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An Individual-Based Approach to Mapping Safety Culture in the Manufacturing Sector: A Case Study at PT MNO

Hernanda Melia Cholis[1], Dwi Hartanti[2]
[1]Universitas Indonesia, Jakarta, Indonesia, hernandacholis@gmail.com
[2]Universitas Indonesia, Jakarta, Indonesia, dwi.hartanti@ui.ac.id

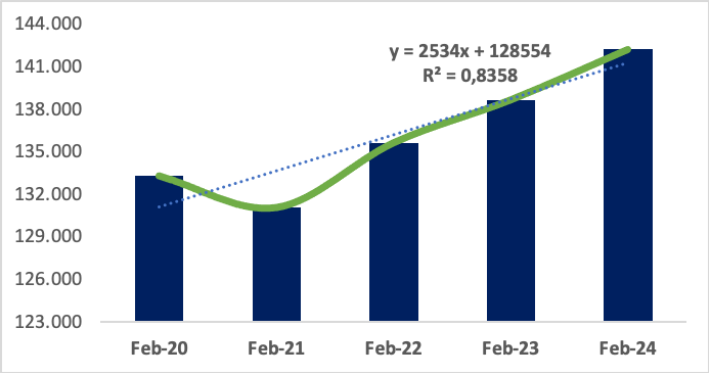
Corresponding Author: hernandacholis@gmail.com[1]

Abstract: This study aims to evaluate the safety culture in the manufacturing sector through an individual-based approach using the Attitude-Behaviour-Culture Model and the Risk Type Compass to map employees' risk characteristics.. The company studied is PT MNO, a manufacturing company in West Java with a high accident rate in its production division. This approach identifies attitudes, behaviors, and values that contribute to the formation of a safety culture. Data were collected using a questionnaire distributed to 51 employees in the production division, with 37 responses received. The results indicate that the majority of employees exhibit conservative (prudent) and analytical (deliberate) risk characteristics, which foster a systematic and compliant safety culture. However, this culture tends to be less flexible in adapting to fast-changing work environments. The study recommends strengthening attitude-based training, providing psychological support to reduce anxiety, and developing emergency decision-making procedures to create a more adaptive and innovative safety culture. These findings provide valuable insights for enhancing safety risk management in the manufacturing sector.

Keyword: Safety Culture, Risk Type Compass, Risk Characteristics.

INTRODUCTION

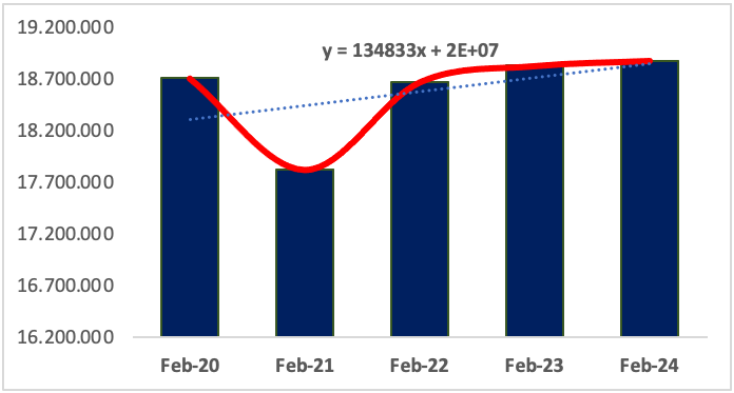
Employment issues remain a significant focus in various nations, especially in developing nations such as Indonesia (Suhandi et al., 2021). This is due to the strategic role of labor in encouraging economic growth (Mubiinzi & Mutumba, 2025), maintaining social stability (Faugoo, 2024), and increasing national productivity (Ramandray, 2024). Employment dynamics are not only related to the availability of jobs but also concern the quality of the work environment (Mannan et al., 2013), organizational culture (Roeschmann, 2014), and the readiness of the industrial sector to face global challenges (Chowdhury & Quaddus, 2016) and technological disruption (Fan et al., 2017).



Source: Central Bureau of Statistics Indonesia (2024)

Figure 1. Number Of Working Population (Thousand People)

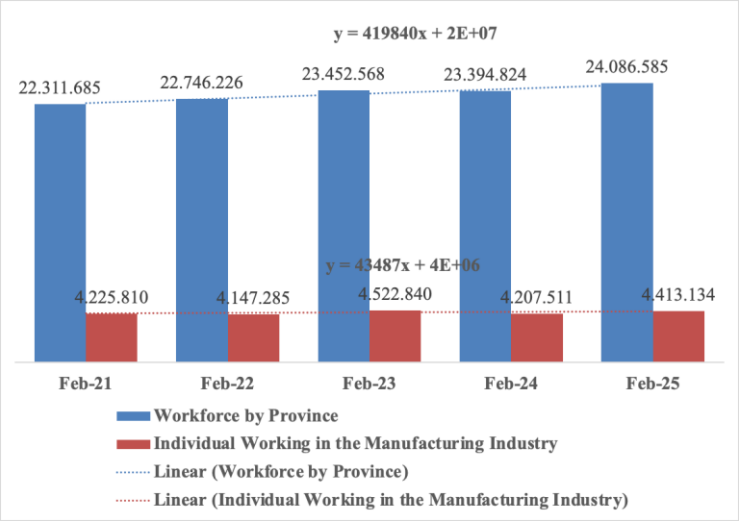
Based on data from the Central Bureau of Statistics Indonesia , the number of working population in Indonesia has fluctuated as a result of the Covid-19 pandemic in early 2020. Nonetheless, the trend of the last five years shows a gradual positive increase (Figure 1). This indicates economic recovery that also encourages increased job opportunities, especially in the manufacturing industry sector (Kementerian Keuangan Republik Indonesia, 2024).



Source: Central Bureau of Statistics Indonesia (2025)

Figure 2. Number of National Workforce in the Manufacturing Industry Sector

The manufacturing industry sector is the second-largest absorber of labor, after the agricultural sector. From 2020 to 2024, around 18 million Indonesians work in this sector (Figure 2). The manufacturing industry is the backbone of industrial development and the national economy, especially in areas that tend to have special industrial zones, such as West Java (Winardi et al., 2017). West Java Province is an area with a large contribution to the national manufacturing industry sector (Kontan.co.id, 2022). Rochmani et al., (2016) also emphasized that with the abundance of industrial estates, this sector is the main support for the structure and absorption of the provincial workforce.



Source: Central Bureau of Statistics Indonesia (2025)

Figure 3. Contribution of the Manufacturing Industry Sector to the Workforce According to West Java Province

Figure 3 shows that the contribution of the processing industry sector to the labor force in West Java has continued to increase in the last four years. However, an increase in the number of workers is not always accompanied by an improvement in the quality of organizational culture (Elliot et al., 2023). Hald et al., (2021) also stated that such conditions can pose challenges, especially in the culture of occupational safety. These challenges have the potential to risk declining team cohesion (Schein, 2010), inconsistency with occupational safety standards (Martyka & Lebecki, 2014), and weak integration of organizational cultural values (Bagga et al., 2023).

This study aims to examine how individual factors affect the organizational culture in a manufacturing company. This research approach is carried out from the individual (employee) side to evaluate attitudes and behaviors that contribute to work culture that have the potential for financial risks. The focus of the research is aimed at production divisions that have a high rate of labor turnover and productivity, which are at risk of triggering work accidents. Hashemian & Triantis (2023) emphasize that high production pressure often correlates with increased workplace accident risk.

This study uses an individual approach based on the attitude-behaviour-culture model according to the Institute of Risk Management (2012), which integrates three core components: attitude, behaviour, and culture. The model emphasizes that individual attitudes toward risk influence decision-making behavior, and these behaviors collectively shape the organization's risk culture. Conversely, the existing culture within an organization can also shape how individuals perceive and respond to risk, including in the context of workplace safety. To complement this, the study also adopts the risk type compass framework, which categorizes individuals into eight distinct risk types: wary, prudent, deliberate, composed, adventurous, carefree, spontaneous, and intense, based on their psychological approach to risk. By combining these two models, this study aims to map employee risk characteristics and serve as the basis for strengthening culture-based risk management strategies in the manufacturing sector.

METHOD

This study employs a single-case study approach with a descriptive qualitative method to explore safety risk culture within an organization. The case study design is appropriate for providing in-depth insights into underexplored phenomena (Yin, 2009) using primary data through surveys with descriptive analysis. Descriptive analysis is applied to systematically

examine survey data, offering insights into patterns, trends, and key characteristics related to employees' perceptions of safety risk culture. This method enables the identification of prevalent attitudes and behaviours among production employees regarding workplace safety.

Population and Sample

The population targeted in this research consisted of employees working in the production division at PT MNO, a manufacturing company located in West Java, Indonesia. The research specifically focused on the production due to its record of the highest accident rates. The survey was conducted in February 2025 with 51 questionnaires distributed using purposive sampling, and 37 responses were returned, resulting in a response rate of 72,5%. Most respondents were male, aged 20-30 years (62%), with 27% having either less than one year or more than four years of work experience at the company.

Data Collection and Measurement

Data were collected using a questionnaire. The responses were then analyzed and evaluated by mapping employees' perceptions of workplace safety risk culture. These findings provide the foundation for a structured risk culture enhancement strategy at PT MNO.

The instrument consisted of 16 statement items adapted from the Risk Type Compass technical manual by Geoff Trickey (2019). It was designed to assess employees' risk-related psychological profiles. Each item was rated using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), as applied in Abeysekara et al., (2019).

RESULT AND DISCUSSION

Descriptive Analysis

Table 1. Survey Results

Item	Strongly Disagree	Disagree	Less Disagree	Agree	Strongly Agree
W1	5,41%	2,70%	10,81%	54,05%	27,03%
W2	0,00%	8,11%	21,62%	29,73%	40,54%
P1	2,70%	0,00%	5,41%	37,84%	54,05%
P2	0,00%	0,00%	10,81%	45,95%	43,24%
D1	0,00%	0,00%	13,51%	51,35%	35,14%
D2	2,70%	0,00%	8,11%	54,05%	35,14%
Co1	0,00%	0,00%	27,03%	37,84%	35,14%
Co2	8,11%	8,11%	32,43%	37,84%	13,51%
A1	2,70%	5,41%	27,03%	40,54%	24,32%
A2	8,11%	16,22%	37,84%	24,32%	13,51%
Ca1	21,62%	8,11%	32,43%	27,03%	10,81%
Ca2	16,22%	10,81%	24,32%	32,43%	16,22%
S1	5,41%	2,70%	18,92%	51,35%	21,62%
S2	8,11%	8,11%	27,03%	40,54%	16,22%
I1	0,00%	2,70%	18,92%	51,35%	27,03%
I2	0,00%	2,70%	16,22%	43,24%	37,84%

Source: Research Results (2025)

Table 1 presents eight types of risk in decision-making based on the Institute of Risk Management (2012), with the results showing that 81.08% of respondents have a cautious attitude and prioritize risk identification before considering opportunities. Additionally, 70.27% of respondents exhibit a behaviour of avoiding uncertainty and prefer certainty, indicating a "wary" type. In the "prudent" type, more than 90% of respondents tend to comply with rules and operational standards to avoid risks and 89.19% of respondents follow a systematic approach before acting to ensure that everything is structured.

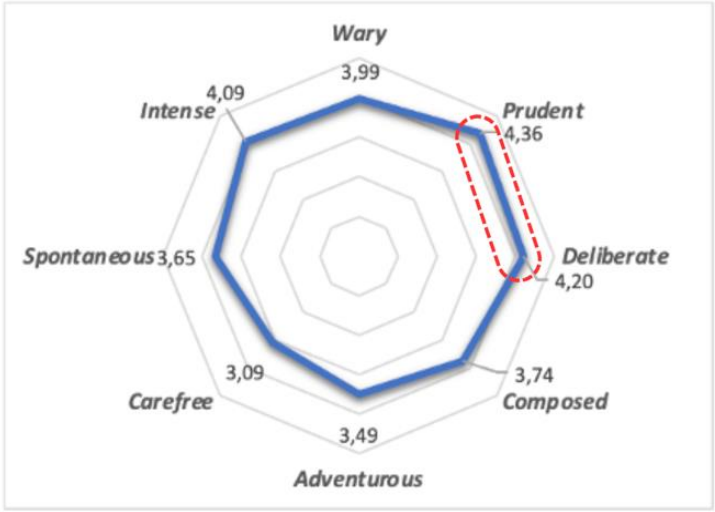
The "deliberate" type resulted in 86.49% of respondents expressing confidence in facing risks because they made careful preparations beforehand, while 89.19% of respondents rely on in-depth analysis in decision-making to minimize impulsivity. As for the "composed" type, 72.98% of respondents demonstrate strong emotional control in dealing with difficult situations or pressures, supported by 51.35% of respondents who tend to rarely feel worried about risks, making them less easily affected in challenging situations.

The "adventurous" type showed that 64.86% of respondents have the courage to take risks to try something new, but less than 40% of respondents remain calm when making impulsive decisions in the face of uncertainty. The "carefree" type resulted in 37.84% of respondents prioritizing speed over accuracy, tending to ignore details in decision-making. This is supported by 48.65% of respondents who have a flexible work style because they are frustrated with overly strict rules in decision-making.

For the "spontaneous" type, 72.97% of respondents expressed high enthusiasm when making spontaneous decisions, but also reported experiencing doubt and anxiety afterwards. Additionally, 56.76% of respondents tended to act based on personal interest, often without careful planning. The final risk type, "intense" type, was characterized by 78.38% of respondents who reported feeling anxious about potential negative outcomes after making a decision. Similarly, 81.08% of respondents tended to react emotionally when faced with results that did not meet their expectations.

Risk Culture Mapping

Shourideh et al., (2024) emphasize that understanding risk culture with organizations is essential to uncover how individual attitudes and behaviors form collective patterns that influence workplace safety. Based on the results of the individual perception survey, the risk risk culture mapping at PT MNO was conducted by analyzing the dominant risk types among employees in the production division, which is the unit with the highest rate of work accidents compared to other divisions.



Source: Research Results (2025)

Figure 4. Risk Type Compass – Spidergram

The survey results (Figure 4) indicate that the majority of respondents display a prudent tendency, with an average score of 4.36, followed by the deliberate type with a score of 4.20. This suggests that most employees demonstrate high compliance with standard operating procedures (SOPs) and prefer to plan their actions before making decisions. Such behavior

reflects a systematic and conservative work culture, oriented toward risk prevention and error minimization (Trickey, 2019).

The wary (3.99) and intense (4.09) scores suggest that employees heightened awareness of potential risks and often experience anxiety about outcomes that do not meet expectations.This pattern reflects a cautious work culture that tends to avoid uncertainty. On one hand, this enhances occupational safety by increasing risk awareness. These findings align with Shourideh et al., (2024), who argue that psychological pressures in the workplace, such as stress from high productivity expectations, can significantly influence safety-related behaviors.

Scores for the composed (3.74) and spontaneous (3.65) types reflect a balance between emotional calmness under pressure and a tendency to act spontaneously in certain situations. While this combination can enhance decision-making agility, it may also reduce consistency in safety practices if not properly managed. These findings are supported by Fedulova et al., (2022), who found that risk culture characterized by spontaneity often rely on quick decisions, informal communication, and minimal planning or formal risk management systems.

The relatively low scores in the adventurous (3.49) and carefree (3.09) types indicate that most employees are less inclined to take risks or experiment with new approaches when facing unfamiliar situations. This suggests that the organizational culture is predominantly risk-averse and favors stability over innovation. Palermo et al., (2017) similarity note that performance and accountability-driven cultures may lead employees to become overly cautious, even hesitant to acknowledge or discuss mistakes.

The mapping results show that the risk culture at PT MNO is dominated by prudent and deliberate characteristics. This reflects a pattern of obedient, analytical, and cautious work behaviour. Such a culture provides a strong foundation for supporting the consistent implementation of occupational safety practices. Shourideh et al., (2024) also emphasized the importance of management's commitment to safety and investment in employee training as key to strengthening safety culture. However, the dominance of conservative risk types also raises concerns regarding potential emotional stress and limited flexibility in responding to dynamic changes in the work environment. Therefore, strategies to reinforce workplace safety culture must be balanced with efforts to build adaptive capacity and promote employee stress management. This aligns with the findings of Zhang et al., (2020), who note that the development of an effective safety culture is a dynamic and cyclical process that requires gradual change to foster organizational progress.

Based on the above of the risk culture mapping results, several strategic recommendations can be made to strengthen workplace safety culture and ensure sustainable risk management. First, the company should enhance attitude-based safety training, particularly in light of the dominance of prudent and deliberate types, which demonstrate a strong inclination toward rule compliance and analytical decision-making. Such training should not only focus on procedures but also aim to foster individual awareness and internalization of safety culture principles. Second, given the relatively high scores in the intense and wary types, the company should provide psychological support programs, such as stress management initiatives, counseling services, or Employee Assistance Programs (EAP), to mitigate emotional stress that could negatively impact work performance.

Furthermore, the relatively prominent spontaneous trait highlights the need for flexibility in rapid decision-making, particularly during emergency situations. To address this, companies should develop contingency planning procedures that enable swift decisions while remaining within the boundaries of control and established safety standards. On the other hand, the low scores in the adventurous and carefree types suggest a predominantly conservative and risk-averse culture. To balance this, organizations should promote

measurable innovation through continuous improvement initiatives or internal innovation forums, creating a safe and structured environment for employees to present ideas and experiment under appropriate supervision. Lastly, it is recommended that companies regularly monitor the evolution of risk culture through annual surveys or structured assessments to ensure that the organizational culture remains relevant, adaptive, and aligned with the dynamic nature of the manufacturing industry.

By implementing these comprehensive mitigation strategies, PT MNO will be better equipped to foster a safer and more adaptive work environment amid the dynamic challenges of the manufacturing industry. The company's strengths, such as high employee compliance and a structured operational system, form a solid foundation for enhancing its risk culture. However, it is equally crucial for PT MNO to address its limitations, including emotional resilience and limited flexibility in decision-making under uncertainty, to ensure a balanced and progressive organizational culture.

This study underscores the importance of integrating individual psychological insights through tools like the Attitude–Behaviour–Culture Model and Risk Type Compass to inform safety-related interventions. By proactively managing cultural and behavioral risks, PT MNO can build a resilient workforce and sustain its competitiveness in the increasingly complex industrial landscape

CONCLUSION

This study assessed the risk culture in the production division of PT MNO using the Attitude–Behaviour–Culture (A-B-C) Model and the Risk Type Compass. The findings show that most employees display conservative and rule-abiding risk traits, dominated by the prudent and deliberate types, which foster a systematic, procedure-oriented work culture. While this supports consistent safety practices, it also limits adaptability and innovation. High scores in the intense type suggest potential emotional distress due to anxiety around risk, indicating a need for psychological support and stress management initiatives.

The study highlights the strengths of PT MNO's risk culture in terms of discipline and compliance, while also pointing out challenges in flexibility, emotional resilience, and risk-taking. To address this, it is recommended that the company implement attitude-based safety training, provide psychological support, develop structured emergency decision-making protocols, and encourage innovation in a safe environment. Nonetheless, this study has certain limitations including the single-case study and a narrow sample scope. Future research should expand to other companies and divisions using mixed methods to statistically explore the link between individual risk traits and organizational culture, as well as examine the role of leadership in fostering adaptive safety culture.

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