes and exposure to risk factors require not only procedures, but also conscious and committed employees. The integration of safety management with human capital management is therefore becoming a strategic challenge (Melhem et al., 2024).

The aim of this article is to explore the relationship between human capital and occupational safety culture based on a case study of two manufacturing companies. It is assumed that human capital, understood as a multidimensional construct, influences the development of safety culture.

Based on this objective, the following research questions were formulated:

- RQ1: Is there a relationship between human capital and safety culture?
- RQ2: Which dimensions of human capital have the greatest influence?
- RQ3: Are there differences between organizations?

The following hypotheses were formulated:

- H1: There is a positive relationship between human capital and safety culture.
- H2: The relational and leadership dimensions have a stronger influence than other dimensions.
- H3: Organizational differences affect the strength of these relationships.

2. Human capital in the perspective of resource-based view (RBV)

Resource-based view (RBV) theory assumes that an organization's sustainable competitive advantage stems from the possession and effective use of resources with specific characteristics. In the classic approach, these resources should be valuable, rare, difficult to imitate, and difficult to substitute, while later developments also emphasize the requirement of organizational embeddedness (VRIN-O), i.e., the organization's ability to use them in management practice (Barney, 1991b). Contemporary analyses indicate that RBV remains one of the key paradigms of strategic management (Monson, 2024a).

Human capital is a key intangible resource within the RBV framework, encompassing knowledge, skills, and relationships that enable value creation. In manufacturing environments, its role extends beyond competencies to include communication, teamwork, and leadership, which are critical for effective safety management (Bhandari et al., 2020; Gerhart, Feng, 2021b).

In manufacturing companies, characterized by complex processes and exposure to risk factors, the importance of human capital goes beyond the competence dimension. Work safety depends not only on formal procedures, but also on the quality of communication, teamwork, and the internalization of safety values. In this context, organizational effectiveness is a consequence of the configuration of resources and organizational capabilities, rather than individual management instruments (Monson, 2024b).

The literature on the subject also emphasizes the role of human capital as an element linking management practices with organizational outcomes (Agha et al., 2025). In the area of work safety, this means that the effectiveness of formal systemic solutions is largely determined by the quality of human resources and their ability to implement requirements in practice.

This article assumes that human capital in the context of occupational safety can be analyzed in four complementary dimensions: competence, relationships, leadership, and commitment and learning.

This approach is consistent with the RBV perspective, which emphasizes the importance of resource configuration in management processes (Gerhart, Feng, 2021c). Furthermore, from the RBV perspective, safety culture can be interpreted as the result of the quality and structure of human capital functioning in an organization. Formal occupational safety management systems, e.g., those compliant with ISO 45001:2018, provide an organizational framework, but their effectiveness depends on the competencies, relationships, and leadership present in the organization. Consequently, human capital is the foundation of a mature safety culture.

3. Work safety culture in the organization

Work safety culture is one of the key constructs explaining differences in safety levels between organizations with similar business profiles, technical equipment, and formal procedures.

In modern terms, it is understood as a set of shared values, norms, beliefs, and practices related to safety that determine decision-making, communication, and behavior in routine and non-routine situations. Research indicates that safety culture is systemic in nature: it is the result of structural and psychosocial factors, and its development requires consistent leadership, organizational learning mechanisms, and consistent internalization of safety priorities (Bisbey et al., 2019b).

The literature emphasizes the need to distinguish between safety culture and safety climate. Safety climate is understood as employees' current perceptions of safety priorities and practices, while safety culture refers to a deeper and more enduring level of organizational values. Climate is therefore more sensitive to short-term changes, while culture provides a long-term interpretive framework for employee behavior. Research indicates that safety climate remains significantly associated with safe behaviors and safety outcomes, and in quantitative studies, it can be treated as a measurable indicator of culture (He et al., 2019b).

This article assumes that safety culture is overarching and relatively stable, while its empirical measurement is based on employee declarations and perceptions, typical of the safety climate approach. This solution is justified in the literature as a practical way of quantifying the soft aspects of safety (Churruca et al., 2021a).

In the systemic approach, safety culture is an element that reinforces the effectiveness of formal OHS solutions. The mere implementation of procedures, instructions, and standards does not determine the maturity of the culture. Implementation mechanisms such as leadership, employee participation, communication, and learning from near misses are of key importance (Pedrosa et al., 2025b).

It is worth noting that recent reviews of the implementation of ISO 45001 highlight the importance of leadership and employee participation as conditions for the effective functioning of the health and safety system, which directly corresponds to the concept of safety culture as an organizational value present in real operational decisions, and not just in traditional documentation (Alshreef, 2025).

In recent years, there has been growing interest in Safety Culture Maturity Models, which enable the diagnosis of the stage of development of an organization's culture and the planning of improvement measures. Systematic reviews show that maturity models most often describe the transition from reactive to proactive and generative phases, and their common denominators are: the role of leadership, consistency in enforcing standards, quality of communication, and organizational learning. At the same time, the literature points to methodological challenges such as the diversity of tools, the lack of full standardization of indicators, and the risk of superficial assessment if the measurement is not linked to real operational practices (Ayob et al., 2022).

In practice, measuring safety culture is complex and most often involves survey tools supplemented by other methods. Research emphasizes the multidimensionality of the construct and the need to consider components such as leadership, communication, and organizational learning (Churruca et al., 2021b).

At the same time, leading indicators are also being strongly developed, which allow the effectiveness of preventive measures to be assessed. The most valuable indicators are those that combine the organizational level (management, training, audits) with the behavioral level (reports, improvement initiatives), integrating quantitative data with the assessment of psychosocial aspects (Sadeghi et al., 2025).

In light of the approaches presented, safety culture can be treated as the result of the quality of human resources and the way they are deployed in everyday organizational practice. Integrative models emphasize that safety culture develops through the interaction of systemic elements (structures, processes, management mechanisms) with psychosocial factors (attitudes, trust, commitment). Thus, safety culture directly depends on the level of human capital understood as a configuration of competencies, relationships, leadership, and organizational learning (Bisbey et al., 2019c).

In view of the above, in this study, safety culture was adopted as a dependent variable, measured synthetically on the basis of an assessment of safety values and practices, while human capital was approached multidimensionally in order to identify the components that most strongly differentiate the level of safety culture in the companies surveyed.

4. Methods

The study was conducted in the fourth quarter of 2025 and adopted an exploratory case study approach, covering two manufacturing companies operating in Poland (Company A and Company B). The analyzed companies operate in the manufacturing sector and perform activities related to industrial processing and assembly, including mechanical operations and component integration. The case study model allows for an in-depth analysis of the relationships between variables within a specific organizational context, rather than seeking statistical generalizations.

The study combined elements of quantitative analysis with an interpretive approach, enabling both the identification of statistical relationships and their contextual explanation. The primary objective of the study was exploratory in nature and focused on identifying patterns and mechanisms linking human capital to safety culture.

Data were collected using an anonymous survey administered to employees representing various organizational levels, including operational staff, supervisors, and management. The respondents represented approximately 29.5% of employees in Company A and 25.3% in Company B, which provides a relatively high level of internal representativeness for an exploratory study. The companies were selected purposively based on their comparability in terms of industry and risk exposure, while differing in organizational structure.

The research tool was a proprietary questionnaire developed based on a literature review and previous studies. It consisted of five sections: competence dimension, relational dimension, leadership dimension, organizational commitment and learning dimension and assessment of workplace safety culture.

All items were measured using a five-point Likert scale (1 – definitely not, 2 – rather not, 3 – hard to say, 4 – rather yes, 5 – definitely yes).

The study adopted the following operationalization:

- Human Capital (HC) – treated as a multidimensional independent variable, calculated as the average of four dimensions:
  - HC1: competencies,
  - HC2: relationships,
  - HC3: leadership,
  - HC4: engagement and learning.
- Safety culture (SC) – treated as a dependent variable, calculated as the average of responses regarding safety-related values, norms, and practices. This approach enabled the analysis of both the general relationship between the level of human capital and safety culture, and the identification of the impact of individual dimensions of human capital.

A total of 68 valid questionnaires were collected. The sample included employees from various organizational levels, which allowed for capturing diverse perspectives on safety-related practices.

Due to the exploratory nature of the study and the limited sample size, statistical analyses (correlation and regression) were treated as tools to aid in identifying relationships, rather than as a basis for strict generalization. This approach is consistent with exploratory research designs commonly applied in organizational and safety culture studies. Therefore, the results should be interpreted with caution and in relation to the specific organizational context.

The reliability of the research instrument was assessed using Cronbach's alpha. Although the overall scale demonstrated acceptable internal consistency, lower values observed in some subscales indicate a need for further refinement of the measurement instrument in future studies.

5. Results

The study covered a total of 68 employees from two manufacturing companies, including 31 respondents from Company A and 37 from Company B (Table 1). The sample structure included:

- operational employees – 63,2% (n = 43),
- middle management (foremen/supervisors) – 19,1% (n = 13),
- senior management – 17,6% (n = 12).

Table 1.
Structure of the research sample by position

Workstation	A (N)	A (%)	B (N)	B (%)
Operational employees	17	54,8	26	70,3
Foremen/supervisors	6	19,4	7	18,9
Senior management	8	25,8	4	10,8
Total	31	100	37	100

Source: own study.

A comparative analysis revealed differences in the structure of positions between organizations. In Company A, the share of management staff was higher (25.8%), while in Company B, operational employees dominated (70.3%). However, these differences do not affect the overall sample size and allow for comparative analyses to be carried out.

5.1. Level of human capital and safety culture

In the first stage of the analysis, the level of human capital (HC) and safety culture (SC) in both companies was assessed. The average values were as follows:

- Company A:
  - Human capital (HC) = 3,88,
  - Safety culture (SC) = 3,98.
- Company B:
  - Human capital (HC) = 3,98,
  - Safety culture (SC) = 3,89.

Minor differences between companies were observed; however, overall levels of human capital and safety culture remained comparable.

Table 2.
Average values of human capital and safety culture dimensions

Dimension	Company A	Company B
HC1 – Competency	4,05	4,09
HC2 – Relational	4,00	3,84
HC3 – Leadership	3,65	3,85
HC4 – Engagement	3,81	4,15
HC – Total	3,88	3,98
SC – Safety Culture	3,98	3,89

Source: own study.

An analysis of individual dimensions of human capital showed (Table 2):

- the highest values in the competence dimension (HC1),
- relatively lower values in the leadership dimension (HC3)

structural differences between organizations: in company A, the relational dimension was stronger, while in company B, leadership and commitment received higher ratings.

5.2. Analysis of the relationship between human capital and safety culture

In order to verify the main hypothesis, a correlation analysis was conducted between the synthetic human capital index and safety culture. The following correlation coefficients were obtained:

- Company A: c = 0,48,
- Company B: c = 0,70,
- Entire sample: c = 0,58.

The results indicate a significant positive correlation between the level of human capital and safety culture, with this correlation being stronger in Company B.

In the next step, a linear regression analysis was performed, in which the dependent variable was safety culture and the independent variable was a synthetic human capital index. The model proved to be statistically significant ($p < 0.001$), and the coefficient of determination

was $R^2 = 0.335$, which means that human capital explains 33.5% of the variability in the level of safety culture.

5.3. The impact of individual dimensions of human capital

Multiple regression analysis taking into account four dimensions of human capital showed that the model explains 44.2% of the variability in safety culture ($R^2 = 0.442$; $p < 0.001$). A statistically significant impact was demonstrated by:

- relational dimension ($\beta = 0,33$; $p = 0,020$),
- leadership dimension ($\beta = 0,39$; $p = 0,012$).

Table 3.
Impact of human capital (HC) dimensions on safety culture (SC)

Dimension	β	p
HC1 – Competency	insignificant	0,908
HC2 – Relational	0,33	0,020
HC3 – Leadership	0,39	0,012
HC4 – Commitment	insignificant	0,995
R^2	0,442	—

Source: own study.

No statistically significant effect of competence was observed (Table 3). However, this result should be interpreted with caution due to measurement limitations and the exploratory nature of the study.

5.4. Analysis of differences between companies

In order to verify the differences between the organizations, a Student's t-test for independent samples was performed. No statistically significant differences were found in either the level of human capital ($t = -1.24$; $p = 0.220$) or the level of safety culture ($t = 0.71$; $p = 0.480$).

These results indicate that despite differences in the structure of human capital dimensions and the strength of correlations, the overall level of the analyzed variables remains similar in both companies.

5.5. Reliability of the research tool

The reliability of the human capital scale (20 items) was assessed using Cronbach's alpha coefficient. A value of $\alpha = 0.82$ was obtained, indicating high internal consistency of the tool. For individual dimensions, the following values were obtained:

- HC1 – $\alpha = 0,59$,
- HC2 – $\alpha = 0,75$,
- HC3 – $\alpha = 0,69$,
- HC4 – $\alpha = 0,57$.

For the safety culture scale, $\alpha = 0.66$ was obtained. The values obtained should be considered acceptable in an exploratory study, taking into account the number of items in each subscale.

6. Discussion

The study's findings indicate that human capital plays a significant role in shaping workplace safety culture. However, it is important to note that its impact should be interpreted in a multidimensional way and with due consideration for the specific context.

The results suggest that relational and leadership dimensions have a greater impact than formal competencies. This indicates that safety culture emerges primarily through social mechanisms such as communication, trust, and leadership practices, rather than solely through knowledge.

This interpretation is consistent with previous research emphasizing the importance of leadership and communication in shaping safety-related behaviors (He et al., 2019; Pedrosa et al., 2025). Leadership translates formal safety requirements into practice, while relational factors support the internalization of safety-related values.

An important aspect of the results is the lack of a statistically significant effect of the competence dimension. Rather than interpreting this result as evidence of the irrelevance of competence, it should be approached with caution. The relatively lower reliability of the measurement scale for this dimension suggests that the observed effect may partly stem from limitations of the research tool. Therefore, competencies should still be considered an important element of human capital, although their role may be indirect or mediated by social and organizational mechanisms.

A comparison of the two companies provides additional insights. Although no statistically significant differences were observed in the overall level of human capital and safety culture, differences in the strength of the relationships between variables suggest that the organizational context plays a key role. In particular, differences in workforce structure and management practices may influence how human capital translates into safety culture.

From an RBV perspective, the results indicate that not only the level of human capital but also its configuration determines its effectiveness. Safety culture can therefore be interpreted as the result of interactions between various dimensions of human capital.

Due to the exploratory nature of the study and the limited sample size, the results should be interpreted with caution. They do not allow for broad generalizations but provide valuable insights into the mechanisms linking human capital and safety culture.

7. Summary and limitations

The aim of this article was to analyze the relationship between human capital and occupational safety culture based on a case study of two manufacturing companies, using the Resource-Based View (RBV) as a theoretical framework.

The findings indicate that human capital is positively associated with safety culture; however, its impact varies across dimensions. The relational and leadership components emerged as the most influential, while the role of competencies appears more complex and potentially indirect.

The results suggest that safety culture should be understood not merely as a function of formal qualifications or compliance, but as an outcome of social and organizational mechanisms embedded in everyday work practices. In this context, safety culture reflects both the presence and configuration of human capital.

From a theoretical perspective, the study extends the RBV approach in occupational safety research by emphasizing the importance of relational and leadership dimensions. Practically, the findings highlight the need to strengthen communication, trust, and leadership practices as key drivers of safety performance.

The study has several limitations. First, the relatively small sample size (68 respondents from two organizations) limits the generalizability of the results. The findings should therefore be considered preliminary. Second, the use of a self-report questionnaire may introduce bias in the responses. Future studies should incorporate additional data sources. Third, the reliability of some measurement scales was below the recommended threshold, indicating a need for further refinement of the research tool.

Despite these limitations, the study provides valuable insights into the relationship between human capital and safety culture and contributes to the RBV perspective in occupational safety management.

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