PUBLISHING KSI
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by : sinta 3 Crossref GARUDA Google Scholar

MULTILEVEL SAFETY COMMUNICATION PATTERNS IN HIGH-RISK GLASS MANUFACTURING: AN EMPIRICAL STUDY OF FORMAL, INFORMAL, AND SYMBOLIC CHANNELS AT PT ASAHIMAS FLAT GLASS TBK

Volume: 7
Number: 4
Page: 986 - 1002

Fadli Muhammad Athalarik[1], Puji Lestari[2], Hari Eko Irianto[3]
[1]Universitas Sahid Jakarta, Indonesia
[2]Universitas Pembangunan Nasional Veteran Yogyakarta, Indonesia
[3]Badan Riset dan Inovasi Nasional, Indonesia
Corresponding author: Fadli Muhammad Athalarik
E-mail: fadli.athalarik@dsn.ubharajaya.ac.id

Article History:
Received: 2026-05-02
Revised: 2026-06-03
Accepted: 2026-07-10

Abstract:
This study aims to analyze formal, informal, and symbolic OHS communication patterns across organizational levels at PT Asahimas Flat Glass Tbk and to construct the first empirically grounded, channel-specific multilevel OHS communication model for glass manufacturing operationalized through the Convergence Model in a Southeast Asian high-risk industrial context. A constructivist qualitative case study design was employed with 14 purposively sampled informants spanning managerial to operational levels; data were collected through in-depth interviews, observation of nine communication events, and document analysis, then coded in NVivo using grounded theory open, axial, and selective coding procedures with source and technique triangulation throughout. The findings of this study reveal a multilevel OHS communication architecture integrating cascading formal policy directives and ritualized daily Toolbox Meetings as the primary transmission mechanism, informal interpersonal channels bridging hierarchical formality with behavioral internalization, and digital reporting via the My Asahimas application raising participation from 79% to 97% among 889 employees by addressing the culturally embedded barrier of sungkan through anonymization—with the core phenomenon identified as safety culture internalization through a multilevel guerrilla communication strategy. The contribution of this study is the SHIFT Model (Safety Habituation through Interactive and Formal Transformation), the first indigenous five-stage model empirically grounding safety culture internalization in Indonesian glass manufacturing, while simultaneously advancing Convergence Model theory in Southeast Asian high-risk industrial contexts and providing practitioners with a diagnostic framework for identifying and addressing internalization regression at each stage of safety culture transformation.

Keywords: OHS Communication, Safety Culture, Glass Manufacturing, Multilevel Communication

INTRODUCTION

Occupational Health and Safety (OHS) communication in high-risk manufacturing environments remains critically underexplored beyond the oil and gas sector, despite glass manufacturing presenting a distinctive multi-hazard risk profile involving extreme thermal exposure, hazardous chemicals, and sharp material risks—as evidenced by Indonesia's dramatic escalation from 101,367 workplace accident cases in 2016 to 462,241 in 2024. This study aims to analyze formal, informal, and symbolic OHS communication patterns across organizational levels at PT Asahimas Flat Glass Tbk and to construct the first empirically grounded, channel-specific multilevel OHS communication model for glass manufacturing operationalized through the

PUBLISHING KSI
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by : sinta 3 Crossref GARUDA Google Scholar

Convergence Model in a Southeast Asian high-risk industrial context. A constructivist qualitative case study design was employed with 14 purposively sampled informants spanning managerial to operational levels; data were collected through in-depth interviews, observation of nine communication events, and document analysis, then coded in NVivo using grounded theory open, axial, and selective coding procedures with source and technique triangulation throughout. The findings of this study reveal a multilevel OHS communication architecture integrating cascading formal policy directives and ritualized daily Toolbox Meetings as the primary transmission mechanism, informal interpersonal channels bridging hierarchical formality with behavioral internalization, and digital reporting via the My Asahimas application raising participation from 79% to 97% among 889 employees by addressing the culturally embedded barrier of sungkan through anonymization—with the core phenomenon identified as safety culture internalization through a multilevel guerrilla communication strategy. The contribution of this study is the SHIFT Model (Safety Habituation through Interactive and Formal Transformation), the first indigenous five-stage model empirically grounding safety culture internalization in Indonesian glass manufacturing, while simultaneously advancing Convergence Model theory in Southeast Asian high-risk industrial contexts and providing practitioners with a diagnostic framework for identifying and addressing internalization regression at each stage of safety culture transformation.

Occupational Health and Safety (OHS) represent one of the most critical dimensions of global industrial governance, encompassing the prevention of work-related injuries, illnesses, and fatalities through systematic risk management and organizational communication. According to the International Labour Organization (ILO, 2019), more than 395 million workers sustain non-fatal work injuries annually, while approximately 2.93 million die from work-related causes, including 330,000 from direct workplace accidents. These figures reflect not only the physical hazards inherent in industrial labor but also systemic failures in how safety information is generated, transmitted, verified, and internalized within organizational systems. The ILO's formal recognition of OHS as a fundamental principle and right at work—codified at the International Labour Conference in June 2022—marks a significant institutional shift, affirming that safe and healthy working conditions are inseparable from the broader framework of decent work (ILO, 2023).

At the national level, Indonesia presents a particularly alarming trajectory. Workplace accident cases surged from 101,367 in 2016 to 462,241 in 2024, with fatality claims reaching 178,381 in the same year (Priono, 2025; HSEPEDIA, 2024). While this increase partly reflects the growth of registered active workers—from 22.6 million in 2016 to 45.2 million in 2024—the disproportionate rise in incident rates signals a deep and persistent implementation gap in OHS value internalization at the operational level. This gap is not merely a regulatory compliance failure; it reflects a fundamental breakdown in how safety communication is structured, delivered, and received across organizational hierarchies in high-risk industries.

Glass manufacturing represents a distinctively high-risk industrial context that has received minimal scholarly attention relative to its occupational hazard profile. The industry combines extreme thermal exposure from smelting furnaces exceeding 1,500°C, constant interaction with sharp glass sheets, sustained exposure to silica dust and toxic chemicals including lead oxide, boron, and arsenic, high-decibel machinery noise across extended shifts, and demanding ergonomic conditions across both hot-end production zones—smelting, forming, and annealing—and cold-end zones encompassing cutting, quality control, and packaging. According to the U.S. Bureau of Labor Statistics (BLS, 2020), flat glass manufacturing recorded an injury incidence rate of 3.5 per 100 full-time workers, significantly higher than the manufacturing sector average. The World Bank Group's (2025) Environmental, Health, and Safety Guidelines for Glass Manufacturing further emphasize the

PUBLISHING
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by :

sector's distinctive multi-hazard profile requiring integrated management systems. Yet despite this risk landscape, glass manufacturing remains conspicuously absent from the mainstream OHS communication literature, which has been dominated almost exclusively by the oil, gas, petrochemical, and construction sectors (Zara, Nordin & Isha, 2023; Dhanush et al., 2025).

The theoretical landscape of this study draws on three integrated frameworks. Katz and Kahn's (1978) Open Systems Theory provides the foundational logic for understanding organizational communication channels as maintenance subsystems that actively counteract entropy in safety behavior—without persistent, active inputs of safety messaging, organizations naturally drift toward habituated non-compliance and diluted risk awareness. Weick and Sutcliffe's (2007) High Reliability Organization (HRO) theory grounds the analysis of how specific organizational principles—preoccupation with failure, sensitivity to operations, reluctance to simplify, commitment to resilience, and deference to expertise—translate into concrete communication practices at the shop-floor level. Most centrally, Kincaid's (1979) Convergence Model of Communication, operationalized through the iterative cycle of Information Sharing → Mutual Understanding → Mutual Agreement → Collective Action, offers the analytically precise framework for diagnosing whether formal safety policy directives genuinely converge with worker behavior or remain at the level of performative compliance under surveillance.

Existing literature has established a robust empirical consensus that safety communication functions as the primary mediating variable between safety culture and safety performance (Naji et al., 2022; Zulkarnain, Lestari & Kholil, 2025). Studies from Malaysia (Mohamad, Adamu & Akanmu, 2023), Indonesia (Sulistyo, Lestari, Irwanti & Lestari, 2022), and Ethiopia (Abeje & Luo, 2023) consistently demonstrate that the quality and architecture of internal safety communication determine the degree to which safety culture becomes institutionalized organizational behavior. However, three significant gaps persist in this literature. First, a contextual gap: virtually all empirical studies on safety communication architecture are situated in oil, gas, petrochemical, or construction sectors, leaving the glass manufacturing industry—with its unique dual-hazard profile of simultaneous extreme heat and sharp material exposure across differentiated hot-end and cold-end production zones—entirely unexamined. Second, a theoretical gap: most studies treat communication as a single intervening variable measured through quantitative surveys, failing to unpack the architecture of how communication channels are structured, ritualized, and experienced across organizational levels. Third, a methodological gap: the dominance of cross-sectional quantitative designs prevents deep exploration of the qualitative dynamics underlying deliberate non-compliant behavior at the shop-floor level (Zara et al., 2023; Dhanush et al., 2025).

Several existing models directly inform the positioning of this study. Sulistyo et al.'s (2022) SIKATBUKA model, developed in the Indonesian national oil company context, identifies cascading top-down and participatory bottom-up communication flows as dual drivers of safety culture institutionalization—but does not specify symbolic or digital channel dimensions. DuPont's Bradley Curve (1995) and Hudson's Safety Ladder (2002) describe safety culture maturity stages without specifying communication mechanisms that move organizations between them. Guldenmund's (2018) Development Stages model and Reason's (1997) Five Sub-Cultures framework similarly describe outcomes without specifying communicative processes. Linden, Ulvenblad, and Barth's (2025) conceptual model of safety culture co-creation in forest industry manufacturing is the closest analogue in the manufacturing literature, identifying vertical and horizontal interaction as the co-generative mechanism, but without the channel-level specificity applicable to glass manufacturing's multi-hazard context.

PUBLISHING
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by :

The present study advances on these models in three ways that constitute its novelty. First, it provides the first empirically grounded, channel-specific map of multilevel OHS communication architecture in glass manufacturing, constructed through primary field data from a flagship Indonesian flat glass manufacturer. Second, it operationalizes Kincaid's (1979) convergence cycle as a diagnostic framework for assessing genuine behavioral convergence in a high-risk Southeast Asian industrial context where cultural variables such as sungkan—reluctance rooted in social hierarchy—constitute structural communication barriers that general OHS frameworks developed in Western contexts have systematically undertheorized. Third, it introduces 'guerrilla communication' as a theoretically grounded construct capturing the persistent, multi-directional saturation logic of effective high-risk safety communication, derived directly from informant language rather than imposed from existing theory. No prior model in the safety culture literature specifies the communication mechanisms that drive organizations through maturity stages; this study directly fills that gap. Based on this positioning, the primary research objective is: to analyze the formal, informal, and symbolic OHS communication patterns applied in a layered and integrated manner across organizational levels in constructing a safety communication culture at PT Asahimas Flat Glass Tbk.

Theoretical Framework. The conceptual architecture of this study integrates three theoretical pillars that together enable a comprehensive diagnosis of OHS communication systems from both structural and processual perspectives. These frameworks are applied not in isolation but in an integrated configuration: Open Systems Theory specifies the organizational imperative for multi-channel saturation; HRO Theory specifies the behavioral principles that communication must operationalize; and Kincaid's Convergence Model specifies the diagnostic standard against which communication effectiveness is assessed.

The first theoretical pillar is Katz and Kahn's (1978) Open Systems Theory, which treats organizations as open systems continuously exchanging energy and information with their environment to sustain themselves against the natural tendency toward entropy—disorder and decay. Applied to OHS communication, this framework conceptualizes communication channels as maintenance subsystems: their function is not merely to transmit information but to actively renew and sustain the organizational commitment to safety against the gravitational pull of habituated non-compliance. Without continuous, multi-channel inputs of safety messaging, the system naturally drifts toward reduced vigilance, normalized risk-taking, and eroded safety culture. This entropic logic directly motivates the 'guerrilla communication' strategy identified in this study: the deliberate counter-entropic saturation of safety messaging across all organizational spaces, times, and communication registers—formal, informal, and symbolic—precisely because no single channel intervention is sufficient to hold the system in a state of sustained safety culture.

The second pillar is Weick and Sutcliffe's (2007) High Reliability Organization (HRO) Theory, which identifies five organizing principles characteristic of organizations that maintain near-zero failure rates in high-hazard environments: preoccupation with failure (treating near-misses as signals of systemic vulnerability rather than isolated incidents); reluctance to simplify (maintaining nuanced interpretations of complex risk scenarios); sensitivity to operations (maintaining continuous situational awareness at the front line); commitment to resilience (building adaptive capacity to respond to unexpected events); and deference to expertise (prioritizing technical knowledge over hierarchical authority in risk decisions). Each of these principles has direct communicative implications. Preoccupation with failure is operationalized through near-miss reporting systems such as My Asahimas. Sensitivity to operations is operationalized through Genba management practice and Kiken Yochi hazard prediction. Deference to expertise is operationalized

PUBLISHING KSI
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by : sinta 3 Crossref GARUDA Google Scholar

through the two-way dialogue structure of Lunch Break Communications. HRO theory thus provides the behavioral content that OHS communication systems must transmit and reinforce.

The third and most analytically central pillar is the Convergence Model of Communication, which fundamentally reconceptualizes communication as a cyclical convergence process rather than linear transmission (Kincaid, 1979; Rogers & Kincaid, 1981). The model posits four iterative stages: Information Sharing, in which participants exchange information about safety conditions, risks, and procedures; Mutual Understanding, in which shared meaning about safety practices is co-constructed through dialogue; Mutual Agreement, in which participants reach alignment on appropriate safety behaviors and their rationale; and Collective Action, in which shared understanding translates into coordinated behavioral change. Critically, convergence is never total or permanent—participants move progressively toward shared understanding through repeated interaction cycles, and any disruption to the cycle produces communication decay and divergence (Kincaid, 1979). Contemporary scholarship corroborates the model's analytical utility in organizational safety contexts: Digmayer and Jakobs (2022) demonstrate that safety communication in industrial environments functions as a meaning-construction process requiring iterative multi-channel reinforcement rather than one-directional message delivery, while Bisbey et al. (2021) establish that safety culture formation is a cyclical, multilevel social process in which shared values are gradually co-constructed through sustained communicative interaction across organizational levels—both conclusions consistent with the convergence cycle's core logic. This model enables precise diagnosis of whether safety communication systems achieve genuine behavioral convergence—where safety values are owned and enacted by workers even without surveillance—or remain at the level of performative compliance. The Horenso breakdown documented in this study is diagnosed through this framework as a convergence decay event: when informal inter-shift coordination fails, the convergence cycle is interrupted and safety knowledge fails to transfer across shift boundaries. The multi-channel guerrilla strategy is the organizational response to this constant convergence decay risk.

METHODS

This study employs a single instrumental case study design at PT Asahimas Flat Glass Tbk, a publicly listed Indonesian flat glass manufacturer and member of the AGC Group (Japan). A case study is a qualitative research strategy in which the researcher conducts in-depth exploration of a program, event, activity, or process, bounded by time and activity, collecting detailed data through various procedures over a sustained period (Sugiyono & Lestari, 2024). The case was purposively selected based on three criteria: (a) high-risk manufacturing classification with documented OHS challenges and established multilevel communication systems; (b) operational scale and organizational complexity sufficient to represent the full spectrum of formal, informal, and symbolic communication channels; and (c) feasibility of comprehensive access across all organizational levels—from corporate management to shift-level operators.

Fourteen (14) key informants were selected through purposive sampling. Purposive sampling, as defined by Sugiyono and Lestari (2024), is a technique for selecting data sources or informants based on specific considerations—premised on the assumption that selected individuals are regarded as having the most comprehensive knowledge of the phenomenon, or are those with relevant organizational authority, enabling the researcher to thoroughly explore the social situation under study. Informants were not selected to represent a statistical population but because they held direct experience, knowledge, and positional access relevant to constructing and managing OHS communication culture at each organizational level. Sampling continued until theoretical saturation

PUBLISHING KSI
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by : sinta 3 Crossref GARUDA Google Scholar

was achieved—the point at which successive interviews yielded no new conceptual categories or properties (Lincoln & Guba, 1985). The sample comprised: one Corporate Manager HSE; two Section Heads (Corporate and Factory HSE); one Department Head HSE; two Shift Foremen (Groups A and B); and eight operational workers across painting operators, forklift drivers, and transport and glass handling operators from both shift groups.

Table 1. Profile of Research Informants

Position	Organizational Level	Shift	Communication Role
Corporate Manager HSE	Strategic	—	Policy formulation & KPI oversight
Section Head Corporate HSE	Strategic	—	Global benchmarking & cross-plant deployment
Section Head Factory HSE	Tactical	—	Factory-level campaign & patrol coordination
Department Head HSE Factory	Tactical	—	Shop-floor communication & training oversight
Shift Foremen (Group A & B)	Supervisory	Rotating	TBM facilitation, daily safety instruction
Painting Operators (Group A & B)	Operational	Rotating	Chemical hazard exposure context
Forklift Drivers (Group A & B)	Operational	Rotating	Heavy equipment risk context
Transport & Glass Handling (A & B)	Operational	Rotating	Primary physical injury risk context

Source: Primary data (2025–2026)

Data were collected through three complementary methods. In-depth semi-structured interviews were conducted individually with all 14 informants between December 2025 and April 2026, each lasting 60–90 minutes, audio-recorded with consent and transcribed verbatim. In-depth interviewing is a technique involving direct interaction between researcher and informant, designed to elicit rich and detailed information about experiences, views, and perceptions; it provides flexibility to spontaneously explore topics based on informant responses and is effective for capturing subjective meaning within the social context of the phenomenon (Sugiyono & Lestari, 2021). Interview protocols were differentiated by informant role to capture both emic (actor-defined) and etic (researcher-interpreted) dimensions of safety communication (Spradley, 1979). Strategic-level informants were asked about policy formulation, cascade mechanisms, and global benchmarking; supervisory-level informants about TBM facilitation, inter-shift coordination, and barrier management; and operational-level informants about daily risk experience, reporting behavior, and informal communication practices.

Direct observation covered nine distinct communication events, documented through structured field notes and photographic documentation: (1) Toolbox Meeting—morning shift (December 31, 2025); (2) Safety Patrol (January 27, 2026); (3) Factory Manager Safety Meeting (January 19, 2026); (4) TBM—QC Float (January 27, 2026); (5) Morning Meeting Staff (January 27, 2026); (6) Lunch Break Communication (January 27, 2026); (7) Incident Investigation Session (January 27, 2026); (8) AGC Regional President Explanation (January 30, 2026); and (9) Safety Quiz Competition (February 10, 2026). As Sutrisno Hadi—cited in Sugiyono and Lestari—states, observation is a complex process consisting of biological and psychological processes, with

PUBLISHING
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by :

perception and memory as its two main components, particularly valuable for collecting data on human behavior and work activities (Sugiyono & Lestari, 2024). Passive participatory observation was applied: the researcher was present at all observed events without directly participating in them, maintaining analytical distance while achieving data completeness and depth (Sugiyono & Lestari, 2024). Systematic observation tables recorded 10–19 indicators per event encompassing communication structure, content directionality, artifact use, hierarchical dynamics, participation patterns, and non-verbal communication elements. Document analysis encompassed PT Asahimas Flat Glass Tbk's Sustainability Reports (2023–2024), Annual Reports (2023–2024), internal OHS policy documents, Kiken Yochi documentation, My Asahimas application participation data, and AGC Group global OHS framework documents.

Analysis proceeded through Strauss and Corbin's (1998) three-stage grounded theory coding, with all interview transcripts, observation field notes, and documents imported and coded using NVivo qualitative data analysis software. NVivo enabled structured node-based coding, relationship mapping between categories, matrix coding for cross-case comparison, and systematic query functions supporting rigorous and transparent analytical procedures. The overarching analytical framework follows the Miles and Huberman interactive model comprising four interrelated stages: data collection, data reduction (selective focusing and abstraction of raw data within NVivo), data display (organizing coded data into structured relational patterns using NVivo's visualization functions), and conclusion drawing/verification (Sugiyono & Lestari, 2024). In the open coding stage, conceptual codes were inductively identified from reduced material and anchored to specific text segments. In the axial coding stage, open codes were organized into ten axial categories using the paradigmatic model—causal conditions, action strategies, contextual conditions, intervening conditions, and consequences—revealing systematic relationships between categories. In the selective coding stage, a core integrative category was formulated with three theoretical propositions. Initial conclusions were provisional and continuously verified through re-examination of data, inter-rater peer debriefing with two external communication scholars, and member checking with informants. Data validity was established through source triangulation—cross-checking data obtained from management, supervisory, and operational informant levels—and technique triangulation—cross-checking the same information through interview, observation, and document analysis, ensuring no single method's limitations compromised the overall credibility of findings (Sugiyono & Lestari, 2024).

RESULT AND DISCUSSION

Overview of the Communication Architecture: Ten Axial Categories. Grounded theory analysis through NVivo yielded ten axial categories representing the constitutive elements of the OHS communication system at PT Asahimas Flat Glass Tbk. These categories are organized within the paradigmatic model of grounded theory as causal conditions, action strategies, contextual conditions, intervening factors, and consequences that together produce the core consequential phenomenon. The paradigmatic model provides the structural logic for understanding not just what communication practices exist, but how they relate to each other causally and functionally within the overall system.

Table 2. Ten Axial Categories of OHS Communication at PT Asahimas Flat Glass Tbk

Axial Category	Definition	Paradigmatic Role
Top Management Commitment & Policy	Structural foundation; cascading from AGC global to shop floor	Causal condition

PUBLISHING
KSI
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by :

Multilevel OHS Ritual Communication	Formal & semi-formal structured activities from strategic to operational level	Action strategy
Channel & Media Infrastructure	Digital (My Asahimas, dashboard), social (WhatsApp), visual (posters/banners)	Contextual condition
Communication Style & Approach	Humanistic, personal, Genba-based, 3S (Senyum-Sapa-Salam) interpersonal modalities	Facilitating intervening
Monitoring, Evaluation & Accountability	Multi-level patrol, scoring, safety report cards, graduated sanctions	Action strategy
Reward & Safety Motivation	Incentive schemes and thematic campaigns building ownership	Action strategy
Communication Barriers & Challenges	Distortion, technical language, APD discomfort, fear of reporting, mannerism	Inhibiting intervening
Organizational Learning & Global Benchmarking	Cross-plant learning within AGC global network	Contextual condition
Holistic Engagement & Psychosocial Support	Family engagement programs and experiential safety simulation	Supplementary action
Operational Coordination & Shift Adaptation	Non-verbal field signals, work-rest rotation, shift handover mechanisms	Contextual condition

Source: Primary data analysis (2026)

Formal Communication Channels: The Multilevel Ritual Architecture. Formal OHS communication at PT Asahimas Flat Glass Tbk operates through a rigorously structured five-level hierarchical cascade: (1) Global Policy—AGC Group Japan, which establishes the universal OHS philosophy and minimum performance standards; (2) Corporate Policy—PT Asahimas Flat Glass Tbk headquarters, which translates global directives into Indonesia-specific operational procedures; (3) Factory Management—Cikampek and Sidoarjo plants, which adapts corporate procedures to site-specific hazard profiles; (4) Departmental Supervisors—Foremen and Section Heads, who operationalize procedures through daily shift-level communication; and (5) Operational Workers—shift operators, the terminal recipients and behavioral enactors of the safety communication system. This cascade structure is anchored in the 'No Production Without Safety Assurance' philosophy introduced in 2006, which established safety as a non-negotiable precondition for production rather than a parallel compliance obligation.

The Toolbox Meeting (TBM) emerges from analysis as the most functionally significant formal channel, constituting the daily ritual through which the entire cascade is operationalized at the production level. TBM operates at each shift commencement for approximately 5–17 minutes and systematically covers: occupational hazard review for the forthcoming work period; review of near-miss incidents and safety deviations from the preceding shift; APD compliance verification and correction; Kiken Yochi (KY/Hazard Prediction) activities requiring workers to verbally anticipate risks specific to their tasks; and Pointing and Calling (P&C) practice, which mandates physical gesture-plus-vocalization confirmation before directional movements. The study's systematic observation of four TBM instances across different production zones and shift groups documented consistent integration of verbal instruction, physical APD inspection, peer-to-peer safety dialogue, and artifact-mediated communication through Kiken Yochi boards. Two foremen from the same department offered contrasting assessments of TBM effectiveness, illuminating the productive tension within the formal architecture:

PUBLISHING
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by :

"*At the beginning of the shift, we hold a Toolbox Meeting (TBM). From there, everything is discussed, from work plans to safety issues and other topics. In my opinion, the most effective are the TBM and Kiken Yochi.*" (Wahyudi, Foreman Mirror Grup A, April 2026)

"*TBMs alone are only about 50% effective. TBMs cannot stand alone; they must be combined with two-way communication and direct field supervision.*"
(Sopari, Foreman Mirror Grup B, April 2026)

Both foremen confirm TBM as universally practiced and widely valued, yet Sopari's critical quantification—50% effectiveness in isolation—constitutes a finding of considerable practical significance that quantitative attendance-based KPI systems would systematically miss. Together, these two perspectives confirm the formal channel as a necessary but not sufficient condition for safety communication effectiveness, and directly motivate the multi-channel guerrilla strategy. From the operational level, Rustono (Production Operator, Cikampek Factory) confirmed TBM's habituating effect at the behavioral level:

"*In the field, safety is no longer just a document but has become part of our daily work rituals through Kiken Yochi and the Pointing and Calling method.*" (Rustono, December 31, 2025).

This statement captures the intended terminal outcome of the formal channel architecture: the transformation of written safety policy into embodied daily ritual that workers enact without requiring external enforcement.

The Monthly Safety Meeting and bi-annual Safety Committee Meeting (P2K3) constitute the upper formal tiers, operating from tactical to strategic levels. P2K3 meetings involve the complete organizational hierarchy from the President Director to union representatives and employ data-driven 'Bad News First' norms—safety performance data is constitutionally the first agenda item, structurally privileging safety discourse over production metrics. Ryan (TGH-A) confirmed the embodied nature of P&C practice while simultaneously articulating a structural critique:

"*Pointing and calling must be done every time you want to turn or when the pallet is full. Patrol frequency should also be increased and not just intensified after an incident.*"
(Ryan, Transport & Glass Handling Grup A, April 2026)

Ryan's dual statement—confirming formal practice while critiquing its reactive rather than proactive implementation—documents the gap between formal system design and actual operational execution. Patrol mechanisms that intensify only after incidents reflect a reactive rather than anticipatory safety governance logic, contradicting the HRO principle of preoccupation with failure (Weick & Sutcliffe, 2007). This gap between formal policy and implementation is precisely what the informal and symbolic channels are designed to fill.

Informal Communication Channels: Bridging Formal and Behavioral Gaps. Informal communication channels operate as the critical bridge between formal safety policy and internalized worker behavior, functioning in the spaces between formal events and outside the constraints of hierarchical formality. Three primary informal channels were identified: Lunch Break Communication (LBC), leadership behavioral modeling, and inter-shift WhatsApp coordination.

The Lunch Break Communication—observed January 27, 2026—represents the most structurally innovative informal channel. Conducted in a relaxed circular seating arrangement on

PUBLISHING
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by :

synthetic grass mats, with boundary-dissolving physical configuration that removes the hierarchical spatial cues of formal meetings, LBC enables genuine two-way dialogue between management and operators in a psychologically safe environment that formal meeting formats structurally cannot replicate. The moderator functions as a facilitator rather than an authority figure; workers freely raise concerns, ask questions, and share experiences. This design directly addresses what Kincaid (1979) identifies as the mutual understanding stage of convergence—the co-construction of shared meaning that cannot occur in unidirectional formal presentations.

The most powerful informal mechanism identified across all informant levels, however, is leadership behavioral modeling—the visible behavioral enactment of safety values by supervisors and managers in the production environment. Two informants from different organizational levels independently converge on this mechanism:

"*The most effective way to translate that commitment to employees is to provide direct examples of safety practices.*"
(Sopari, Foreman Mirror Grup B, April 2026)

"*Occupational safety is about modeling behavior. If a leader is disciplined in using PPE and following a safe path, employees will automatically follow suit. Conversely, if a leader breaks the rules, they will lose the moral legitimacy to reprimand their subordinates.*"
(Pahlevi, Corporate Manager HSE, Desember 2025)

The convergence of Sopari (foreman level) and Pahlevi (corporate strategic level) on behavioral modeling—rather than verbal instruction or written procedure—as the decisive transmission mechanism confirms a fundamental principle: informal channels carry moral authority that formal channels structurally cannot generate. A manager who violates APD protocols while issuing verbal compliance instructions does not merely set a bad example; he structurally disqualifies himself as a safety communicator, as Pahlevi's formulation of 'moral legitimacy' explicitly captures. This finding is consistent with Mohamad, Adamu, and Akanmu's (2023) work on internal crisis communication in Malaysian high-risk manufacturing, where supervisory behavioral modeling was identified as the decisive variable in safety communication credibility.

WhatsApp group communication serves as the primary informal digital channel for urgent inter-shift coordination. Its adaptive function is described by Sopari: 'If something is urgent, I call directly to the foreman; if I put it in the group, it might not get read'—revealing a sophisticated informal triage system for information urgency. However, a critical structural vulnerability was identified in the Horenso (Hokoku-Renraku-Sodan) coordination ritual:

"*At Mirror, there are no in-person meetings between shifts due to the several-hour gap. Communication is done through the Horenso WhatsApp group. However, the Horenso has not been running smoothly in recent months, even though it is essential for the next shift to be aware of what happened in the previous shift.*"
(Galuh, Transport & Glass Handling Grup B, April 2026)

Galuh's account reveals a convergence decay event in Kincaid's (1979) terms: when the informal coordination ritual fails, information about near-misses, equipment anomalies, and abnormal conditions does not transfer across the shift boundary—creating safety blind spots that formal systems miss entirely because they occur in the temporal and spatial gap between formal

PUBLISHING
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by :

reporting cycles. This structural vulnerability demonstrates that informal channels, when functioning, provide redundancy and resilience to the formal system, but their degradation creates discontinuities that neither formal procedures nor symbolic messaging can compensate.

The Stop-Wait-Educate (SWE) interpersonal intervention and the 3S (Senyum-Sapa-Salam / Smile-Greet-Wish) communication philosophy complete the informal channel architecture. SWE operationalizes corrective safety communication by halting work upon observing unsafe behavior, creating a deliberate psychological pause for disengagement from the unsafe act, and delivering personalized educational messaging without public shaming. The 3S philosophy establishes the interpersonal tone of all supervisory interactions, ensuring that corrective messages are delivered within a relational framework of respect and warmth. Genba (現場) practice—the Japanese management principle requiring managers to physically visit the shop floor to obtain firsthand observational data—further operationalizes informal leadership communication by maintaining authentic, unannounced surveillance that communicates genuine managerial investment in floor-level safety conditions rather than dashboard-based remote governance.

Symbolic Communication and Digital Infrastructure. Symbolic communication constitutes the most pervasive yet least formally studied dimension of the OHS communication system, operating continuously in the physical and digital environment of the workplace rather than requiring scheduled events or direct interpersonal interaction. Five integrated layers of visual information anchoring were identified through observation and document analysis: (1) mandatory APD signage and hazard warnings at all area entry points, establishing safety as the first cognitive frame upon entering any production zone; (2) process-specific Kiken Yochi boards at workstation level, embedding hazard prediction data directly in the physical workspace where risks materialize; (3) department-level safety performance dashboards in common areas, making collective safety performance continuously visible to all workers; (4) rotating monthly thematic campaign banners, preventing the visual environment from becoming habituated background noise; and (5) the My Asahimas digital application interface, functioning as both a reporting tool and a visible symbol of the organization's commitment to participatory safety governance.

Monthly thematic campaigns (Safety Campaign Tematik Bulanan) rotate systematically across topics—forklift safety, emergency response, chemical handling, near-miss reporting, ergonomics—each accompanied by distinctive visual identities. The rotation strategy directly addresses the mannerism problem: the phenomenon wherein repetitive messaging degrades into performative ritual that workers process habitually without genuine cognitive engagement. By refreshing the visual communication environment monthly, the system maintains the novelty threshold necessary for active message processing. This strategy operationalizes the Open Systems Theory principle of active negentropy maintenance (Katz & Kahn, 1978): static messaging allows the system to drift toward safety attention entropy, while dynamic messaging actively counteracts that drift.

The My Asahimas application constitutes the most significant channel innovation in the system, representing the convergence of digital infrastructure and psychological safety design. The platform enables real-time reporting of unsafe conditions, near-miss incidents, and daily forklift inspection checklists by any employee regardless of organizational level. Two informants describe the platform from contrasting institutional and individual user perspectives:

"If someone feels uncomfortable reporting something directly, they can use this system. Simply take a photo of the unsafe condition and upload it. Management has established a rule: anyone can report it, and there should be no defensiveness or argumentation from the person being reported. The goal is purely to foster a safe work environment."

PUBLISHING
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by :

(Heru Fahrudin, Section Head HSE Cikampek Factory, Desember 2025)
"*In the My Asahimas reporting system, the reporter's identity is not disclosed so that the reporter feels protected and safe.*"
(Sutadja, Driver Forklift Grup B, April 2026)

Heru Fahrudin's institutional framing and Sutadja's individual user experience converge to confirm that My Asahimas functions as a psychological safety enabler rather than merely a data collection tool. The anonymization feature directly addresses the sungkan barrier—the culturally embedded reluctance to report upward that characterizes collectivist-hierarchical Indonesian workplace dynamics—by restructuring the social risk calculus of reporting: workers can fulfill their safety reporting obligation without the interpersonal exposure that hierarchical reporting pathways impose. The behavioral outcome of this design is documented: OHS reporting participation rose from 79% to 97% of 889 registered employees following full deployment. The gradient of reporting barrier was further illuminated by contrasting accounts from the same operational position across shift groups:

"*There's definitely a fear of being reprimanded or fired, but you still have to report to the foreman first, following the hierarchical reporting process.*"
(Ryan, Transport & Glass Handling Grup A, April 2026)

"*There's definitely a feeling of discomfort when reporting something, but because work conditions require it, it still has to be reported, especially to the foreman first.*"
(Galuh, Transport & Glass Handling Grup B, April 2026)

Ryan's institutional fear—the possibility of punitive consequences—and Galuh's interpersonal discomfort—rasa tidak enak, a culturally specific reluctance distinct from fear—represent two points on the same inhibition gradient. Together with Sutadja's account of confidence through anonymity, these three perspectives document the operational texture of the five-stage internalization process at PT Asahimas: workers at different points in the Coercion → Habit → Awareness → Need → Culture trajectory experience and respond to reporting barriers differently, requiring differentiated communication interventions—anonymization tools for those at the fear stage, normalization messaging for those at the discomfort stage, and recognition programs for those who have internalized reporting as a personal value.

The central finding of this study is that OHS communication culture in high-risk glass manufacturing is not an outcome of any single channel or policy directive but an emergent property of a complex, multilevel architecture operating across formal, informal, symbolic, and digital registers simultaneously. Selective coding produced the core integrative category: Internalization of Safety Culture through a Multilevel Guerrilla Communication Strategy, Hierarchical, Participatory, and Responsive. The term 'guerrilla communication' was derived directly from informant language—'Our communication is guerrilla in nature—continuously seeping through various channels' (Heru Fahrudin, Department Head HSE Factory, 2026)—and captures, in the informants' own conceptual vocabulary, the defining logic of the system: persistent, multi-channel, multi-directional saturation of safety messaging across all organizational spaces, temporal periods, and communication registers. 'Guerrilla' in this context does not imply subversiveness but rather the tactical logic of omnipresence—ensuring that safety cannot be avoided as a cognitive and behavioral reality in the workplace.

PUBLISHING KSI
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by : sinta 3 Crossref GARUDA Google Scholar

Three theoretical propositions structure the interpretation of findings. First, effective OHS communication culture forms when there is sustained synergy between top management commitment as the foundational causal condition, multilevel guerrilla communication strategies as the primary action strategies, digital and global knowledge-sharing infrastructure as contextual conditions, and humanistic-participatory communication styles as facilitating intervening conditions. When any of these four elements is absent or weakened, the system loses coherence: commitment without communication strategies produces policy without implementation; communication without digital infrastructure loses reach and measurability; and technical communication without humanistic style produces compliance without internalization. This proposition extends the SIKATBUKA model developed in oil-and-gas contexts by Sulistyo et al. (2022) to include symbolic, digital, and affective dimensions not captured in that sector-specific framework. Second, communication effectiveness is determined by the organization's capacity to systematically mitigate structural inhibiting conditions on a continuous basis—including information distortion across hierarchical levels, technical language barriers between HSE professionals and operational workers, APD ergonomic discomfort, fear of reporting rooted in punitive cultures, ritual mannerism wherein repeated formats lose communicative substance, and production pressure dilemmas where time urgency competes with safety procedure adherence. Critically, sungkan functions not merely as a cultural nuance but as a structural barrier operating on a gradient that requires differentiated organizational responses at each hierarchical level—extending Rahim et al.'s (2024) reporting barrier findings into the collectivist-hierarchical Indonesian manufacturing context, and revealing an inhibition mechanism qualitatively distinct from the social desirability bias documented in Western-context safety communication studies. Third, the transition from compliance-based to value-based safety culture is achievable through persistent multi-channel communication saturation that simultaneously addresses cognitive, behavioral, emotional, and normative dimensions of worker safety experience. The documented rise in OHS reporting participation from 79% to 97% among 889 employees constitutes empirical evidence that this transition is organizational rather than merely individual—achieved through architectural redundancy across all channel registers rather than optimization of any single channel.

These propositions find theoretical grounding in multiple complementary frameworks. The identification of TBM as the primary formal transmission mechanism operationalizes what Katz and Kahn (1978) theorized as the maintenance subsystem of open organizations: TBM does not merely disseminate safety information but enacts the daily renewal of safety commitment through ritualized co-presence, joint risk identification, reciprocal accountability, and behavioral confirmation through KY and P&C. The guerrilla communication construct is further significant in relation to Open Systems Theory in that, without active continuous multi-channel inputs, organizational systems naturally drift toward safety culture entropy—habituated non-compliance, normalized risk-taking, and diluted risk awareness. The guerrilla strategy operationalizes negentropy as a deliberate organizational practice and fills the gap left unspecified by prior safety maturity models—the Bradley Curve, Hudson's Safety Ladder, Guldenmund's Development Stages, and Reason's Five Sub-Cultures—by identifying the specific communication mechanisms that actively counter safety culture decay and drive transitions between maturity stages. Through the convergence cycle, each channel layer targets a different stage of the process: formal channels drive information sharing; informal channels build mutual understanding through dialogue; symbolic channels sustain mutual agreement through environmental reinforcement; and digital channels enable collective action through participatory reporting.

PUBLISHING
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by :

The present study identifies a more architecturally complex system than two-directional flows: a multi-directional web simultaneously targeting cognitive (formal TBM instruction), behavioral (modeling and Stop-Wait-Educate intervention), emotional (Lunch Break Communication relational trust-building), and normative (symbolic anchoring and thematic campaign) dimensions of worker safety experience. This finding is consistent with Linden, Ulvenblad, and Barth's (2025) conclusion that safety culture is co-created through vertical and horizontal interaction in manufacturing, now extended to glass manufacturing with greater channel-level specificity. The digital dimension—My Asahimas participation rising from 79% to 97%—addresses the digital gap in OHS communication research noted by Dhanush et al. (2025) and Sunil Kumar et al. (2025), while the anonymization mechanism that drove this increase confirms that sungkan requires structural rather than merely attitudinal solutions.

Finally, the Genba practice and 3S communication philosophy—Japanese management traditions adapted to the Indonesian manufacturing context—operationalize the transmitting and reinforcing stages of safety culture development through culturally specific interpersonal norms rather than the confrontational disclosure cultures more common in Western manufacturing environments. This confirms that safety culture internalization in high-risk Southeast Asian manufacturing cannot be adequately theorized through Western-derived frameworks alone, and positions the SHIFT Model's five-stage indigenous architecture as a more contextually valid diagnostic tool for organizations operating within collectivist-hierarchical cultural systems, and as this study's primary contribution to safety communication theory and practice.

CONCLUSION

This study demonstrates that OHS communication culture in high-risk glass manufacturing is not an outcome of any single channel or policy directive but an emergent property of a complex, multilevel architecture operating across formal, informal, and symbolic registers simultaneously. Ten axial categories identified through grounded theory analysis reveal a system in which top management commitment provides the foundational causal condition; ritualized formal communication—particularly Toolbox Meetings—serves as the primary transmission mechanism; informal interpersonal channels including Lunch Break Communications, behavioral modeling, and Stop-Wait-Educate interventions bridge hierarchical formality with authentic behavioral internalization; and symbolic and digital channels provide persistent environmental reinforcement. The core phenomenon—safety culture internalization through a multilevel guerrilla communication strategy—captures the defining logic of this system: persistent, multi-directional saturation of safety messaging designed to overcome cultural inertia, hierarchical barriers rooted in sungkan, and production pressure dynamics that continuously threaten to displace safety priorities.

Three contributions mark the novelty of this study. First, it produces the first empirically grounded, channel-specific model of multilevel OHS communication in glass manufacturing—a sector systematically absent from existing safety communication literature despite its distinctive multi-hazard profile of simultaneous thermal, chemical, and mechanical risks. Second, it advances the Convergence Model analytically by operationalizing convergence decay as a diagnosable organizational event: the Horenso breakdown documented here demonstrates precisely how inter-shift communication failures interrupt the convergence cycle and cause safety knowledge to fail at shift boundaries, a mechanism not previously theorized in industrial safety communication research. Third, the SHIFT Model (Safety Habituation through Interactive and Formal Transformation) constitutes the first indigenous five-stage model grounded in Indonesian high-risk manufacturing reality, providing organizations with a diagnostic framework to identify and address

PUBLISHING
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by :

internalization regression at each transitional stage from compliance-based to value-based safety culture. The documented rise in OHS reporting participation from 79% to 97% among 889 employees empirically validates that this transition is achievable through persistent, multi-channel communication saturation.

Several limitations bound the transferability of these findings. As a single-case study, findings are contextually specific to PT Asahimas Flat Glass Tbk's organizational culture and Japanese management integration, requiring theoretical rather than statistical generalization to other manufacturing contexts; the 14-informant sample, while achieving theoretical saturation, underrepresents night-shift dynamics and the full workforce; and self-reported data may carry social desirability bias. Future research should pursue comparative testing of the multilevel communication framework across glass manufacturing facilities in Southeast Asia; develop quantitative instruments for large-sample validation of the ten axial categories and the five SHIFT stages; investigate differential channel effectiveness across hot-end versus cold-end production zones where hazard profiles diverge significantly; and conduct longitudinal studies tracking communication strategy evolution alongside incident frequency rates to establish causal evidence beyond what cross-sectional designs can support. Practitioners in high-risk manufacturing contexts are encouraged to audit their communication architectures against the SHIFT Model's five stages to diagnose internalization gaps before they surface as behavioral regression or incident escalation.

REFERENCES

Abeje, A., & Luo, Q. (2023). The influence of safety culture and climate on safety performance: Mediating role of employee engagement in manufacturing. *Safety Science, 158*, 105–119.

Bisbey, T. M., Kilcullen, M. P., Thomas, E. J., Ottosen, M. J., Tsao, K., & Salas, E. (2021). Safety culture: An integration of existing models and a framework for understanding its development. *Human Factors, 63*(1), 88–110. (Scopus-indexed, Sage)

BLS (Bureau of Labor Statistics). (2020). *Occupational injuries, illnesses, and fatalities in the United States.* U.S. Department of Labor.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approache (3rd ed.).* SAGE Publications.

Dhanush, A., Hamzat, A., & colleagues. (2025). Safety culture research: A bibliometric analysis of 7,058 publications (1978–2023). *Safety Science, 170,* 106–124.

Digmayer, C., & Jakobs, E.-M. (2022). Analyzing safety communication in industrial contexts. *Technical Communication Quarterly, 31*(3). https://doi.org/10.1177/00472816211014126 (Scopus-indexed, Sage)

DuPont. (1995). *Bradley Curve: Safety leadership model.* DuPont Sustainable Solutions.

Dukeshire, S., & Thurlow, J. (2002). Understanding the link between research and policy. Rural Communities Impacting Policy.

Guldenmund, F. W. (2018). Understanding safety culture and its relationship to safety management. *Risk Analysis, 20*(4), 215–225.

Handayani, R. (2023). Implementation of occupational health and safety communication in the petrochemical industry of Kujang Fertilizer. *Jurnal Komunikasi, 15(*1), 45–67.

HSEPEDIA. (2024). Data kecelakaan kerja dan kematian terkait kerja di Indonesia 2016–2024. Retrieved from https://www.hsepedia.co.id

PUBLISHING
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by :

Hudson, P., Parker, D., & van der Graaf, H. (2002). *The Hearts and Minds programme.* Shell Global Solutions.

ILO (International Labour Organization). (2019). Safety and health at the heart of the future of work. ILO Publications.

ILO (International Labour Organization). (2023). Global trends on occupational accidents and diseases. ILO.

Katz, D., & Kahn, R. L. (1978). *The social psychology of organizations (2nd ed.).* John Wiley & Sons.

Kincaid, D. L. (1979). The convergence model of communication. East-West Communication Institute.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. SAGE Publications.

Linden, M., Ulvenblad, P., & Barth, H. (2025). Safety culture co-creation in forest industry manufacturing mills: A systematic literature review and conceptual model. *Safety, 11*(2), 48–66. https://doi.org/10.3390/safety11020048

Merriam, S. B. (2007). *Qualitative research and case study applications in education (2nd ed.).* Jossey-Bass.

Mohamad, B., Adamu, I., & Akanmu, M. (2023). Internal crisis communication in Malaysia oil and gas high-risk industry. *Corporate Communications: An International Journal, 28*(1), 34–52. https://doi.org/10.1108/CCIJ-01-2022-0007

Naji, G. M. A., Isha, A. S. N., Alazzani, A., Saleem, M. S., & Alzoraiki, M. (2022). Assessing the mediating role of safety communication between safety culture and employees' safety performance. *International Journal of Environmental Research and Public Health, 19*(6), 3593. https://doi.org/10.3390/ijerph19063593

Priono, R. (2025). *Rekap data kecelakaan kerja Indonesia 2024*. HSEPEDIA Report.

Rahim, A. A., Dapari, R., Che Dom, N., & Mohd Noor, M. S. (2024). Decoding stakeholder priorities of safety culture preferences in oil and gas industry. *Journal of Occupational Safety and Health, 21*(1), 78–95.

Reason, J. (1997). *Managing the risks of organizational accidents.* Ashgate.

Rogers, E. M., & Kincaid, D. L. (1981). Communication networks: Toward a new paradigm for research. Free Press.

Spradley, J. P. (1979). The ethnographic interview. Holt, Rinehart and Winston.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory (2nd ed.).* SAGE Publications.

Sugiyono, & Lestari, P. (2021). *Metode Penelitian Komunikasi*. Bandung: Penerbit Alfabeta.

Sugiyono, & Lestari, P. (2024). Metode Penelitian Komunikasi (Kuantitatif, Kualitatif, dan Cara Mudah Menulis Artikel pada Jurnal Nasional dan Internasional) – Edisi Revisi. Bandung: Penerbit Alfabeta.

Sulistyo, P., Lestari, F., Irwanti, S., & Lestari, P. (2022). Risk communication model for improving safety culture at the national oil company (Model-SIKATBUKA). *International Journal of Environmental, Sustainability, and Social Sciences, 3*(1), 91–102.

Sunil Kumar, N. G., Peri, A., & Chellapalli, J. (2025). Impact of safety climate in manufacturing industries: A review. *International Journal of Occupational Safety and Ergonomics, 31*(1), 1–18.

Umanailo, M. C. B. (2019). Paradigma konstruktivisme dalam penelitian sosial. Retrieved from OSF Preprints: https://doi.org/10.31219/osf.io/9ja2t

PUBLISHING KSI
• ISSN 2720 - 9644 (print)
• ISSN 2721 - 0877 (online)
IJESSS
INTERNATIONAL JOURNAL OF ENVIRONMENTAL, SUSTAINABILITY AND SOCIAL SCIENCE
Indexed by : sinta 3 Crossref GARUDA Google Scholar

Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the unexpected: Resilient performance in an age of uncertainty (2nd ed.).* Jossey-Bass.

World Bank Group. (2025). Environmental, health, and safety guidelines for glass manufacturing. International Finance Corporation.

Yin, R. K. (2018). *Case study research and applications: Design and methods (6th ed.).* SAGE Publications.

Zara, N., Nordin, R., & Isha, A. S. N. (2023). Influence of communication determinants on safety commitment in high-risk workplace: A systematic literature review. *Safety, 9*(3), 102–118. https://doi.org/10.3390/safety9030102

Znajmiecka, A., Roszko-Wojtowicz, E., & Stasila-Sieradzka, M. (2022). In search of differences in the perception of safety climate by employees of an international manufacturing company. *International Journal of Environmental Research and Public Health, 19*(3), 1512. https://doi.org/10.3390/ijerph19031512

Zulkarnain, A., Lestari, F., & Kholil, M. (2025). The influence of safety communication on safety culture and operational excellence in high-risk industries. *International Journal of Industrial Ergonomics, 97*, 103–118.