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OCCUPATIONAL-SAFETY FRAMING AND ITS DECAY IN INDONESIAN NEWS COVERAGE OF THE IMIP MOROWALI SMELTER EXPLOSION: A TOPIC-MODELING STUDY, 2023–2026

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ABSTRACT

Nickel smelter expansion has concentrated industrial hazards in Indonesian resource extraction zones, yet how national media frame disasters at these sites remains unexamined computationally. This study aimed to identify the latent frames of Indonesian news coverage of the December 2023 furnace explosion at the Indonesia Morowali Industrial Park (IMIP) and to trace how victim-centered framing evolved over 30 months. A corpus of 178 Indonesian-language articles from Antara, Detik, and Kompas (December 2023–July 2026) was analyzed with latent Dirichlet allocation topic modeling (k = 5; Cv = 0.4671; seed = 42) and interpreted through Entman's framing theory and the victim-centered disaster management paradigm. Five frames emerged: safety and casualty response (25.8%); nickel industry, environment, and downstreaming (23.6%); regional development and industrial zones (23.6%); production & commodity economics (15.7%); and electric vehicle battery supply chains (11.2%). Safety framing dominated December 2023 coverage (96.8%) but collapsed to 3.6% by May 2024–June 2025 and remained below 8% thereafter. Word-boundary verified victim vocabulary was confined to the safety frame, and sources differed sharply: the broadsheet Kompas devoted 48.6% of its output to regional development while contributing only 4.3% of safety-frame articles. Coverage therefore systematically displaced victim-centered disaster discourse with economic development narratives, implying a need for independent post-disaster investigation, worker-led monitoring, and sustained parliamentary oversight in resource extraction regions.

Keywords: *Media framing, disaster discourse, nickel industry, topic modeling, Indonesia.*

INTRODUCTION

Industrial disasters are critical sites where media framing shapes public understanding of corporate accountability, state regulation, and worker safety. News coverage does not merely report events; it selects and elevates certain dimensions while suppressing others, activating problem definition, causal interpretation, moral evaluation, and treatment recommendation (Entman, 1993). In Indonesia, the rapid expansion of nickel smelting for electric-vehicle (EV) batteries has concentrated a workforce of more than 85,000 in a single industrial park, where formal occupational-safety (K3) certification covers only about a tenth of workers (Islam et al., 2026), creating new sites of industrial harm where global commodity demand, domestic industrial policy, and local community welfare intersect (Astuti et al., 2025; Libassi, 2026; Warburton, 2024).

Whether framing is stable after a disaster has been tested repeatedly, and the answer is that it is not. Houston et al. (2012) analysis of 927 news stories covering eleven severe

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United States natural disasters between 2000 and 2010 found that the environment frame, which captured the death and destruction of the event itself, "constituted the vast majority of all coverage frames in the immediate aftermath of the disaster, but quickly declined during the first two months," with human-interest framing rising around two months and the political frame increasing at approximately five to six months.

Industrial disasters show the same sequence in a compressed form. Thomas et al. (2016) study of coverage of the 2014 Elk River chemical spill in West Virginia, in the first, the human-interest frame was most dominant and attribution of responsibility second; in the second, after the state of emergency had ended, attribution of responsibility overtook human interest, and the economic-consequences frame rose then. What is more consistent across these studies than the decay itself is whose voice survives it. Wahyuni (2008), analyzing Indonesian print, online and television coverage of the Yogyakarta earthquake, the sinking of the KM Senopati Nusantara, the Adam Air disappearance, the Padang earthquake and the Lapindo mudflow, argued that Indonesian disaster coverage treats the event as a "media event" and consistently positions the state as the policy-determining actor, with treatment recommendation the weakest of Entman's four functions.

Aliifa et al. (2025) quantified the source structure behind this: attribution of responsibility was the dominant frame, while sources were almost exclusively official, against just two articles that quoted anyone outside government. Pribadi (2018) read two articles on the Palu earthquake as commodification of suffering and identified the neglect of victims' own voices as its first mechanism, noting that one outlet chose the word "mayat" (corpse) where the other used "korban meninggal" (the deceased). Juditha (2014) found that four of fourteen television items on the Sinabung eruption failed to consider victims' recovery, and traced ethical lapses to limited journalistic skill together with "the capital-commercial ideology that has taken root in every media activity." In the international literature, Gawley & Dixon (2015), analyze Canadian newspaper articles on workplace injury and fatality, reported that "worker voices were largely absent in newspaper accounts compared with law enforcement, the State and management."

On 24 December 2023, a furnace explosion at the Indonesia Morowali Industrial Park (IMIP) killed between 18 and 21 workers and injured dozens more (Antara, 2023; Detik, 2023; Kompas, 2023). The incident occurred within a complex of numerous nickel smelters processing ore for global EV supply chains, drawing a workforce of tens of thousands including foreign workers (tenaga kerja asing, TKA) into a region where oversight of occupational safety is weak (Islam et al., 2026). The accident triggered immediate institutional responses: labor unions called for criminal charges, parliamentary committees summoned executives, and the Ministry of Manpower dispatched inspection teams (Sur Fadila et al., 2024). Yet media attention shifted rapidly; by mid-2024, coverage increasingly emphasized Indonesia's positioning in the global nickel market rather than accountability for the dead and injured.

Two studies show that a single event's framing can be tracked across more than a year, and that framing depends on the observer's institutional position as much as on the

event. Shin & Kim (2026) modeled Korean news articles on the Itaewon crowd crush, drawn from several sources over fourteen months, and identified twelve topics whose peaks rotated in time: calls for an investigation of the state administration surged in December 2022, conflict between the municipal government and bereaved families peaked in February 2023, and protest activity peaked in June 2023. Choi & Shahin (2025) compared 32,901 posts on the same event, 26,246 in Korean and 6,655 in English, and found that the English-language network, in which corporate media accounts are most prominently represented, "dehumanizes the victims and parrots the official version of events," while the Korean-language network "evinces empathy and draws attention to administrative failures." They treat even the vocabulary of the catastrophe as framing, arguing that the word "stampede" "apportions blame to the victims." Together these studies establish that frame composition is a property of media position as well as of the event, and that longitudinal topic modeling can detect it.

Indonesian research on disaster coverage shows official state sources dominating the news while victims' own voices are neglected (Aliifa et al., 2025; Juditha, 2014; Pribadi, 2018); the Indonesian press can also adopt adversarial, accountability-seeking stances toward authorities (Wahyuni, 2008); and a computational analysis of news coverage of the Amasra mining disaster in Türkiye found post-event reporting shifting from grief toward demands for accountability (Dikbıyık & Alp, 2026). Parallel work links Indonesia's nickel boom to global EV supply chains, documenting how downstreaming (hilirisasi) policy has concentrated wealth while generating land conflicts and labor precarity (Astuti et al., 2025; Muhyiddin et al., 2026; Warburton, 2024).

However, to our knowledge no prior study has applied topic modeling to this question: how Indonesian news media framing of a specific industrial disaster evolves across the full media ecology over an extended post-disaster period. The nearest comparable work, analyzed news coverage of the Amasra mining disaster using sentiment analysis rather than topic modeling (Dikbıyık & Alp, 2026). This study addresses that gap using latent Dirichlet allocation (LDA) topic modeling (Blei et al., 2003), interpreted through Entman (1993) framing theory and Shin & Kim (2026) victim-centered disaster management paradigm. Its novelty is that it is, to our knowledge, the first study to combine longitudinal topic modeling with a source-level decomposition of the same corpus, so that the decay of victim-centered framing in Indonesian industrial-disaster coverage is measured across thirty months rather than inferred from a single time window. The objectives are to (RQ1) identify the latent frames characterizing media coverage of the IMIP smelter explosion, (RQ2) trace how the prevalence of victim-centered framing changes over time, and (RQ3) compare framing patterns across news sources.

RESEARCH METHOD

This research is a computational content analysis of secondary data. The corpus comprises 178 Indonesian-language news articles collected from three digital outlets: Antara (the state news agency), Detik.com, and Kompas. The three outlets were purposively selected to span the institutional range of Indonesia's news ecology. Antara

is the state wire service, Detik.com is the top commercial outlet, and Kompas is the principal national broadsheet. The selection follows precedent. Detik.com and Kompas.com have held distinct market positions since 1998 (Dea Purnama & Utami Nugrahani, 2013), and a recent Indonesian content analysis chose its outlets on the same grounds of relevance and reach (Priyanto et al., 2026). Articles were collected through digital-archive searching and manual curation, using 18 keyword and named-entity queries (IMIP, Morowali, PT ITSS, smelter, ledakan, tungku, korban, TKA, Morowali Utara, PT GNI, Kemnaker, Hilirisasi, Vale Indonesia, among others). A three-tier relevance filter was applied: publication date between 1 December 2023 and 31 July 2026; topical relevance confirmed by at least one primary keyword in the headline or body; and deduplication by headline similarity and timestamp. The search retrieved 206 unique articles; after subsequent check, 27 articles whose manually verified publication dates predate the study window, the analysis corpus comprises 178 articles (Antara 79, 44.4%; Detik 64, 36.0%; Kompas 35, 19.7%), all published between 1 December 2023 and 31 July 2026. Publication dates were extracted from article timestamps and manually verified against archive records for Detik.com. Each article was labeled sensitive when its primary focus concerned the explosion, its casualties, or the immediate aftermath; 40 articles (22.5%) met this criterion.

LDA models (Blei et al., 2003) were estimated with the Gensim 4.x library for k = 3, 5, 7, 10, 12, and 15 topics, each run with 10 passes and 200 iterations for model exploration, automatically estimated asymmetric Dirichlet priors (α and η set to "auto"), and a fixed random seed of 42 for reproducibility; the selected model was retrained with 20 passes and 500 iterations. Topic quality was assessed with the Cv coherence metric (Röder et al., 2015) which correlates most strongly with human-judged topic quality. Coherence scores are reported at the exploration settings, which were identical for every k so that they are comparable. Although k = 7 achieved the numerically highest score in the sweep (Cv = 0.4982), the k = 5 model was selected because the seven-topic solution was less distinct at term level: it split the accident itself into two overlapping topics (T3, casualty; T5, site and infrastructure) and distributed industrial and economic content across five topics, producing three pairs that shared at least 25% of their top-20 terms (Jaccard 0.3333 for T3–T5, 0.2903 for T1–T6, and 0.2500 for T2–T4). The k = 5 model produced no pair above 0.2121, and its mean pairwise overlap was slightly lower (0.1205 against 0.1247), so k = 5 yielded five distinct, interpretable frames (Cv = 0.4671; Table 1, Figure 1). Topics were labeled independently by two authors, each reviewing the top 20 terms per topic and reading the five highest-probability articles to confirm thematic coherence. The two sets of labels were compared, and disagreements were adjudicated by a third author who examined the same evidence.

For temporal analysis, articles were aggregated by calendar month and the dominant-topic distribution computed per period. Source-level distributions were computed as the proportion of each outlet's articles assigned to each topic. Victim-language prevalence was measured by word-boundary counts of five terms (*korban, tewas, meninggal, luka, jenazah*) within each topic. During lexical analysis, initial

substring matching falsely reported that "tka" appeared in 55.0–82.1% of articles; word-boundary verification showed these were substrings of common Indonesian verbs (*meningkatkan, mendapatkan, melanjutkan*). After correction, the word "tka" standing alone appears in 23 of 178 articles (12.9%)

Table 1. Coherence Scores of LDA Models at Different Topic Numbers

Number of Topics (k)	Coherence (C_v)
3	0.4572
5	0.4671
7	0.4982
10	0.4488
12	0.4656
15	0.4702

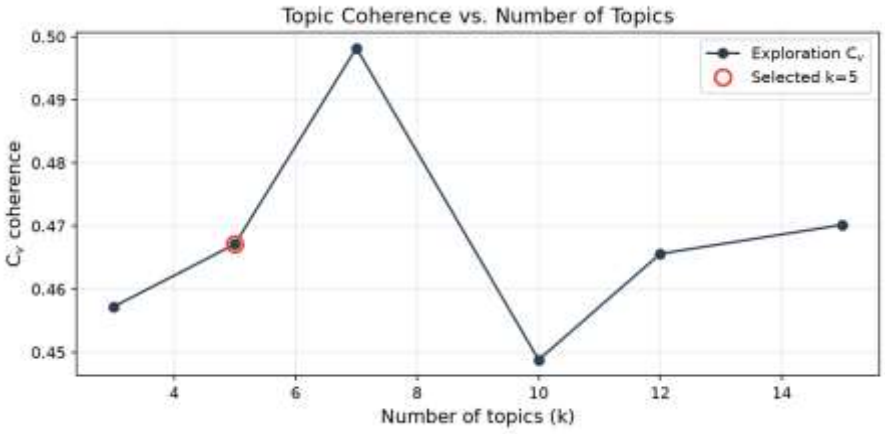


Figure 1. Topic-model coherence (C_v) by number of topics

RESULTS AND DISCUSSION

Topic model overview

The five-topic model identified five interpretable frames (Table 2). Topic 0 forms a production-economics frame: nikel (0.020), vale, juta (billion/million), produksi (production), smelter, ton, and harga (price), together with the year markers 2025 and 2026. Topic 1 is the EV battery frame, carrying the highest single-term probability in the model (nikel at 0.040) alongside baterai (battery), listrik (electric), kendaraan (vehicle), hilirisasi (downstreaming), pemerintah (government), and insentif (incentive). Topic 2 captures nickel-industry operations and their environmental governance: nikel, kerja (work), industri, perusahaan (company), hilirisasi, lingkungan (environment), tambang (mine), energi, esg, and nickel, with berkelanjutan (sustainable), gni, and operasional beyond the top ten. Topic 3 is the safety and casualty frame, led by korban (victim; 0.024) and imip, with morowali, kerja, orang (person), smelter, tungku (furnace), itss, pekerja (worker), and kecelakaan (accident), and further terms including ledakan (explosion), keselamatan (safety), meninggal (died), and santunan (compensation). Notably, tungku,

itss, and kecelakaan appear only among Topic 3's top terms, confirming that the explosion itself remains lexically anchored in the safety frame. Topic 4 captures regional development and industrial zones: industri, morowali, kawasan (zone), nikel, masyarakat (society), perusahaan, and sulawesi, with daerah (region), kabupaten (district), pembangunan (development), and desa (village) beyond the top ten.

Two features of the model deserve comment. First, topic assignment was crisp rather than diffuse: the dominant topic carried a mean probability of 0.917 for Topic 3 articles against 0.802 for articles assigned elsewhere (medians 0.999 and 0.857), and the Topic 3 weight itself averaged 0.917 within Topic 3 articles but only 0.037 outside them. Second, the probability values reported in Table 2 are asymmetric across topics because Topic 1 assigns a comparatively large mass to a single highly informative word, nikel, while the remaining topics spread probability over longer tails of operational and institutional vocabulary. A topic label in this model is therefore a statement about the concentration of a document's distinctive vocabulary, not a claim that the article concerns only that subject.

Table 2. Top Ten Terms and Interpretive Labels of the Five-Topic Model

Topic	Label	Top 10 Terms (probability)
0	Production & Commodity Economics	nikel (0.020), vale (0.019), juta (0.017), produksi (0.015), smelter (0.015), ton (0.014), 2025 (0.014), 2026 (0.012), harga (0.008), semester (0.007)
1	EV Battery & Global Supply Chain	nikel (0.040), baterai (0.032), listrik (0.026), kendaraan (0.021), industri (0.020), pemerintah (0.017), hilirisasi (0.015), nasional (0.010), bahan (0.010), insentif (0.010)
2	Nickel Industry, Environment & Downstreaming	nikel (0.029), kerja (0.014), industri (0.013), perusahaan (0.011), hilirisasi (0.009), lingkungan (0.009), tambang (0.009), energi (0.007), esg (0.007), nickel (0.007)
3	Safety & Casualty Response	korban (0.024), imip (0.022), morowali (0.015), kerja (0.015), orang (0.013), smelter (0.012), tungku (0.012), itss (0.010), pekerja (0.010), kecelakaan (0.010)
4	Regional Development & Industrial Zones	industri (0.021), morowali (0.020), kawasan (0.017), nikel (0.016), masyarakat (0.011), perusahaan (0.009), kerja (0.008), tambang (0.008), baca (0.008), sulawesi (0.008)

Document-level distribution of frames

Across the 178 documents, Topic 3 (safety and casualty response) is the largest single category (46 articles; 25.8%), followed closely by Topic 2 (nickel industry, environment, and downstreaming) and Topic 4 (regional development and industrial zones) at 42 articles (23.6%) each; Topic 0 (production & commodity economics) accounts for 28 (15.7%) and Topic 1 (EV battery & global supply chains) for 20 (11.2%)

(Table 3). Even in a corpus anchored on a fatal industrial disaster, the safety frame holds only about a quarter of coverage, with three frames standing near parity.

Read against the framing literature, the distribution is more striking than the largest category suggests. Houston et al. (2012) found the environment frame to be the most common frame in 39.7% of disaster stories, with human interest second at 27.0%, so a distribution in which the event frame leads by a few points is, in their terms, a normal early phase. Here the safety frame never approaches that lead: across the full thirty-month window it accounts for 25.8% of articles, and two further frames sit within 2.2 percentage points of it. The aggregate figure also conceals how unevenly the safety frame is distributed in time, being 96.8% of December 2023 coverage and 3.6% of the following fourteen months, so the 25.8% is an average of two very different periods rather than a stable share. That the safety frame is only one of four near-equal categories in a corpus defined by a fatal industrial accident is the finding that the remainder of this section elaborates.

Table 3. Dominant Topic Distribution across the 178 Articles

Topic	Label	Articles (n)	Proportion
0	Production & Commodity Economics	28	15.7%
1	EV Battery & Global Supply Chain	20	11.2%
2	Nickel Industry, Environment & Downstreaming	42	23.6%
3	Safety & Casualty Response	46	25.8%
4	Regional Development & Industrial Zones	42	23.6%

Validation of the topic labels

Before interpreting these distributions, the topic assignments were checked against the only independent measure available. Each article was also labeled by the authors as sensitive when its primary focus concerned the explosion, its casualties or its immediate aftermath; 40 articles (22.5%) met that criterion. Topic 3 and the human label agree on 35 of the 46 Topic 3 articles (76.1%) and on 35 of the 40 sensitive articles (87.5%). The agreement is not complete, and the discrepancies are informative. The eleven Topic 3 articles that were not judged sensitive are institutional rather than casualty reporting: labor-inspector deployments, proposed sanctions, a national occupational-safety standard, two foreign workers named as suspects, a separate October 2025 fire at the industrial park, and two November 2025 articles on the ownership and status of the park's airport. The five sensitive articles assigned elsewhere fall in Topic 4 (three) and Topic 0 (two). Topic 3 is therefore best read as a safety-and-casualty frame that reaches beyond the explosion itself to Indonesian-language reporting that makes workplace harm, formal inspection and regulatory response its subject. The figures reported below describe that broader frame, and the distinction matters for the interpretation of the temporal pattern.

Source-level patterns

News sources differ markedly in framing emphasis (Table 4). Safety coverage (Topic 3) is supplied equally by Antara and Detik: 22 articles each, that is 47.8% of all safety-frame articles apiece, while Kompas contributes only 2 (4.3%). Within outlets, Detik devotes the largest share of its own output to safety framing (34.4%), followed by Antara (27.8%), whereas Kompas devotes only 5.7%. Kompas instead concentrates on Topic 4 (regional development and industrial zones; 48.6% of its articles) and Topic 2 (17.1%); Antara is the most evenly distributed outlet, spanning 11.4–27.8% across the five frames.

The pattern tracks each outlet's institutional position rather than its readership. Antara's near-even spread across all five frames, together with its concentration on inspection deployments, proposed sanctions and named suspects, is the signature of a wire service carrying institutional response; Detik's emphasis on safety is consistent with a fast, event-driven online format; and Kompas's concentration in regional development is consistent with a broadsheet editorial line that frames industrial projects as national development. Choi & Shahin (2025) documented exactly this kind of position-dependence for a single event, where two language communities produced different frames of the same tragedy, and Aliifa et al. (2025) documented it for Indonesian disaster coverage, where the difference between outlets operated through whom the outlet quoted. In the present corpus the mechanism is similar: safety coverage is overwhelmingly drawn from official statements, so an outlet's framing emphasis reflects which institutional statements it chooses to develop. That the two outlets supplying the most safety coverage are the wire service and the commercial online outlet, and that the broadsheet contributes 4.3%, is therefore a statement about editorial positioning rather than about the absence of safety news.

Table 4. Dominant Topic Distribution by News Source (%)

Source	n	T0	T1	T2	T3	T4
Antara	79	17.7	11.4	21.5	27.8	21.5
Detik	64	14.1	9.4	29.7	34.4	12.5
Kompas	35	14.3	14.3	17.1	5.7	48.6

Temporal decay of the safety frame

The temporal analysis (Table 5, Figure 2) confirms a steep decay of the safety frame: from 96.8% of the 31 articles in December 2023, to 50.0% of 14 articles in January–April 2024, 3.6% of 28 articles in May 2024–June 2025, and 7.6% of 105 articles in July 2025–July 2026 (5.4% in July 2026 alone). Because two of the four periods rest on small samples, December 2023 (n = 31) and January–April 2024 (n = 14), the shares within them are estimated with wide uncertainty: a single article shifts the December 2023 share by 3.2 and the January–April 2024 share by 7.1 percentage points. The claim therefore rests on the contrast between those 45 early-period articles and the 133 articles of the later two periods, in which the safety frame accounts for 6.8% (1 of 28 plus 8 of 105), a difference too large to be an artefact of sample size. Over the same window, Topic

4 (regional development and industrial zones) expanded to 33.3% and Topic 2 to 22.9% of late-period coverage, so the expansion of total coverage worked to the relative disadvantage of victim-centered framing.

Two features of the temporal curve qualify the description of the safety frame as having "collapsed." First, the safety frame is burst-shaped rather than a smoothly declining share: across the thirty months of coverage it is the dominant topic in only eight of the twenty-nine months in which the corpus contains articles. December 2023 (30 of 31 articles) is followed by January 2024 (5 of 11), February 2024 (2 of 2) and a single June 2024 article, and then by a fourteen-month interval in which it appears once in twenty-eight articles. Second, that interval ends in a partial resurgence: October 2025 records 2 of 3 articles in Topic 3 (66.7%) and November 2025 records 3 of 8 (37.5%), giving five of the forty-six Topic 3 articles in two months, sixteen months after the last casualty reporting. The October 2025 articles concern a separate fire at the industrial park and the deployment of a ministry inspection team; the November 2025 cluster includes a national occupational-safety standard and two articles on the park's airport. The resurgence is therefore not the original explosion returning but a new industrial incident re-arming the same vocabulary. It also demonstrates, within a single corpus, the oscillation predicted by the safety literature: safety attention is not permanently lost, it is held by whichever serious error is most recent. February 2026 (1 of 9) and July 2026 (2 of 37, 5.4%) show the pattern re-declining. The decline is best described as episodic rather than terminal, and each episode is short.

Table 5. Dominant Topic Distribution over Time (N = 178)

Period	T0	T1	T2	T3	T4	n
Dec 2023	0.0	0.0	3.2	96.8	0.0	31
Jan–Apr 2024	0.0	0.0	42.9	50.0	7.1	14
May 2024–Jun 2025	35.7	0.0	39.3	3.6	21.4	28
Jul 2025–Jul 2026	17.1	19.0	22.9	7.6	33.3	105

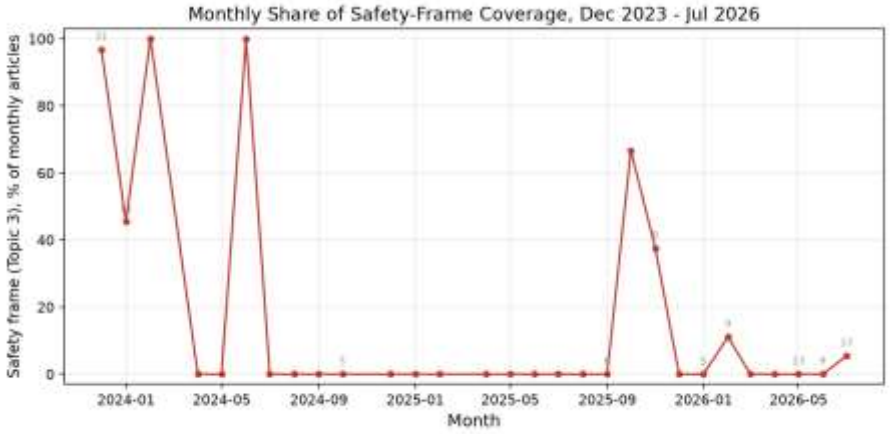


Figure 2. Monthly share of safety-frame (Topic 3) coverage, December 2023 – July 2026

Victim vocabulary concentration

Victim vocabulary was concentrated in the safety frame (Table 6): korban appears in 76.1% of Topic 3 articles, meninggal 54.3%, luka 54.3%, tewas 19.6%, and jenazah 15.2%. Only minor traces appear elsewhere (korban 10.7% in Topic 0; tewas, meninggal, and luka 2.4–4.8% in Topic 4); the corrected TKA token appears in 41.3% of Topic 3 articles (23/178, 12.9% overall). Core victim terms are near-zero in the production-economics, EV supply-chain, and industry/environment frames.

Vocabulary concentration has been used before as an index of whose voice is present, and the direction of the association is stable. Gawley & Dixon (2015) found in 304 Canadian articles that worker voices were largely absent relative to law enforcement, the State and management, and that women were drastically under-represented in coverage relative to their 38.0% share of workers' compensation claims. Choi & Shahin (2025) argued that even the vocabulary chosen for a catastrophe can be a frame, since the word "stampede" alone "apportions blame to the victims." Houston et al. (2012) recorded individuals as the most frequently affected entity in 85.76% of disaster stories, but as affected objects rather than as sources. In the present corpus the corresponding pattern is lexical rather than source-based: the vocabulary of harm is present, but quarantined. *Korban, meninggal, luka, tewas* and *jenazah* are near-exclusive to Topic 3, while pekerja, the word that names the worker as an economic subject, is the exception, appearing in 45.2% of Topic 4 articles and 32.1% of Topic 0 articles. Only pekerja crosses that boundary, and it does so in the direction of economic description rather than of victimhood: the vocabulary of harm is confined to one frame while the vocabulary of work is dispersed across three.

Table 6. Victim-Term Prevalence by Topic (articles in topic; %)

Term	T0 (28)	T1 (20)	T2 (42)	T3 (46)	T4 (42)
korban	3 (10.7)	0 (0.0)	3 (7.1)	35 (76.1)	3 (7.1)
tewas	0 (0.0)	0 (0.0)	0 (0.0)	9 (19.6)	2 (4.8)
meninggal	0 (0.0)	0 (0.0)	0 (0.0)	25 (54.3)	2 (4.8)
luka	0 (0.0)	0 (0.0)	0 (0.0)	25 (54.3)	1 (2.4)
jenazah	0 (0.0)	0 (0.0)	0 (0.0)	7 (15.2)	0 (0.0)
pekerja	9 (32.1)	0 (0.0)	7 (16.7)	39 (84.8)	19 (45.2)
tka	0 (0.0)	0 (0.0)	2 (4.8)	19 (41.3)	2 (4.8)

Mapping the frames onto Entman's four functions

The five frames map onto Entman (1993) four functions with important asymmetries. Topic 3 (safety and casualty response) activates all four simultaneously: it defines an industrial emergency, attributes causality to technical failure and oversight absence, assigns moral blame through words such as kecelakaan (accident) and keselamatan (safety), and prescribes treatment through formal institutions (tim, Kemnaker, Kemenperin). Topic 2 (nickel industry, environment, and downstreaming) emphasizes causal interpretation and moral evaluation while reducing explicit prescription. Topics 0, 1, and 4 primarily activate treatment recommendation—

production expansion, EV supply-chain investment, and regional development with structural causal attribution largely absent.

Two prior findings sharpen the asymmetry described above. Houston et al. (2012) concluded that United States disaster news "is essentially a descriptive frame," giving little coverage of what caused the event or what it would mean, and treated that as the reason their framing findings were "somewhat disappointing." In the Indonesian tradition the same asymmetry has been described as a deficit in treatment recommendation: Wahyuni (2008) judged that Indonesian disaster coverage had advanced problem definition, causal interpretation and moral evaluation but remained weakest in offering concrete remedial recommendations, and Pribadi (2018) made the same complaint explicitly, asking that coverage give more weight to "why" and "then what." In the present corpus the asymmetry runs in the opposite direction: treatment recommendation is not the neglected function, it is the dominant one, but it is discharged almost entirely by Topics 0, 1 and 4, whose prescriptions are production expansion, investment incentive and regional development. Thomas et al. (2016) found that in coverage of an industrial disaster only 48.2% of stories covered any solution, 39.5% covered immediate solutions, and 16.6% covered prevention; here, by contrast, preventive prescription is largely absent while developmental prescription is constant. The practical consequence is that the media are not silent about what should be done: they are prescribing vigorously, but prescribing something other than the prevention the accident required.

Whose accountability is assigned?

Substitution between frames is not neutral with respect to whom the public is told to hold responsible. Thomas et al. (2016) quantified this in their two-window comparison: 200 stories (37.8%) named a specific individual or entity as responsible, 196 of these (98%) blamed the spill's responsible company, and 76 (14.4%) suggested that some level of government had contributed to the spill, rising to 17.3% in the second window against 2.5% in the first. Stories carrying government sources were far more likely to indict government (81.6%) than stories without them (18.4%). Houston et al. (2012) reached the opposite conclusion for natural disasters, where causal interpretation was barely present at all. The pattern relevant to the present corpus is neither a company scapegoat nor a state scapegoat but institutional containment: the safety frame names agencies and locates responsibility in procedure rather than in the worker. That is distinct from the accountability practice Naghavi-Konjin et al. (2020) document in process industries, where investigation commonly amounted to "seeking to prosecute subsidiary company employees at different organization levels in the accident investigation process," which they classify as a blaming culture and which suppresses the reporting that learning requires. Drupsteen & Guldenmund (2014) put the same finding in structural terms: "if only direct causes are addressed, learning is in practice limited to single-loop learning," and the underlying organizational causes "are often not addressed." The frame that dominates after the casualty frame disappears activates treatment recommendation

without causal interpretation, so the attribution it supplies is procedural rather than structural.

Organizational forgetting and risk perception

Following Shin & Kim (2026) call for a victim-centered disaster management paradigm, we take two conditions to define victim-centered framing: victims appear as identifiable human subjects, and structural causes of harm are attributed alongside technical failure. Topic 3 satisfies both for a subset of articles; Topic 4 occupies an intermediate position, keeping worker bodies visible as economic subjects (pekerja in 45.2% of its articles) rather than as rights-bearing victims; Topics 0, 1, and 2 satisfy neither, as their subjects are commodities, companies, and agencies. The central empirical finding, the decay of safety framing from 96.8% in December 2023 to 7.6% in July 2025–July 2026 is consistent with frame decay in disaster coverage ((Houston et al., 2012), but the mechanism here is not public disinterest or competing events. Rather, an actively promoted industrial-development frame appropriates the post-disaster media space: as the government courted EV-battery investments from firms such as BYD and Hyundai (Warburton, 2024) and nickel output grew ten-fold between 2009 and 2024 (Libassi, 2026), coverage of the dead and injured was displaced by regional-development, export-volume, and industrial-growth reporting. To our knowledge, it is the first computational analysis to track frame composition in Indonesian news coverage of a single industrial disaster across thirty months rather than across a single post-disaster window, and the longitudinal model shows not only that the safety frame declines but that it collapses to 3.6% of coverage and then oscillates, reappearing at 37.5% of a two-month interval after a separate fire.

The mechanism Haunschild et al. (2015) identified is quantitative as well as conceptual. In a panel of 923 firm-year observations covering 146 pharmaceutical firms under Food and Drug Administration oversight between 1997 and 2004, 48 firms experienced at least one serious drug error and 127 observations did; the rate of safety-related activity was 78% and 62% higher in the year following a serious error, while safety investment fell by between 16% and 22% in the same period. Their central point is that the effect is temporary: error-free periods are read as evidence that the problem is solved and resources are reallocated away from safety, and "the role of luck in error-free periods tends to be systematically underestimated." They also model the visibility of the error as a moderator, arguing that errors "more hidden from the public and regulators" should produce shallower oscillation cycles than the highly visible crises they studied. The IMIP case sits at the visible end of that range: the casualty figures were national headlines, and the state's own agencies were drawn into the response. The October 2025 articles, concerning a separate fire at the park, show the same dynamics a second time at reduced amplitude. That a single accident can re-arm attention twice and lose it twice is precisely the oscillation the organizational literature predicts, and it is observed here in news frames rather than inferred from internal records.

Where learning from disasters breaks down

This decay pattern closely parallels what research on high-reliability organizations calls the oscillation between learning and forgetting. Haunschild et al. (2015) demonstrated that a serious error triggers a sharp, firm-wide surge of safety attention, but that the effect of the error weakens systematically as time elapses while attention migrates back to efficiency and innovation an oscillation whose theoretical definition of forgetting explicitly includes “a shift in attention and emphasis,” accompanied by declining regulatory and public scrutiny of the original failure. It is observed that media maintain focus on a tragic occurrence “only gradually to weaken that focus as other serious issues emerge” (Haunschild et al., 2015). Madsen et al. (2016) supply the complementary risk-perception mechanism from the aviation industry: as catastrophes recede, error-free periods are reinterpreted as evidence that the system is safe, apparent success “tends to breed complacency” and suppresses the organizational search for residual hazards, so near-misses masquerade as success and perceived risk falls below actual risk. Disaster research locates the same dynamics in the public arena: events with severe consequences gain media and institutional interest and open a "window of opportunity" for change, yet political and social pressure for learning is greatest in the immediate aftermath and decreases with time (Filho et al., 2021). Read through this lens, the collapse of victim-centered coverage from 96.8% to 7.6% is the discursive face of organizational forgetting: public attention, the external pressure that sustains accountability, transfers to the developmentalist nickel-industry frame precisely at the moment when sustained scrutiny would be needed to convert investigation findings into prevention. Because our design measures news frames rather than organizational behavior, this connection is a theoretical extension by analogy; the correspondence of temporal signatures, a crisis-triggered peak followed by a collapse to single-digit prevalence within roughly 18 months is nonetheless striking.

Three process-industry studies supply the mechanism in concrete terms. Jacobsson et al. (2012) assessed more than 1,900 incident reports and found the analysis step to be the weakest almost everywhere, the dissemination of lessons "an especially weak point," and no plant strong in aggregating lessons across incidents. Drupsteen & Guldenmund (2014) identified the corresponding causes in a review of 44 articles and three doctoral theses: underreporting driven by “fear of blame or social sanctions,” a selection made “based on the consequences of the events,” and investigations that stop at the sharp end. De Kam et al. (2019) showed that requiring an external chair raised report quality substantially, yet organizations still stopped analysis "too early," because "simply identifying a solution is part of event analysis, but does not entail learning." Recent work in healthcare and construction converges on the same failure points: the learning tools of high-reliability organizations, including debriefing, simulation, and incident-reporting systems, improve learning chiefly when applied soon after the incident and embedded across organizational levels (Serou et al., 2021) ; robust dissemination structures are necessary but insufficient where professional politics and severity-based classification narrow what is investigated at all (Rowland et al., 2025); and front-line informal learning

depends on formal resources and open communication (Murphy et al., 2022). Read against this evidence, the corpus suggests that the response to the IMIP explosion supplied the first step well and the last two poorly: reporting and inspection were extensive, while dissemination and follow-up appear in the record only as the casualty frame's residual vocabulary

Two longitudinal studies of other disasters corroborate this sequence, although neither measured topics and so neither tests the mechanism. Dikbıyık & Alp (2026) found that sadness after the 2022 Amasra mining disaster in Türkiye declined over subsequent periods while anger rose during the trial, shifting public and media reaction from grief toward demands for accountability. Straub (2021) documented the same displacement over a longer window in another sector: a burst of attention, a decline in volume, and the displacement of human-interest content by economic and institutional frames. These parallel trajectories support reading the decay measured here as a property of disaster coverage rather than of the Morowali case.

The contribution of this study is therefore threefold. Methodologically, it is, to our knowledge, the first to combine structural topic modeling with an outlet-level design to measure the longitudinal decay of disaster frames in Indonesian news, extending an approach applied to sentiment in single-event coverage elsewhere (Dikbıyık & Alp, 2026; Straub, 2021) to a resource-extraction disaster in the Global South. Theoretically, it links media-frame dynamics to the organizational-learning literature, showing that the forgetting oscillation documented within firms (Haunschild et al., 2015; Madsen et al., 2016) has a measurable discursive counterpart in public news attention, and that the window of opportunity opened by severe disasters (Filho et al., 2021) narrows in the news record on the same timescale on which learning cycles fail (Murphy et al., 2022; Serou et al., 2021). Empirically, it identifies the institutional position of outlets, not merely event salience, as a conditioning factor in which frames dominate after an industrial disaster, consistent with recent evidence that dissemination structures alone do not guarantee learning (Rowland et al., 2025; Usman et al., 2026).

Source structure and the invisibility of workers

Source structure conditions this displacement. Safety coverage is supplied equally by Antara and Detik (22 articles each; 47.8% of the safety frame apiece), while Kompas—the broadsheet with a regional investigative tradition (Astuti et al., 2025) contributes just 4.3% of safety articles despite 19.7% of the corpus, devoting 48.6% of its output instead to regional-development framing. Detik's safety plurality (34.4% of its articles) is consistent with its short-form, event-driven format, and Antara's even distribution across frames, with institutional-response emphasis—tim deployments, inspections, criminal investigations reflects a wire-service role consistent with Indonesian research showing that disaster coverage is built overwhelmingly on official state sources and institutional-response framing (Aliifa et al., 2025; Pribadi, 2018). Within the safety frame itself, the worker appears overwhelmingly as victim—dead, injured, compensated but almost never as an agent of reform, paralleling the voicelessness of disaster victims in Indonesian

coverage, where official sources dominate and victims appear as objects of suffering rather than as speaking subjects (Aliifa et al., 2025; Juditha, 2014; Pribadi, 2018).

The mechanism by which victims disappear from Indonesian disaster coverage has been described more precisely than the general finding implies. Aliifa et al. (2025) did not merely observe official-source dominance but counted it, recording 54 references to central government and 30 to local government in 85 headlines and only two articles that quoted anyone outside government, which is why their attribution-of-responsibility frame is saturated with state actors while victims are absent from the source coding altogether. Pribadi (2018) named the practical cause: journalists report from official sources because they lack access to the primary source, that is the victims themselves, and the result is what they call the neglect of victims' voices. Juditha (2014) attributed the ethical failures she found in television coverage to a combination of limited journalistic skill and "the capital-commercial ideology that has taken root in every media activity." Taken together, these accounts describe a structural constraint rather than a failure of conscience: the source that knows most about the harm is the source the newsroom least reliably reaches.

The asymmetry described here raises the question of whether a casualty frame carrying no causal content could itself count as an appropriate victim-centring. The current crisis-communication literature is explicit that it does not. Jong & Brataas (2021) describe the field's orientation as skewed toward reputation management and brand protection, so that the needs of victims are minimized to 'apologies' and 'expressions of sympathy'; and Coombs' situational crisis communication theory, which they cite, holds that victims 'not only should be provided with an expression of sympathy, but also with information about corrective actions, and trauma counseling when needed.' Their case evidence points the other way from the present corpus: the families of the Boeing 737 MAX crash victims wanted more than condolences and 'wanted Boeing to show that it learned from the accident,' with relatives calling it 'absolutely inexcusable that it takes another crash for people to kick this investigation and improvements into high gear.' Their occupational analogue is explicit: on the case of 'a deadly mining operation,' they warn that 'as long as crisis communication research tends to focus on the reputation of the mining company, the well-being of victims and their next of kin might be overshadowed,' and they hold that as a crisis winds down it is important 'to acknowledge victims in their wish to understand why a crisis occurred.'

Jong et al. (2026) extend the argument in a relational framework, Affected Circles, in which 'communication follows impact rather than reach,' and in which communication to the innermost circle is 'not persuasion or explanation, but acknowledgment, psychosocial care, privacy control and the provision of concrete, actionable information.' Their own qualification decides the case: they distinguish 'information that is necessary for public accountability and democratic oversight' from information that 'primarily satisfies broader curiosity without substantially contributing to those goals,' and they place 'organizational responses to damage compensation or liability' among the outer-circle issues that public communication must still address. Victim-centring does not therefore require the causes of harm to disappear; it requires that they be handled with

care. A corpus in which casualties survive and causes, contractors and accountability all disappear supplies acknowledgment without cause, which is the asymmetry the literature warns against

Systemic causation

Finally, what the decay of the safety frame erases is systemic causation. Qualitative research on fatal accidents in petroleum and process industries finds that accidents are driven above all by latent organizational conditions—contractor management that rewards price over safety, weakened supervision, and an organizational climate that prioritizes production which create precarious contract workforces that, for fear of losing their jobs, cannot refuse unsafe work and do not report near-misses (Naghavi-Konjin et al., 2020). When coverage shifts from casualty response to export volumes and industrial expansion, the attribution of harm correspondingly reverts from these structural conditions to proximate technical failure, and the foreign contract workers most exposed in IMIP's labor regime—already nearly invisible as victims (Aliifa et al., 2025; Juditha, 2014; Pribadi, 2018) disappear from public accounting altogether. Risk perception at societal scale is thus conditioned by the same outcome-driven complacency documented at firm scale (Madsen et al., 2016): absent new catastrophes to refresh attention, the developmentalist frame is read not as contested but as self-evidently benign.

Whether the absence of causal content in the corpus is a description of the accident or a distortion of it can be checked against the safety literature on the same site. Naghavi-Konjin et al. (2020), analyzing 46 interviews in the Iranian petroleum industry, found that organizational factors appeared in 62% of the subcategories they coded and that the accident-management system, comprising "failures in accident reporting, analysis, lesson-learning, and implementing corrective action," was one of the ten organizational categories they identified, alongside contractor management, supervision, procedures, resource management, risk management, training, communication, organizational climate and management planning. They report that supervision alone is responsible for 45% of accidents, and that the failure to consider root causes and the failure to follow recommendations were recurring entries. At IMIP the conditions match: Islam et al. (2026) report an average working week of 56 hours, occupational-safety certification for only about 10.7% of the workforce, single-person safety teams responsible for hundreds of workers, and safety induction for subcontractors consisting of a single introductory session; the same study records 25 major accidents between 2016 and 2023 resulting in 39 deaths and 82 injuries, and 55,527 cases of acute respiratory infection at the local health centre in 2023.

Sur Fadila et al. (2024) report furnace workers in denim or jeans where aluminium or fire-aluminized suits are required, no ambulance on site, and victims transported in company vehicles, together with a foreign-worker substitution that could not communicate in Indonesian. Warburton (2024) identifies the enabling condition in the 2020 Omnibus Law, which removed local participation from environmental permitting and centralized it; legal scholarship documents the same statute as emergency lawmaking

that excluded meaningful public participation and favored large business interests (Mochtar et al., 2024). The causal register the corpus would need in order to interpret its own decay is available in the safety and political-economy literature; what the corpus lacks is the coverage that would have carried it.

The practical benefit of this study lies in demonstrating why critical, systematic reading of the limits of media coverage is necessary for explaining the systemic causation of industrial disasters. Because frame decay removes precisely the thematic material through which audiences attribute political and systemic responsibility (Boukes, 2022; Vallés, 2026), regulators, oversight bodies, and civil-society monitors cannot treat media attention as a reliable proxy for safety salience, and independent incident-learning and monitoring structures are required, a conclusion consistent with recent evidence that dissemination structures alone do not produce learning (Rowland et al., 2025; Serou et al., 2021). For journalism practice, the findings argue for connecting casualty reporting to the documented structural conditions of resource-extraction regions while the window of attention is still open. More broadly, the study offers a transferable template: measuring the longitudinal composition of frames across institutionally distinct outlets turns media coverage itself into evidence of where accountability attention fails, in Indonesia and comparable Global South extraction economies.

Causal claims and their evidentiary status

The study rests on casualty figures that differ across sources, and the difference should be stated rather than resolved. Sur Fadila et al. (2024) report 18 deaths, comprising 10 Indonesian workers and 8 foreign workers, and 33 injured. Islam et al. (2026) report 21 workers killed and 46 injured; Libassi (2026) reports 21 workers killed and 39 injured; and Warburton (2024) reports 18 deaths and describes the event as a fire rather than an explosion. No source consulted reports the findings of an official investigation, and none of the figures can be traced to a police or labor-inspection record. The divergence is best explained by the fact that the casualty count was still rising while reporting continued, and by the possibility that some accounts fold in a further incident at the same site. For that reason this article reports a range rather than a point estimate, and neither the frame analysis nor the temporal analysis depends on the count: both are computed on article assignment, which is independent of the number of fatalities. The point is nonetheless worth recording, because it is the same evidentiary asymmetry that shapes the coverage. The numbers most in need of verification are the numbers least likely to be verified by the frame that dominates the record.

Limitations

These findings must be read against several limitations. All 178 articles carry dates within the study period, but the early-period cells are small (n = 31, 14). The source composition (Antara 44.4%, Detik 36.0%, Kompas 19.7%) is not a balanced sample of Indonesia's news ecology, and outlets excluded for technical reasons may carry critical frames. LDA topic labels are post-hoc interpretive constructs; refitting the model across

successive corpus revisions preserved the qualitative frame structure and the steep safety-frame decay but redistributed documents among economic topics, indicating that frame-level proportions are less stable than the decay pattern itself. Qualitative content analysis of individual articles is needed to validate frame adoption

CONCLUSION

Indonesian news coverage of the IMIP Morowali smelter explosion was organized around five frames: safety and casualty response; nickel industry, environment, and downstreaming; regional development and industrial zones; production economics; and EV battery supply chains. The study's central finding is a systematic asymmetry between disaster accountability and economic-development reporting in resource-extraction contexts: safety and victim-centered narratives dominated only briefly before being displaced by developmentalist industry framing, and the balance of framing varied with each outlet's institutional position. This pattern indicates that when industrial accidents occur at sites embedded in globally salient commodity chains, investor-confidence pressures can displace sustained public attention to human harm. Because this decay is a property of the coverage itself, mechanisms that sustain victim-centered attention must lie outside the newsroom; post-disaster investigation, worker-led monitoring, and sustained parliamentary oversight are therefore necessary, as is stronger occupational-safety enforcement in resource-extraction regions. Future research should extend this approach comparatively across industrial disaster events, incorporate social-media counter-frames, and validate LDA-derived frame labels through article-level qualitative coding.

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