



From Silence to High Alert: Enhancing Incident Response Through Voluntary Safety Reporting in High-Reliability Airport Operations

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Abstract

Proactive safety reporting is crucial for high-reliability organizations (HROs) to prevent accidents by identifying and addressing potential hazards before they escalate. In the aviation sector, employees face multiple barriers that impede reporting safety incidents. These barriers include fear of punitive actions, favoritism, and lack of support within groups, discouraging transparency and leaving latent threats unresolved. Additionally, a lack of trust in management fosters a perception that reporting is disruptive. At the same time, fear of consequences deters employees from reporting incidents, especially in hierarchical workplaces. Furthermore, the complex and inefficient reporting systems hinder participation, particularly in high-pressure environments. This study investigates the decision-making behind reporting safety concerns or remaining silent in the aviation industry. Utilizing a grounded theory approach, participants were selected through purposeful and theoretical sampling. In-depth interviews were conducted with 21 aviation professionals, including pilots, air traffic controllers, dispatchers, airport staff,

management, quality assurance personnel, and aircraft mechanics. The Aviation-Voluntary Safety Reporting Behavior (A-VSRB) model was developed through qualitative data analysis involving extraction and coding. This model identifies six themes influencing voluntary safety reporting decision-making in HROs, providing a comprehensive framework for understanding and improving safety reporting practices within the aviation industry. The A-VSRB model enhances safety reporting practices by identifying key factors that encourage or impede voluntary reporting, thereby supporting the development of more effective safety management policies in aviation HROs.

Keywords

Incident Response, Voluntary Safety Reporting, High-Reliability Organizations, Airport Operations, Aviation Safety

Introduction

Safety reporting is critical for organizational learning and accident prevention within high-reliability organizations (HROs) in the aviation, nuclear, and oil and gas sectors. Effective safety reporting systems enable these organizations to identify and mitigate potential risks before they escalate into serious incidents. In HROs, sharing deidentified aggregate data from voluntary safety reports among companies and regulators is standard practice, which helps uncover hidden trends and refine safety recommendations, regulations, and controls (ICAO, 2020; Stolzer et al., 2023; Zimmermann & Duffy, 2023). The International Civil Aviation Organization (ICAO) defines a Safety Management System (SMS) as identifying and mitigating potential risks before they result in accidents or incidents (ICAO, 2018). An effective SMS is a voluntary safety reporting system that allows frontline personnel such as pilots, air traffic controllers, and maintenance engineers to report latent hazards and near-misses that mandatory reporting might overlook (ICAO, 2018). This voluntary safety reporting complements mandatory systems by highlighting the importance of procedural flaws and potential hazards, supporting trend analysis, timely decision-making, and preventing minor issues from developing into significant failures (Stolzer et al., 2023).

From 2023 to 2025, a series of aviation disasters and near-misses heightened global concerns about flight safety. In March 2023, a crash in South Korea claimed 179 lives, highlighting ongoing safety vulnerabilities. The following years saw recurring incidents: a midair collision near Washington in January 2025 that killed 67 people, a fiery plane crash in Philadelphia, and the disappearance of a small commuter aircraft in Alaska (Press, 2025c). Other events, such as a Japan Airlines plane clipping a parked aircraft in February 2025 and an engine fire on a United Airlines flight in April 2025, added to the growing unease (TIME, 2024). Security concerns further intensified when stowaways were discovered deceased in aircraft wheel wells and when a passenger opened an emergency exit during taxiing in Boston (Press, 2025a, 2025b). Although statistics indicate that air travel remains the safest mode of transportation (Bureau of Transportation Statistics, 2025), the clustering of such incidents within just two years demonstrates the persistence and frequency of safety risks. To enhance effectiveness and reduce uncontrollable risks, safety information provided by frontline personnel plays a critical role in strengthening organizational safety. Voluntary safety reporting enables these employees to capture and communicate observable risks, thereby helping to mitigate potential hazards before they escalate. Additionally, aviation authorities, such as the National Transportation Safety Board (NTSB) and the Federal Aviation Administration (FAA), have raised concerns about overworked and understaffed air traffic control systems, identifying them as a potential safety risk. Officials warn that long shifts, low pay, and mandatory retirements contribute to staffing shortages (Koenig, 2023).

Despite its benefits, many aviation employees hesitate to report accidents, incidents, or near-misses due to fears of punishment, blame, or reputational damage (Dekker, 2018; Neal & Griffin, 2006). This reluctance hampers organizational learning and prevents the identification of latent problems that could escalate if left unaddressed (Heinrich, 1941; ICAO, 2022). Implementing a just culture where errors are treated as learning opportunities rather than grounds for punishment can alleviate these fears and encourage reporting (Brugnara et al., 2023; Reason, 1998). A positive safety culture fosters trust, transparency, and open communication, making employees feel secure when disclosing risks (Dekker, 2018; McMurtrie & Molesworth, 2018). The decision to report is influenced by a complex interplay of individual and organizational dynamics (Naveh et al., 2006; Wawersik & Palaganas, 2022). At the personal level, factors such as fear of blame, insufficient trust in leadership, and skepticism about how information will be used can suppress the willingness to speak up (Dekker, 2018). Conversely, personal beliefs, moral courage, and confidence in reporting can motivate employees to report safety concerns (Aydeniz, 2021; McMurtrie & Molesworth, 2018). Organizational factors play pivotal roles in empowering employees to report their concerns. A just culture that treats errors as learning opportunities rather than punishable offenses can help alleviate fears of blame (Dekker, 2018). When employees perceive reporting as fair, constructive, and free from negative repercussions, they are more likely to disclose minor concerns that might otherwise escalate into significant hazards. Additionally, leadership commitment to safety through allocating sufficient resources and resolving reported issues promptly and supportively signals that employee input leads to tangible improvements (Stolzer et al., 2023). Individuals who witness tangible progress from their reports tend to engage more consistently in voluntary reporting (Adjekum et al., 2023).

Several theoretical frameworks reinforce these considerations. Heinrich's Pyramid illustrates that overlooking minor incidents and near-misses can ultimately lead to significant accidents (Heinrich, 1941). Normal Accident Theory (NAT) argues that accidents are inevitable in tightly coupled and complex systems (Perrow, 1999). In contrast, High-Reliability Organization (HRO) theory suggests that accidents can be significantly reduced through heightened organizational vigilance, ongoing learning, and open communication (Dekker et al., 2023). HRO theory demonstrates how robust reporting processes can protect against complex, cascading failures. Understanding how these organizational elements and individual predispositions coalesce provides deeper insight into aviation safety and employee behavior.

This study addresses the gap in understanding how organizational and individual factors influence voluntary safety reporting in aviation (Dwyer et al., 2023; Under & Gereide, 2021b), particularly given the extensive barriers to reporting, such as fear of punitive actions

(Aydeniz, 2021; Edmondson, 2018), favoritism, lack of support (Addo & Dartey-Baah, 2020), and overly complex processes (Schuh-Renner et al., 2019). The gap in understanding these factors intersects across various levels (organizational, group, and individual) within hierarchical structures. Current studies have acknowledged multiple barriers to reporting such as organizational culture, fear of retaliation, and lack of managerial feedback (Jausan, 2018; Lam & Chan, 2023), but they often examine these barriers in isolation, overlooking their interconnected nature and combined impact on employees' decisions to report or remain silent. This study addresses this limitation by adopting a grounded theory approach and conducting in-depth interviews with aviation experts. Through iterative coding, recurring themes and relational patterns are identified, offering practical strategies to enhance reporting behaviors.

Grounded Assumption

Grounded Theory is constructed through individual interactions and interpretations rather than being an objective, pre-existing reality (Glaser & Strauss, 2017). This viewpoint is consistent with constructivism, emphasizing that participants shape their understanding of organizational phenomena through their lived experiences rather than adhering to the predetermined theoretical model (Charmaz, 2014). As a theory grounded in participants' experiences, it is suited for examining aviation safety reporting in high-reliability organizations (HROs). The decision-making processes of employees regarding safety reporting are influenced by various factors, including organizational culture, leadership behaviors, and individual perceptions of accountability (Beus et al., 2016; Neal & Griffin, 2006).

Previous studies of safety reporting often rely on established theoretical frameworks, which may constrain the discovery of novel factors influencing incident-reporting behavior (Archer et al., 2020; Dekker et al., 2023; Sieberichs & Kluge, 2021). Empirical barriers such as fear of punitive consequences, hierarchical constraints, and lack of trust in management further complicate reporting behavior (McMurtrie & Molesworth, 2022; Under & Gereade, 2021b). To address these limitations and develop a comprehensive model, this study employs theoretical sampling and iterative coding (Corbin & Strauss, 2008) to develop a comprehensive model of voluntary safety reporting behavior in aviation, thus providing a more nuanced understanding of voluntary safety reporting behavior (Gioia et al., 2013).

Methodology

The study employed a grounded theory methodology to examine safety reporting behaviors among aviation personnel through a systematic, multi-step process. First, a structured yet adaptable interview guide was collaboratively developed. Using theoretical and purposive sampling, semi-structured interviews with non-leading, open-ended questions were conducted to elicit participants' experiences and perceptions. These questions explored the motivations behind choosing to report regarding safety concerns in the aviation industry, as follows:

1. Please share your experiences regarding safety reporting in your position.
2. Please share your experience with minor incidents or refraining from reporting.
3. What problems and difficulties have you faced during safety reporting?
4. What are the concerns you have regarding reporting safety incidents?
5. Why do you remain silent instead of reporting safety concerns?
6. Do you have any suggestions or other opinions?

Follow-up questions enriched the data, while supplementary materials, including safety reports and policy documents, provided additional context.

The study's methodology examined decision processes influencing safety reporting, as shown in Figure 1. Applying grounded theory illuminated how aviation employees and supervisors engage with voluntary safety reporting. The process began with interview design, where participants across sectors, including airport operations, airline services, and outsourcing, were identified. Semi-structured interviews were conducted with aviation personnel. Non-leading, open-ended questions encouraged participants to share their insights and perceptions, fostering a dynamic flow of conversation. The research team collected additional documentation to supplement these interviews to validate emerging themes and strengthen the data set.

The research process emphasized a collaborative design. Drawing upon existing literature, organizational documents, and safety guidelines, the team generated questions encouraging participants to reflect on their unique experiences with safety reporting. After gathering the interview data, researchers independently coded the materials before reconvening to synthesize key themes and ensure consistency in their analysis. Including supplementary documentation further contextualized findings, guaranteeing a comprehensive exploration of the safety reporting culture within aviation organizations. The iterative approach to theoretical sampling allowed the research team to refine their focus, ensuring the inclusion of participants who could clarify ambiguities or expand upon emergent themes, as shown in Figure 2.

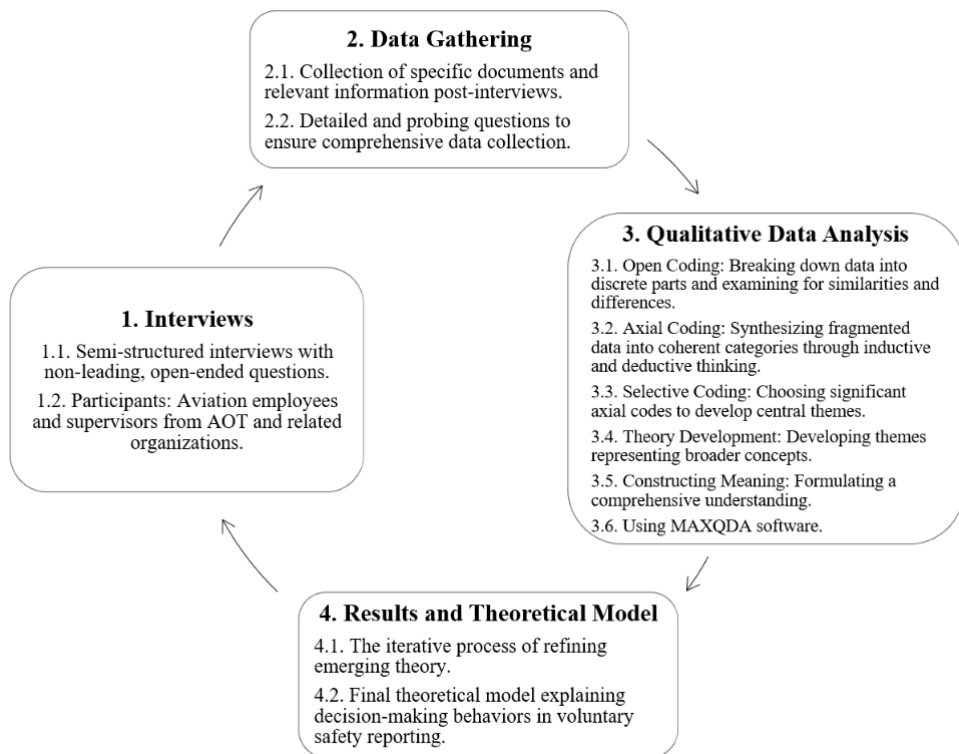


Figure 1 The cyclical process in grounded theory illustrates a structured approach.

Source: Reproduced from Williams & Moser (2019).

The qualitative data analysis was conducted through open, axial, and selective coding phases. Open coding identified key ideas, axial coding revealed patterns and connections, and selective coding consolidated these into a cohesive theoretical framework. MAXQDA software facilitated data organization and visualization, enhancing analytical transparency (MAXQDA, 2022). The study's results culminated in a theoretical model that maps the interactions among core themes, illustrating how organizational culture and individual factors influence safety reporting. This comprehensive approach provided actionable insights for fostering transparency and a robust reporting culture in aviation. The study underscores the importance of iterative processes, from data collection to theoretical refinement, to comprehensively understand the dynamics of safety reporting.

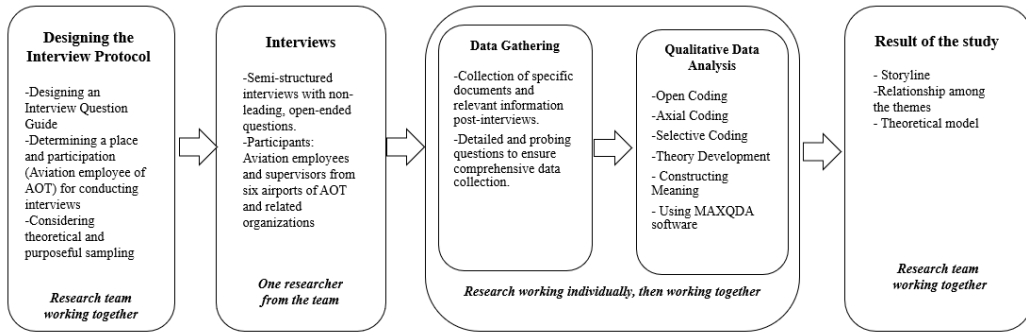


Figure 2 The study process outlines the sequential methodology employed in the research.

Source: Adapted from Stolzer et al. (2023).

Participants

The study was conducted within the context of High-Reliability Organizations (HROs) in the aviation sector, focusing specifically on airport operations. Participants were selected from aviation personnel working within the organizational structure of Airports of Thailand (AOT). The research encompassed six major AOT-operated airports including Suvarnabhumi, Don Mueang, Chiang Mai, Phuket, Hat Yai, and Mae Fah Luang (Chiang Rai). The selection of the six Airports of Thailand (AOT) airports was guided by both strategic and practical considerations. These airports represent the major hubs and regional gateways within the national aviation system, thereby capturing a diverse range of operational contexts and safety cultures. Other airports were not included due to resource constraints, access limitations, and the need to maintain methodological rigor by focusing on sites under the same organizational structure. This approach ensured both feasibility and consistency, while still providing sufficient variation to achieve theoretical saturation in line with grounded theory methodology.

Following grounded theory methodology, participant recruitment proceeded until theoretical saturation was reached. New themes ceased to emerge after approximately 15 interviews, indicating saturation of core categories. Nevertheless, the sample was deliberately extended to 21 participants to ensure comprehensive representation across all major organizational groups. Specifically, two to three participants were included from air operators, public aerodrome operators, air traffic management service providers, approved training organizations with aircraft operations, approved maintenance organizations, organizations responsible for aviation safety oversight, and communication system service providers (Charmaz, 2014; Corbin & Strauss, 2008).

Participants were drawn from three core areas: airside aerodrome operations, air traffic control (ATC), and airline functions. These domains highlight the complexity and interdependence

of aviation operations. Airside aerodrome operations cover the maintenance of runways, taxiways, and aprons; ATC personnel manage aircraft movements and maintain safe separations; and airline staff, including flight crews and ground handlers, coordinate across air and landside operations.

Data collection

The study employed a qualitative questioning framework (Charmaz, 2014; Oktay, 2012) to explore participants' experiences, motivations, and reflections on safety reporting (Manapragada & Bruk-Lee, 2016). The study conducted semi-structured interviews using non-leading, open-ended questions to elicit in-depth insights. Follow-up questions were used dynamically to clarify details and uncover additional context-specific insights into emerging themes, such as the role of leadership in decision-making.

Data was collected through semi-structured interviews, safety reports, and policy documents, which provided insights into participants' motivations and challenges. The analysis utilized a structured coding process with MAXQDA software, leading to a theoretical model demonstrating how leadership practices, organizational culture, safety climate, and individual perceptions influence safety reporting behaviors. The following sections outline the study's methodology, participants, data collection procedures, and data analysis. Follow-up questions were employed to probe participants' responses in greater depth, enabling the researchers to clarify meanings, explore emerging themes, and obtain richer contextual insights during the interviews. This approach facilitated clarification and expansion of participants' initial responses, generating more detailed and context-specific insights and allowing the research team to adapt the interviews dynamically as new areas of interest emerged. The interview process was guided by theoretical sampling, a key principle of grounded theory, which involves recruiting additional participants to address emerging gaps and refine developing categories. Data collection continued until theoretical saturation was achieved, meaning that no new themes or conceptual insights emerged from the data, thereby ensuring analytical depth and comprehensiveness (Birks et al., 2015; Glaser et al., 2017). To maintain relevance to current aviation practices, participants had at least one year of recent employment experience. Interviews were conducted between May and July 2023 via Zoom, providing a cost-effective and flexible platform for in-depth discussions while maintaining participants' comfort and confidentiality (Jovchelovitch & Bauer, 2000; Sturges & Hanrahan, 2004). Ethical considerations, including privacy and voluntary participation, were emphasized. Participants represented diverse aviation roles, such as air traffic control, airport security, and ground operations, capturing perspectives from critical segments involved in safety reporting. The process highlighted recurring patterns, including barriers, organizational support structures, and individual risk attitudes, which informed the study's findings.

The study implemented rigorous measures to minimize interview bias and ensure the validity and reliability of the data. Firstly, we provide structured and open-ended questions to maintain consistency while allowing participants to share their perspectives freely without leading participants in any direction. Secondly, assurance of confidentiality helped reduce social desirability bias, fostering open discussions on sensitive topics. Researchers utilized reflective memos to document their assumptions and emotions, preventing undue influence on data collection and analysis. Thirdly, peer debriefing sessions facilitated critical discussions about coding and interpretation, helping to resolve potential biases. Furthermore, the iterative grounded theory approach employed the constant comparative method, which required ongoing refinement of interpretations based on new data. These measures ensured that the findings accurately reflected participants' experiences rather than the researchers' preconceptions, resulting in a robust theoretical model of safety reporting behaviors in aviation.

Data analysis

Data analysis employed a grounded theory approach to analyze qualitative data, identifying patterns and developing theories grounded in participants' experiences (Corbin & Strauss, 2008). The analysis progressed through three coding levels: open coding, which identified key concepts; axial coding, which examined relationships among these concepts; and selective coding, which refined the core categories and theoretical constructs. Using MAXQDA software, the researchers conducted a rigorous and systematic process to organize, code, and categorize the data effectively, ensuring transparency and reliability throughout (MAXQDA, 2022). During the open coding phase, raw data were broken down and labeled based on participants' language and perspectives, anchoring the analysis in their lived experiences. Axial coding followed, refining these codes into broader categories, revealing relationships and patterns, and connecting descriptive accounts with theoretical constructs. Finally, selective coding integrated the axial categories into overarching themes, capturing the primary factors influencing voluntary safety reporting behavior. Throughout this process, constant comparison was used to ensure the emerging theory remained closely tied to the data, as shown in Figure 4. MAXQDA's visualization tools facilitated mapping relationships among categories and aided in developing a comprehensive theoretical model. This model illustrates how organizational factors, individual motivations, and the broader safety climate shape safety reporting behavior. The structured approach provided an in-depth exploration of voluntary safety reporting, contributing significantly to understanding how proactive practices enhance safety in aviation (Gioia et al., 2013). The findings underscore the value of grounded theory in uncovering nuanced insights and advancing safety practices.

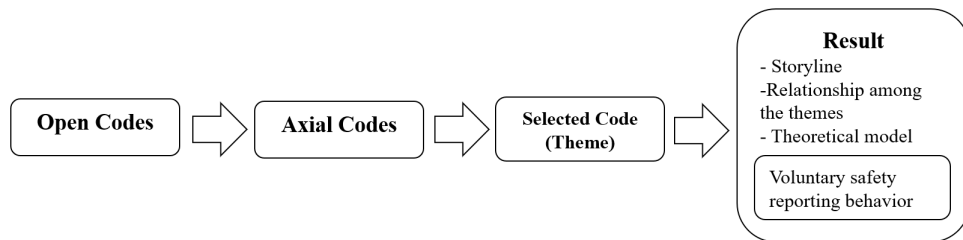


Figure 3 The qualitative data analysis process conducted in this study.

Source: Reproduced from Williams & Moser (2019).

Results and Discussion

This section synthesizes the study's findings and analysis to connect empirical insights with theoretical constructs. In the first part, the research employed a coding process to identify core themes related to aviation safety reporting based on data from a diverse group of 21 aviation professionals, including airport, airline, and outsourced personnel. The data were collected through in-depth interviews, observations, and document reviews. In the second part, the study identified six themes: empowering leadership, safety climate, just culture, safety motivation, employee moral courage, and voluntary safety reporting. Finally, the model illustrated how these multi-level influences converge to shape safety behaviors, offering practical and policy-oriented insights for enhancing safety performance in aviation HROs.

The study categorized participants as airport, airline, and outsourced personnel, ensuring a broad and balanced industry representation. Table 1 shows the 21 participants, comprising 14 aviation professionals (e.g., air traffic controllers, AOT dispatchers, and AOT ground staff) and 7 in leadership roles. Most participants (52.38%) were from the airline sector, followed by airports (38.10%) and outsourced services (e.g. contracted dispatchers, ground handling crews) (9.52%). Gender distribution included 14 males and 7 females, with experience ranging from under five years to over thirty years. This diversity in roles and expertise enriched the study's understanding of safety reporting in aviation (Charmaz, 2014; Glaser et al., 2017).

Table 1 The participant's background was categorized by role, gender, experience, and age.

Participants	Number	Level		Gender		Job experiences (Years)	AGE
		Employee	Leaders	Male	Female		
Airports	8 (38.10%)	4 (28.57%)	4 (57.14%)	6 (42.86%)	2 (28.57%)	10.38 year	Below five years: 42.90%
Airlines	11 (52.38%)	8 (57.14%)	3 (42.86%)	7 (50.00%)	4 (57.14%)	6.36 year	Ten years: 47.60%
Outsources	2 (9.52%)	2 (14.29%)	0 (0.00%)	1 (7.14%)	1 (14.29%)	3.5 year	20 years: 4.80%
Total	21	14	7	14	7		More than 30 years: 4.80%

Source: Authors' primary interview data.

Data were collected through in-depth interviews, observations, and document analysis, ensuring a comprehensive exploration of aviation safety reporting behaviors. Firstly, using the coding process provided a structured framework for identifying core themes and subcategories. An example of an open coding process identified key themes, such as the need for mandatory safety reports. The researcher coded from a participant's note, "The system where people feel safe to come forward, even if it is not mandatory." The coding for decision-making voluntary safety reports. Subcategories included mandatory reports and voluntary safety reporting. The coding participant remarked, "I always discuss it with my superior if it is related to safety, no matter how minor. He could provide immediate assistance." This underscored the importance of communication and leadership support. The data revealed a robust safety climate, highlighted by comments, "Everyone talks openly about mistakes. No one tries to hide anything." Employee Moral Courage emerged as a theme from statements, "I feel it is my responsibility to report issues" and "Honestly, I worry about retaliation if I speak out." Just culture was emphasized through remarks such as, "Transparency only works if we stop punishing people for slip-ups." Suggestions for improvement included, "It would help if we received feedback after we report so we know it is taken seriously." These insights were part of the coding process, providing a structured framework that led to axial coding, which grouped open codes into broader categories, including leadership style and decision-making, fear and emotional responses, and reporting processes.

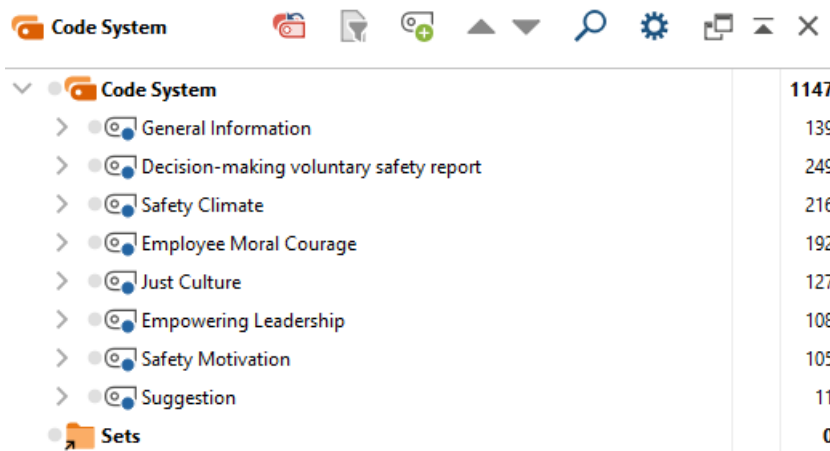


Figure 4 A code system was conducted in this study using MAXQDA.

Source: Created by the authors using MAXQDA software.

This study used MAXQDA to conduct a code system, as shown in Figure 4. This system showed that these categories reflected central concepts such as non-punishment, accountability, and transparency. The analysis identified 1,147 coded segments across several themes: general information (139 segments), decision-making voluntary safety reports (249 segments), safety climate (216 segments), employee moral courage (192 segments), just culture (127 segments), empowering leadership (108 segments), safety motivation (105 segments), and suggestions (11 segments).

The largest category comprised voluntary safety reporting related to decision-making (249 segments), including mandatory reports (105 codes), verbal reports (77 codes), and voluntary safety reporting (67 codes). This highlighted extensive discussions on reporting attitudes and processes. Safety climate (216 segments) emphasized communication as illustrated by the example: “Everyone talks openly about mistakes. No one tries to hide anything,” as well as organizational commitment, supportive environments, and training. Employee moral courage (192 segments) addressed responsibility as reflected in the statement, “I feel it is my responsibility to report issues,” as well as fears, such as: “Honestly, I worry about retaliation if I speak out,” reflecting the tension between ethical duty and potential repercussions. Just culture (127 segments) focused on non-punitive approaches, transparency, and shared accountability. One participant remarked, “Transparency only works if we stop punishing people for slip-ups.” Safety-integrated leadership (108 segments) highlighted empowerment, informed decision-making, and support. Safety motivation (105 segments) captured internal and external drivers, emphasizing the role of

anonymity and ethics. Suggestions (11 segments) provided recommendations for enhancing safety culture and accountability.

The study was systematically coded to identify six key themes, which provides a comprehensive perspective on safety practices as shown in Figure 5. Leadership fosters trust through guidance, empowerment, and clear communication, while a just culture promotes open communication by emphasizing transparency and non-punishment. A safety climate, characterized by regular updates, team alignment, and shared commitment, reinforces safety as a core value. At the individual level, safety motivation is driven by training and support, with moral courage enabling employees to overcome emotional pressures and fulfill social responsibilities.

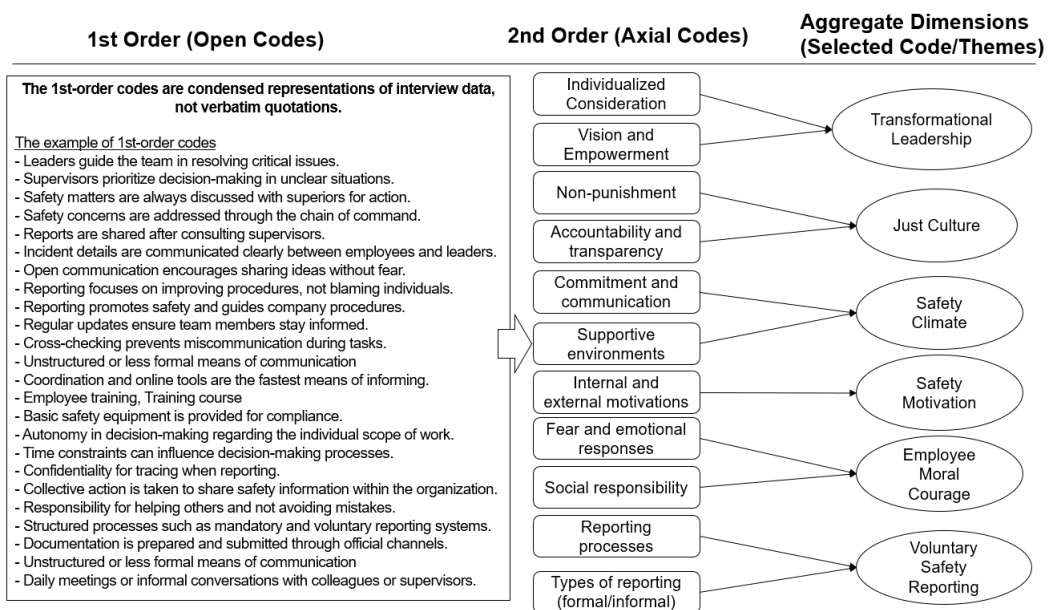


Figure 5 The data structure presents a three-step coding analysis process.

Source: Reproduced from Corley and Gioia (2004).

The study identified six key themes in aviation safety: empowering leadership, just culture, safety climate, safety motivation, employee moral courage, and voluntary safety reporting with the Integrated Safety Model (ISM) (Beus et al., 2016), situating organizational factors as distal antecedents, individual factors as proximal antecedents, and reporting behaviors as leading indicators. While the A-VSRB model is aligned with the multi-level structure of the ISM by utilizing the concepts of distal and proximal antecedents, it extends beyond the ISM's broad scope by offering a context-specific application to voluntary safety reporting behavior in aviation. Unlike the

ISM, which provides a general framework for understanding safety culture and performance across industries, the A-VSRB model identifies and operationalizes two critical proximal mechanisms (moral courage and safety motivation) that directly mediate the relationship between organizational-level factors and frontline reporting behavior. This specification not only narrows the theoretical focus to the unique challenges of aviation, but also offers actionable insights for designing interventions that foster ethical agency and intrinsic motivation among personnel. In doing so, the A-VSRB model moves beyond the conceptual abstraction of the ISM to deliver a more practical, aviation-oriented framework that directly informs organizational policy, leadership development, and safety management practices. Building on these theoretical insights, the empirical data in this study are organized into three categories, which provide the basis for the following analysis.

1. Distal Antecedents (Organizational-Level Factors)

According to Beus et al. (2016), Distal Antecedents (Organizational-Level Factors) refer to the overarching organizational elements. The current study revealed that leadership, safety climate, and just culture are key organizational-level factors influencing safety reporting. Using qualitative analysis with open and axial coding, leadership emerged as a central theme, encompassing leader encouragement, trust, and effective coordination. Firstly, leaders who model safety reporting behaviors, provide guidance and demonstrate support inspire transparency and engagement, aligning with prior findings (Kark et al., 2015; Wawersik et al., 2023). A safety climate encompassing consistent communication, structured training, and supportive tools enhances employees' willingness to report hazards, echoing foundational research by (Kavanagh & Ashkanasy, 2006; Neal & Griffin, 2006; Zohar, 1980). Secondly, just culture plays a vital role by promoting accountability over blame, ensuring that honest mistakes are not met with punitive responses (Dekker, 2018). This reassures employees and fosters proactive safety reporting behaviors. The findings underscore that when leadership visibly champions safety, the safety climate facilitates open dialogue. Lastly, just culture ensures non-punitive responses, and employees are more likely to report concerns. This interconnectedness reinforces the importance of a supportive organizational culture for improving safety performance (Beus et al., 2016). The results align with previous studies, reaffirming that organizational-level factors create a foundation for safety engagement and emphasizing the pivotal role of trust, training, and accountability in promoting safety behaviors.

1.1 Empowering Leadership in Aviation Safety

The findings of this study suggest that empowering leadership in aviation, which is characterized by participative decision-making, flattened hierarchies, and a balance between autonomy and oversight, plays a critical role in shaping employees' willingness to report safety concerns. This leadership pattern emerged inductively through interviews, yet it aligns conceptually with the four dimensions of transformational leadership: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Bass & Riggio, 2006). These empowering behaviors foster psychological safety, encourage moral courage, and enhance proactive safety engagement (Edmondson, 1999; Nembhard & Edmondson, 2006). In high-reliability settings such as aviation, leadership that combines ethical modeling with inclusive communication supports a culture where frontline staff feel valued and safe to speak up. Recent studies confirm that empowering leadership, when combined with a strong reporting culture and safety climate, significantly enhances organizational resilience and mindful organizing in air traffic and airline operations (Dinh et al., 2020; Mezentseva et al., 2023). This supports the view that top-down commitment to empowerment is essential for cultivating a robust safety reporting environment. The qualitative data underscores leaders' need to engage with minor and significant safety concerns. Participants expressed similar perspectives, as one respondent stated, "If it is related to safety, no matter how minor, I make it a point to discuss it with my superior because he could provide immediate assistance." This indicates that managerial responsiveness encourages proactive reporting. Similarly, ground service personnel remarked, "In case we are not sure and unclear in the manual. The supervisor will make the final decision to report accurately." These comments underscore how leadership behaviors, such as prioritizing safety and offering assistance, shape organizational norms and reporting practices (Bunner et al., 2021; Pratama et al., 2023).

Consistent with previous findings, the study reveals that hierarchical structures can be a double-edged sword (Adjekum et al., 2023; Wu et al., 2023). Rigid command chains create clarity in decision-making but may also inhibit open communication. Participants noted, "We follow the chain of command according to rank" and "If we report to higher authorities, it might seem like we are complaining, so we usually do not do that." This process discourages frontline personnel and outsourced workers from raising concerns, who often have less direct access to official reporting channels. Reflecting prior scholarship, these results confirm that while flattening hierarchies may promote dialogue, a well-defined command structure offers consistency when skillfully managed (Biggs et al., 2023; Van De Mierop et al., 2023).

The balance between leadership autonomy and oversight is another key theme. Participants indicated that communication with senior management is tightly monitored, potentially

discouraging employees from voicing concerns for fear of being perceived as complaining. This finding confirms that hierarchical cultures can hinder open reporting (Biggs et al., 2023). On the other hand, leaders who encourage informal conversations and collective discussion support just culture principles (Pellegrino, 2019). They also ensure that employees feel safe when bringing up potential hazards before filing a formal report.

Moreover, the study draws attention to outsourced staff in aviation operations who often face additional challenges, such as restricted access to reporting systems (Dekker et al., 2023; Enya et al., 2019). One participant observed, "We do not have much autonomy. If we send an email to the top, they will trace it back to the source through the chain of command." Indirect channels may isolate contract workers from formal reporting processes. These findings align with previous research on the importance of organizational support and leadership behaviors that prioritize expertise over rank to integrate all personnel into safety cultures (Biggs et al., 2023).

Empowering leadership is crucial in cultivating a productive and transparent safety culture. Leaders who exhibit transparency, promote open communication, and balance autonomy and oversight constructively foster an environment where even minor concerns can be openly discussed (Wu et al., 2023). While excessive monitoring can inhibit frontline initiative, overly granting autonomy may result in inconsistencies in safety practices (Dekker, 2016; Provan et al., 2020). Leaders who promote informal huddles, offer clear guidelines, and remain responsive to employees' concerns enhance psychological safety (Dekker & Edmondson, 2022). This approach supports just culture frameworks and strengthens high-reliability organizational principles by emphasizing learning from mistakes and minimizing blame (Dekker, 2018). Leaders capable of harmonizing hierarchical clarity, empowered oversight, and open dialogue foster continuous learning, vigilant reporting, and operational resilience fundamental to high-risk sectors such as aviation (Biggs et al., 2023).

1.2 Safety Climate

Safety climate encompasses employees' perceptions of an organization's safety policies, procedures, and practices, with a positive safety climate ensuring stronger safety performance (Wen Lim et al., 2018). In this study, communication and commitment emerged as critical elements. ATCs stated, "We mainly rely on verbal communication and cross-checking to confirm that the manager and team understand the same. If a serious incident occurs or cannot be resolved, we will report it in the system." Similarly, dispatchers noted, "We constantly coordinate and communicate using walkie-talkies and phones, ensuring everyone on duty is informed and aligned on addressing any issues and we have daily meetings that we can discuss and update situation real-time," underscoring how open dialogue and routine debriefings reduce errors and foster real-

time problem-solving. Previous research confirms that such frequent interactions, paired with shared expertise, enhance performance in high-reliability organizations (Amponsah-Tawiah et al., 2020; Dekker et al., 2023; Huang et al., 2006).

Safety training also plays a vital role in creating a robust safety climate, as participants emphasized the need for “Up-to-date teaching content.” Consistent with prior findings, well-structured programs reduce human errors, boost decision-making, and improve reliability by providing technical knowledge, communication skills, and situational awareness (Georgiev, 2021; Sadasivan & Gramopadhye, 2009). Moreover, standardized training modules encouraged by ICAO (2020) and Shamsiev (2022), along with ongoing refreshers, support the evolving nature of aviation, aligning with research on the importance of continuous learning (Griffin & Neal, 2000; Neal & Griffin, 2006; Reason, 2016). In turn, this promotes proactive risk management through early detection of potential threats (Dekker et al., 2023; Dwyer et al., 2023).

Lastly, supportive environments proved pivotal for encouraging employees to report concerns without fear of retaliation. One airport staff member underlined essential protective equipment requirements: “Employers must provide basic safety equipment, such as safety shoes, an earplug, and a reflective vest.” This observation aligns with prior work showing that tangible organizational support increases workers’ willingness to communicate near-misses and participate in safety measures (ICAO, 2018). These findings confirm that strong communication, meaningful training, and organizational support enhance the safety climate and elevate overall safety outcomes.

1.3 Just Culture

The study found that a just culture creates an environment where employees feel safe reporting concerns without fearing negative consequences. This fosters a secure and efficient atmosphere. Therefore, the theme of a just culture encompasses non-punishment, transparency, and accountability, which create an atmosphere where employees feel safe reporting concerns without fear of adverse consequences. These findings align with the literature indicating that a just culture promotes learning rather than punishment (Reason, 2004) and encourages open reporting (Teske & Adjekum, 2022). Employees value anonymity and non-punitive approaches, resonating with broader psychological safety research demonstrating that individuals are more likely to report issues when they feel safe speaking up (Kassing, 2002; Kish-Gephart et al., 2009; Newman & Scott, 2023).

A core aspect involves open communication practices that allow staff to share ideas and disclose errors in a non-threatening environment. One participant remarked, “Reporting is not a punishment but a promotion of safety to establish a procedure that will lead the whole company

in the same direction.” This reflected that accountability often lies in procedural weaknesses rather than personal failings. This perspective supports previous arguments that mistakes should serve as catalysts for system improvements rather than triggers for blame (ICAO, 2017; Pellegrino, 2019). However, organizational culture and local norms can complicate “no blame” strategies. For instance, a participant commented, “In Thai culture, we tend to be relaxed and open to compromises,” hinting that a preference for informal resolutions may lead to inconsistencies in just culture application (Pellegrino, 2019).

Ensuring transparency and fostering trust are also crucial. Airline employees emphasized, “Reporting is not a punishment but a promotion of safety. While no individual blame is assigned, the focus should be improving shortcomings.” Neal and Griffin (2006) support that employees need clear evidence of constructive responses to develop trust in the reporting process. However, local norms or leadership ambiguity can shift accountability onto procedural rules rather than conducting thorough oversight. Such compromises potentially weaken safety reporting effectiveness, leading to confusion or under-reporting (Pellegrino, 2019). Leaders must balance fostering a supportive environment with upholding strict accountability, aligning that transparency and leadership clarity help cultivate a positive safety climate (Pratama et al., 2023; Reason, 1997).

Accountability is thus more expansive than simply following regulations; it involves shared responsibility, continuous learning, and open dialogue. One participant observed, “I do not hesitate to report if it is a matter of following the law and regulations,” suggesting that when individuals clearly understand their obligations, they are more inclined to voice concerns (Neal & Griffin, 2006). A non-punitive response to honest mistakes is central to just culture. Participants in this study repeatedly emphasized that “Transparency only works if we stop punishing people for slip-ups” and “Everyone talks openly about mistakes. No one tries to hide anything,” illustrating how psychological safety fosters proactive risk management (Dekker, 2018; Dekker et al., 2023; Reason, 2004).

These findings reinforce that a just culture becomes a success when leaders promote fairness, encourage the reporting of minor and severe issues, and focus on systemic rather than individual blame (Adjekum et al., 2023; Adjekum & Tous, 2020; Reason, 2004). Emphasizing shared responsibility helps organizations overcome cultural barriers to disclosure (McMurtrie & Molesworth, 2018). At the same time, balancing firm safety standards with a willingness to learn from mistakes enables institutions to maintain a consistent approach to accountability. It ensures employees’ concerns are taken seriously (Pellegrino, 2019). These insights confirm that just culture principles significantly bolster aviation safety by merging non-punitive transparency with robust organizational learning.

2. Proximal Antecedents (Individual-Level Factors)

Proximal Antecedents (Individual-Level Factors) are essential in converting organizational influences into personal actions. The study found that safety motivation, encompassing intrinsic and extrinsic elements, is vital for employees' willingness to report safety concerns. Intrinsic motivation, driven by "personal responsibility and moral commitment" (Chen & Chen, 2014; Graafland & Van de Ven, 2006), and extrinsic motivation, affected by deadlines and peer approval, determine safety behaviors (Vallerand, 2000; Zhang & Liu, 2022). However, time pressures can weaken extrinsic factors if not managed properly (Zhang & Liu, 2022). Additionally, moral courage enables employees to speak up about hazards despite challenges. Supportive leadership and a just culture enhance safety motivation and moral courage, aligning with previous research and demonstrating that organizational support is crucial for effective safety reporting. The results corroborate prior studies, emphasizing that individual motivation and courage, influenced by organizational culture, are key to proactive safety behaviors (Sekerka & Bagozzi, 2007).

2.1 Safety Motivation

This study highlights how intrinsic and extrinsic motivations shape employees' willingness to report safety issues, echoing previous research on the importance of fostering a motivated workforce (Vatankhah, 2021). Participants spoke of autonomy-related tensions in safety reporting, exemplified by a remark that "We must follow their command and do not have much autonomy. I prefer making decisions myself." This illustrates how organizational constraints can reduce individual freedom and ensure consistency. Aligning with Self-Determination Theory (SDT), the data suggest that fulfilling employees' needs for autonomy, competence, and relatedness boosts intrinsic motivation (Gagné et al., 2018). A participant noted feeling "very happy at work." At the same time, another stated, "Everyone knows their scope of work and can make decisions accordingly." This reflects the satisfaction that arises when personal input is recognized and blame is minimized (Martela et al., 2021). These findings resonate with Martela et al. (2021), who emphasize that autonomy-supportive environments encourage voluntary compliance and safety ownership.

Extrinsic factors also play a prominent role. Participants indicated that time pressures can overshadow reporting, as one stated, "I was pressured about working on the schedule whether to report this tool without a report, it may still find a solution," highlighting how immediate demands may take precedence over longer-term safety objectives (Harris et al., 2022). Airline personnel echoed this sentiment, stating that "I was time-pressured according to the planned flight schedule," underscoring how organizational culture and penalty avoidance may shape employees' decisions

to report hazards (Harris et al., 2022; Zhang & Liu, 2022). Furthermore, the study shows that social pressures complicate safety reporting when workforce units are small, exposing reporters' identities. One participant explained, "Even though reports can be confidential, it is not difficult to trace who sent the message," suggesting that fear of conflict or judgment can hinder disclosure and erode trust in reporting systems.

These findings confirm the dual nature of safety motivation. Intrinsic drivers, bolstered by autonomy and mastery, increase employees' commitment to safe practices (Millette & Gagné, 2008), while extrinsic pressures ranging from leadership and penalty systems to strict schedules may undermine or redirect such commitment (Vatankhah, 2021). Balancing performance expectations with genuine concern for long-term safety aligns with research showing that external demands can detract from intrinsic motivation if not carefully managed (Deci & Ryan, 2013; Gagné et al., 2018). This underscores the need for organizational strategies that nurture intrinsic dedication and prudent extrinsic incentives, ensuring safety objectives are met without compromising employee morale or transparency.

2.2 Employee Moral Courage

Moral courage in safety reporting indicates upholding ethical standards and addressing safety issues despite challenges. The study found that employee moral courage in aviation safety reporting is conceptualized through the dual influence of fear, emotional responses, and social responsibility, which collectively determine employees' willingness to report safety concerns and maintain ethical standards in high-stakes environments.

Fear and emotional responses act as significant psychological barriers. Participants expressed concerns about interpersonal relationships, potential workplace conflicts, and repercussions from reporting. For instance, one participant noted, "I had to work with him every day. I fear to report as it would have affected my work." While another shared, "My close friend faces situational duty time exceedances... he worked over the schedule and was afraid that if he reported, he would lose the opportunity to fly." These fears, including job loss and personal accountability, can deter individuals from reporting issues, even when necessary (Bird, 1996; Edmondson, 2018; Kish-Gephart et al., 2009).

Conversely, social responsibility plays a pivotal role in fostering moral courage. Employees who recognize the collective importance of adhering to safety standards demonstrate extraordinary moral courage, overcoming fears to report issues that could impact organizational safety. Statements such as "A maintenance team's quick action on an aircraft's lighting issue, informing pilots and initiating checks, highlights collective responsibility in aviation safety" emphasize shared

accountability and the ethical duty to prioritize safety (Adjekum et al., 2023; Graafland & Van de Ven, 2006; Hollnagel et al., 2015).

The study's findings align with existing literature, emphasizing the role of a supportive culture in promoting learning and encouraging open reporting (McMurtrie & Molesworth, 2021; Reason, 2004; Under & Gerede, 2021b). Employees value anonymity and non-punitive responses, consistent with psychological safety research showing that reporting rates increase when employees feel safe to speak up, enhancing organizational risk detection (Kassing, 2002; Newman & Scott, 2023).

Organizational conflicts, such as favoritism and leadership pressure, further complicate safety reporting. A participant stated, "I reported, and then I had problems with them." This highlighted how negative repercussions can discourage future reporting (Yu et al., 2022). Leadership that values transparency and fairness mitigated these barriers and fostered a culture of accountability and trust (Schuh-Renner et al., 2019).

Moral courage empowers employees to prioritize long-term safety over short-term relational or professional challenges. Leaders who model ethical behavior and create supportive environments enhance employees' confidence in reporting, promoting a resilient safety culture (Materna et al., 2023). This study reinforces the importance of just culture principles in aviation, demonstrating that balancing accountability with non-punitive approaches significantly bolsters safety performance and organizational integrity (Dekker et al., 2023; Reason, 2004).

3. Leading Indicators of Voluntary Safety Reporting

The current study identifies leading indicators in aviation safety reporting through informal verbal discussions and formal documentation, illustrating how employees communicate safety information. Informal reporting within small teams enables immediate dialogue and quick resolution of minor issues but risks losing critical data if undocumented. This aligns with Tani (2010) and Under and Gerede (2021b), who emphasize the role of informal and formal mechanisms in fostering proactive safety cultures. Formal reporting includes mandatory documentation under regulations such as ICAO Annex 13 and voluntary, often anonymous reporting, which promotes psychological safety (Probst & Estrada, 2010; Wawersik et al., 2023). While informal reporting facilitates swift problem-solving, formal systems ensure consistent data capture for cause analyses (Noort et al., 2021). The results demonstrate that combining informal and formal reporting enhances safety culture by encouraging transparent communication and enabling data-driven improvements, consistent with previous research (Fox et al., 2021; Newman & Scott, 2023).

3.1 Safety Reporting in Aviation

The final theme identified from the interviews relates to safety reporting in aviation. The findings underscore mandatory, voluntary reporting in aviation and informal verbal reports. The study highlights the necessity of balancing formal and informal reporting mechanisms to foster a proactive safety culture in aviation. By promoting moral courage and integrating just culture principles, organizations can enhance transparency, trust, and overall safety performance, aligning with high-reliability organization (HRO) principles and supporting continuous improvement in safety practices (Dekker et al., 2023; Reason, 2004).

Mandatory reporting involves operational personnel documenting accidents and specific incidents as required by ICAO Annex 13, Appendix C (ICAO, 2021). For instance, a starter malfunction in an aircraft must be formally reported to the Civil Aviation Authority of Thailand (CAAT) following CAAT Requirement No. 22 and ICAO Annex 19 (Annex, 1994; CAAT, 2019). A participant stated, "If an incident needs to be reported to the CAAT, we will send it as a safety report following CAAT Requirement No. 22 and ICAO Annex 19." Air Traffic Controllers (ATCs) echoed this meticulous approach: "We write down all the pertinent details, including how it could impact flights or aircraft. After identifying the issue, I report it to our organization and CAAT." This process ensures timely and accurate reporting, promoting a culture of compliance and accountability (Adjekum et al., 2023; Dwyer et al., 2023; Reason, 2004).

Voluntary Reporting allows employees to report hazards without legal obligation, driven by responsibility and potential impact. However, participants noted reluctance to report minor issues, as illustrated by one saying, "I will choose a voluntary report and conceal the name I want to report." This tendency to tolerate inefficiencies when problems seem minor or solvable informally can lead to long-term safety hazards. A participant explained, "Even though reports can be confidential, it is not difficult to trace who sent the message," highlighting fears of retaliation and loss of anonymity (Teske & Adjekum, 2022).

Informal reporting through verbal communication and daily meetings allows for quick resolution of minor issues. Participants mentioned, "In minor incidents, it is a basic verbal report. Since we do not have many people, everyone can communicate directly without going through multiple systems." This approach supports a resilient problem-solving culture but risks underreporting if not complemented by formal systems (Chatzi et al., 2019; Reason, 2004).

Integrating the mandatory and voluntary systems approach is recommended to enhance safety reporting. Participants suggested, "It would help if we received feedback after we report so we know it is taken seriously," indicating the need for transparent and supportive responses to reports (Adjekum et al., 2023). Aligning mandatory reporting with open communication and non-punitive frameworks can mitigate fears of punishment and encourage comprehensive data capture (ICAO, 2017, 2018). Aviation organizations can enhance their safety culture by combining these three reporting approaches: mandatory, voluntary, and verbal reporting. Establishing non-punitive frameworks, fostering feedback, and utilizing technology-driven reporting systems will strengthen transparency and trust. Integrating structured accountability with open communication and real-time problem-solving enables organizations to identify risks and drive continuous safety improvements effectively. Firstly, mandatory reporting, governed by standards such as ICAO Annex 19, ensures that critical incidents are systematically documented, fosters accountability, and facilitates root-cause analysis. However, fear of punishment can deter individuals from reporting, highlighting the necessity of a just culture to alleviate these concerns (Dekker, 2018; Hayton, 2022). Secondly, voluntary reporting is vital in proactively identifying hazards and near-misses, capturing incidents that may not be reported through mandatory channels. This approach is most effective in environments prioritizing anonymity and psychological safety, but fears of retaliation or doubts about confidentiality can impede participation. Implementing robust feedback mechanisms is crucial to overcome these barriers (Dekker, 2018; Reason, 2016). Lastly, verbal reporting allows immediate responses to emerging issues and fosters teamwork and resilience. However, informal reports must be integrated into formal systems to avoid being overlooked (Newman & Scott, 2023).

Thus, the model highlighted the relationship between organizational and individual factors in shaping aviation voluntary safety reporting behaviors. Empowering leadership in aviation safety fostered a supportive environment, encouraging employees to report safety concerns. A safety climate strengthens shared perceptions of safety importance, while a just culture ensures fairness and reduces fear of punishment. At the individual level, safety motivation drove reporting engagement, and employee moral courage helped overcome barriers to reporting. These factors influenced safety reporting behavior, including informal (verbal) and formal (mandatory and voluntary) reporting.

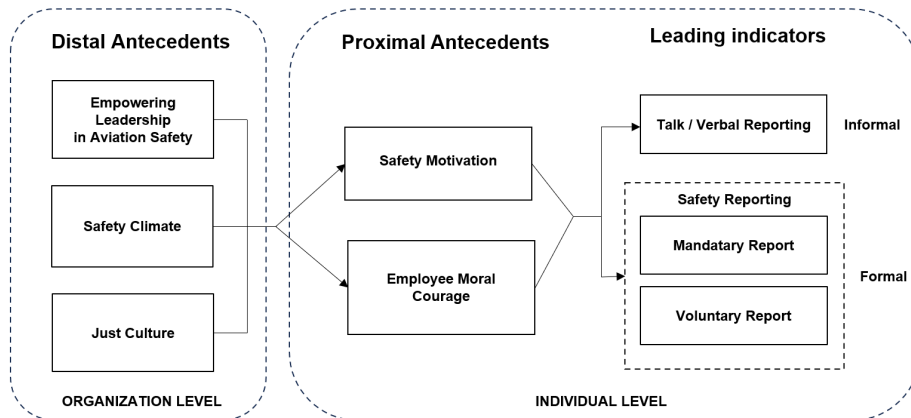


Figure 6 The model integrates organizational and individual factors to explain the pathways to aviation voluntary safety reporting behaviors (A-VSRB).

Source: Developed by the authors.

To provide a clearer understanding of the relationships within the model (Figure 6), these four cases exemplify practical scenarios reflecting the relevance of the Aviation-Voluntary Safety Reporting Behaviors (A-VSRB) model in aviation practices.

Case 1: A senior ground staff member declined to alert the pilot about an emerging technical issue due to fear of blame or reprimand. Believing his extensive experience could resolve the matter independently. He withheld critical information until the problem caused a delay and safety concerns at the parking bay. When the pilot eventually discovered the issue and confronted him, the staff member walked away rather than engage in open dialogue. This case underscores how apprehension about consequences exacerbated by overconfidence in personal expertise can hinder the free flow of safety-critical information (Subramaniam et al., 2023). The context highlights a breakdown in organizational-level communication (safety climate) and individual-level factors (lack of moral courage), illustrating how reluctance or fear of reprisal can create additional operational risks.

Case 2: Maintenance personnel responsible for servicing an aircraft's tires chose not to torque the wheel nuts according to the required standards. Instead, they relied solely on a visual inspection and their seasoned judgment, prematurely deeming the task complete. This overreliance on experience rather than strict adherence to prescribed procedures represents a lapse in individual safety motivation, wherein complacency supersedes due diligence (Zhang & Liu, 2022). Ineffective organizational leadership and the absence of a robust safety climate may have contributed to this negligence, as there was insufficient reinforcement or oversight of reporting requirements (Neal & Griffin, 2006).

Case 3: An aircraft was cleared for boarding even though one of its three critical systems malfunctioned. Ground engineers and crew justified their decision by citing manual guidelines that allowed flight operations to continue with two remaining functional systems. While the pilot consented to proceed, this practice introduced an unwarranted level of risk by assuming redundancies would suffice. Such choices reflect overconfidence rooted in experience and underestimating potential hazards when standard safety margins are eroded (Noort et al., 2021). Gaps in organizational oversight (distal antecedents) amplified individuals' inclination to downplay potential risks, hindering proactive hazard reporting (leading indicators).

Case 4: A mechanic pre-signed a job card indicating that engine repairs had been completed before any actual work occurred. During a subsequent inspection by auditors, it was discovered that no repairs had been performed, as evidenced by engine oil leakage on the floor. This breach not only led to the immediate revocation of the mechanic's license but underscored a critical disregard for safety standards. The behavior suggests a breakdown of just culture where individuals might feel emboldened to bypass formal processes, anticipating minimal repercussions (Dekker, 2018). The lack of strict accountability mechanisms at the organizational level likely diminished individual moral courage, thereby facilitating actions that undermine safety and regulatory compliance (Adjekum & Tous, 2020).

Practical Implications

The findings of this study offer valuable guidance for improving safety reporting practices within high-reliability organizations (HROs). First, the A-VSRB model reveals that empowering leadership can serve both as a facilitator and, paradoxically, as a barrier when hierarchical structures suppress open communication. Thus, leadership development programs should emphasize a balance between authority and psychological safety, enabling personnel to report issues without fear of reprisal (Edmondson, 1999; Nembhard & Edmondson, 2006). Second, the study reinforces the importance of a just culture, in which accountability mechanisms are not only fair but also perceived as credible and consistently applied. Organizations must ensure that disciplinary processes focus on learning rather than blame, thereby mitigating fear of retaliation and encouraging honest reporting (Reason, 2004). Third, cultivating a strong safety climate requires more than top-down commitment, reinforcement occurs through daily operational practices such as timely feedback, public recognition of proactive reporting, and the incorporation of informal or anonymous reports into formal safety systems (Mezentseva et al., 2023). Finally, at the individual level, organizations operating in high power-distance cultures should implement strategies that build moral courage and intrinsic safety motivation. Anonymous, team-based, or culturally adaptive

reporting channels can help ensure participation while respecting local norms and avoiding social risk (Chen & Chen, 2014; Zhang & Liu, 2022).

Finally, at the individual level, organizations (particularly those operating in high power-distance cultures) should foster moral courage and intrinsic safety motivation. Anonymous, team-based, or culturally adaptive reporting channels can promote participation while respecting local norms and minimizing social risk (Chen & Chen, 2014; Clarke & Ward, 2006; Ogunfowora et al., 2021; Zhang & Liu, 2022).

Conclusion

The International Civil Aviation Organization (ICAO) mandates that all member states implement Safety Management Systems (SMS) under Annex 19, which require both mandatory and voluntary safety reporting systems to enhance organizational learning and risk mitigation (ICAO, 2018). In support of this framework, ICAO Doc 9859 provides detailed guidance on the implementation of SMS, highlighting the importance of a just culture, non-punitive reporting practices, and shared safety accountability (ICAO, 2023). National civil aviation authorities, such as the Civil Aviation Authority of Thailand (CAAT), align their regulatory structures with these global standards. Additionally, international exemplars such as the Federal Aviation Administration's (FAA) Aviation Safety Reporting System (ASRS) illustrate how voluntary, confidential reporting mechanisms can lead to continuous safety improvements and trust-building across the aviation sector (NASA, 2023). These policies and systems apply to a wide range of operational roles, including pilots, air traffic controllers, ground operations staff, and maintenance technicians, reinforcing the notion that safety reporting is a collective responsibility that transcends departmental boundaries.

Accordingly, the findings present a framework applicable across all organizational levels and positions within high-reliability organizations, enabling targeted interventions that strengthen safety motivation and moral courage regardless of employees' functions or hierarchical units. The A-VSRB model offers an integrated framework by linking organizational (distal) and individual (proximal) factors, ultimately shaping the pathways of safety reporting. This approach clarifies the transition from motivation to action, illuminating employees' decisions to report safety concerns verbally. Moreover, it provides actionable insights by emphasizing both organizational and individual dimensions while streamlining mechanisms that encourage proactive reporting. In doing so, this study deepens the understanding of how personal and organizational factors interact to influence voluntary safety reporting, in alignment with the Integrated Safety Model (ISM) (Beus et al., 2016), as outlined below:

First, organizational factors and distal antecedents (leadership, just culture, and safety climate) create a foundation for trust and confidence. Leadership emphasizing transparency, accountability, and open communication fosters employee trust, making them more likely to disclose safety concerns (Devitt et al., 2021; McMurtrie & Molesworth, 2022). A well-defined safety climate, reinforced by consistent training, supportive resources, and open dialogue, cultivates collective responsibility and proactive safety behavior (Afsar et al., 2019). Previous research highlights that just culture, focusing on learning rather than blame, strengthens employees' psychological safety and promotes open reporting channels (Dekker & Edmondson, 2022; ICAO, 2022; Under & Gerede, 2021).

Secondly, individual factors: proximal antecedents (motivation and moral courage) are critical at the individual level. Employees who perceive their work environment as fair and non-punitive are likelier to draw on moral courage and intrinsic motivation to report hazards or near misses (Graafland & Van de Ven, 2006). However, cultural norms, hierarchical structures, and fear of reputational damage can hinder these behaviors (Petitta et al., 2017). Addressing these barriers involves implementing simplified reporting systems and fostering supportive leadership to enable employees to report safety concerns (Afsar et al., 2019; Tani, 2019).

Thirdly, the study differentiates between informal and formal voluntary safety reporting behaviors, identifying essential indicators of workplace safety. Informal reporting (verbal reporting) promotes real-time problem-solving but risks leaving critical issues undocumented (Newman & Scott, 2023). In contrast, formal reporting provides systematic documentation and supports comprehensive data collection, consistent with the requirements of aviation safety management systems (Flemons & McRae, 2012). A non-punitive, learning-oriented environment encourages employees to engage in both informal and formal reporting, thereby strengthening psychological safety within the organization (Petitta et al., 2017).

Therefore, the Aviation-Voluntary Safety Reporting Behavior (A-VSRB) model focuses on aviation safety reporting. Unlike the ISM's broad approach to safety behaviors, the A-VSRB emphasizes the decision-making processes behind reporting. It highlights moral courage and safety motivation as mediators linking organizational culture to reporting outcomes. This aligns with research on just culture and safety climate, addressing gaps in the literature by providing actionable strategies for fostering safety cultures where employees feel secure raising concerns. Ultimately, the model integrates leadership, just culture, and individual drivers, creating a roadmap for policymakers and aviation organizations to prevent small-scale errors from escalating into systemic failures

Suggestions and Recommendations

1. Verbal reports are not officially documented in the system when the issue is resolved and no actual incident occurs. The organization should balance its communication methods by integrating informal discussions and formal reporting within its safety system.

2. The aviation industry should consider implementing AI systems for submitting safety concerns verbally, making reporting more accessible and efficient. AI can analyze and categorize reports more accurately, ensuring timely resolution of critical issues. Real-time feedback can also reinforce a proactive safety culture.

Limitations and Future Research

The Aviation–Voluntary Safety Reporting Behavior (A-VSRB) model should be validated beyond the aviation sector and applied to other high-reliability organizations (HROs), including healthcare, nuclear energy, and maritime transport. Employing quantitative or mixed-method approaches would further enhance the model's robustness and allow for cross-validation across diverse cultural and organizational settings. Future research should therefore prioritize extending and validating the A-VSRB model across these varied high-reliability contexts.

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