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Can science and journalism be mutually reflexive? A Global South perspective

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Abstract

This theoretical essay examines the relationship between scientific research and journalistic practice in an era of epistemic fragmentation, misinformation, and global health crises. Drawing upon post-normal science communication (PNSC) frameworks, science and technology studies (STS), and journalism studies, it analyzes the epistemic frictions, temporal misalignments, and structural asymmetries that shape how scientific knowledge is publicly communicated, with particular attention to the Global South context. The essay identifies three interconnected problem domains: epistemic and structural divergences between science and journalism, temporal and normative misalignments exacerbated by digital platforms and social media, and the reconfiguration of verification norms under algorithmic mediation and the rise of scientist-influencers. In response, it proposes a conceptual framework of two-way reflexivity, defined as a reciprocal process through which scientists and journalists interrogate their own epistemic assumptions, institutional constraints, and communicative responsibilities toward each other and toward the public. The framework is operationalized across four analytical dimensions: epistemic, institutional, communicative, and structural. Illustrated through cases from Indonesia, Southeast Asia, and Latin America, the essay argues that reflexive collaboration, rather than one-way knowledge transfer, is essential for reflexive science communication under post-normal conditions.

Keyword: post-normal science communication, science journalism, reflexivity, epistemic justice, global south

1. Introduction

The relationship between science and journalism is increasingly central to maintaining public reason in a world plagued by the climate crisis, global infodemic, and erratic algorithmic governance. Although these two institutions share a mission to serve the public interest, they are governed by different normative logics and epistemic cultures. Science relies on methodological rigor and peer validation, while journalism prioritizes communicative closeness and audience engagement (Schudson, 2008; Ziman, 2000). This distinction became acutely visible during the COVID-19 pandemic, which simultaneously elevated science journalism to unprecedented public prominence and exposed the structural frictions between the slow pace of scientific consensus and the accelerated pace of digital media production. The pandemic triggered what Massarani et al. (2021) documented as a fundamental reconfiguration of science journalists' professional routines, including intensified workloads, heightened public scrutiny, and the challenge of reporting on rapidly evolving and contested evidence. Fleerackers et al. (2024) demonstrated that media coverage of unreviewed preprints surged dramatically during this period, creating new epistemic risks as provisional findings were communicated to the public unfamiliar with the norms of scientific provisionally. Brüggemann et al. (2020) theorized these dynamics as characteristic of post-normal science communication, in which the boundaries between science and journalism are not merely blurred but actively renegotiated under conditions of uncertainty, value contestation, and urgency.

Temporal and structural differences exacerbate the tension between these two domains: science works over long periods with gradual verification, while journalism demands speed, relevance, and framing of issues (Knorr-Cetina, 1999; Schäfer, 2017). As a result, epistemic friction manifests as misrepresentation, hyperbole, or the triggering of public distrust, especially in the Global South, which faces structural inequalities in research infrastructure and press freedom (Chabibah et al., 2024; Nguyen & Tran, 2019; Tapsell, 2017). The COVID-19 crisis highlights how these tensions have shaped public perceptions of risk, trust in institutions, and the capacity for democratic deliberation (Hallin et al., 2023; Sastramidjaja, 2023).

The Post-Normal Science Communication (PNSC) approach offers a substantive corrective to conventional science communication. Developed for situations in post-normal science, in which facts are uncertain, values are contested, stakes are high, and decisions are urgent (Funtowicz & Ravetz, 1993, 1994), PNSC departs from the dominant knowledge deficit model. The deficit model rests on three assumptions: the public is a passive recipient of settled scientific facts, communication flows linearly from laboratory to newsroom to audience, and public skepticism stems from ignorance remediable through better information (Bucchi, 2008; Simis et al., 2016; Sturgis & Allum, 2004). Under this framework, journalism functions as a neutral conduit for scientific authority, and uncertainty is treated as a deficiency to be eliminated before public communication (Trench, 2008).

PNSC challenges each of these assumptions. It reconceptualizes publics as legitimate participants in knowledge deliberation, recognizes that the boundaries between science and journalism are actively negotiated rather than fixed, and treats uncertainty as an inherent feature of post-normal conditions that must be articulated transparently rather than concealed (Brüggemann et al., 2020; Felt & Fochler, 2010). Secko et al. (2013) demonstrated that science journalism does not operate from a single, uniform logic; rather, it encompasses four distinct models — science literacy, contextual, lay-expertise, and public participation — each grounded in different theoretical frameworks and each producing different conditions for how scientific knowledge, uncertainty, and relevance are negotiated with diverse publics. This theoretical body of work renders the transmission paradigm insufficient: a one-way narrative of science in journalism can no longer adequately capture the relational and deliberative dimensions of current science communication. What is required instead is a co-production framework — based on a shift from linear information transmission to participatory engagement (Bucchi & Trench, 2014; Trench, 2008) — that positions scientists and journalists as reflexive agents who jointly negotiate public legitimacy, epistemic uncertainty, and mutual accountability (Schäfer & Fähnrich, 2020; Weingart & Guenther, 2016).

This essay is positioned as a theoretical contribution to the emerging field of post-normal science communication (Brüggemann et al., 2020), drawing on published cases from Indonesia, Southeast Asia, and Latin America as analytical illustrations. It pursues three interrelated objectives: first, to examine the epistemic and structural divergences between scientific research and journalistic practice, with particular attention to postcolonial and Global South contexts where these divergences are compounded by institutional fragility; second, to analyze how temporal misalignments, digital platforms, social media influencers, and shifting verification norms reconfigure the science–journalism interface; and third, to propose and operationalize a conceptual framework of two-way reflexivity as a basis for the democratization of science and boundary-work theory (Gieryn, 1983), post-normal science (Funtowicz & Ravetz, 1993, 1994) and epistemic justice perspectives (Ndlovu-Gatsheni, 2018a; Santos, 2016) to address the structural and relational conditions under which reflexive collaboration between scientists and journalists can be realized.

2. Epistemic and Structural Divergence

The divergence between science and journalism is often understood as a contrast between methodological rigor and narrative proximity, two epistemic orientations that grow from differences in each field's normative logic (Schudson, 2008; Ziman, 2000). Science privileges controlled observation, reproducibility, and a cumulative logic of discovery. Journalism, by contrast, responds to urgency, audience interest, and narrative coherence. These orientations shape differing expectations regarding truth, temporality, and uncertainty. Scientific caution may be perceived by journalists as evasiveness, while journalistic urgency can appear reckless to scientists (Fahy & Nisbet, 2011; Schäfer & Fähnrich, 2020).

These differences are not merely epistemic but are rooted in historical, material, and institutional conditions, especially in postcolonial contexts. The epistemic constraints in journalism regarding science coverage cannot be explained solely by the dynamics between science and the media; they must also be understood as products of the historical development of journalistic institutions themselves. Adiprasetio (2026) describes the study of journalism in postcolonial countries such as Indonesia, which developed in the shadow of colonialism and authoritarianism. From the Dutch colonial period to the New Order era, journalism education was designed to serve state interests and to suppress structural criticism of the media and of power. This legacy has led to an epistemic deficiency, which is the dominance of technocratic and normative approaches in journalism research that inhibit critical reflection on the relationship between knowledge, authority, and society.

This condition is compounded in many regions of the Global South, where knowledge infrastructure remains fragile. Limited research funding, restricted access to scientific literature, and dependency on external donor agendas constrain both the production and public dissemination of scientific knowledge (Albornoz et al., 2018; UNESCO, 2021). In parallel, media ecosystems in various countries are dominated by oligarchical ownership, unstable working conditions, and varying levels of state intervention in science coverage (Fadillah & Zhenglin, 2020; Navarro & McKinnon, 2020; Tapsell, 2017). These structural conditions manifest differently across Southeast Asian media systems but converge on a common pattern: the absence of specialized science journalism infrastructure forces science coverage into generalist frameworks ill-equipped to handle epistemic complexity. In Indonesia, scientific topics are predominantly covered by general-assignment journalists who lack specialized training (Rachman, 2024) and operate within newsrooms shaped by media conglomerates and political elites (Tapsell, 2012, 2017). Scientific expertise is rarely given editorial space unless politicized or sensationalized. The COVID-19 pandemic exposed this vulnerability acutely: inconsistent government messaging, weak coordination with research institutions, and information overload combined to erode public trust in both science and media (Apriliyanti et al., 2022; Geusan Akbar et al., 2021; Sastramidjaja, 2023). Thailand presents a different variant of the same structural problem: science communication remains technocratically controlled by the state, limiting journalistic autonomy in framing scientific issues (Chinnalong, 2015). In the Philippines, a tradition of investigative journalism coexists with the absence of institutionalized science journalism, which is often reduced to public relations functions that serve institutional interests rather than public deliberation (Navarro & McKinnon, 2020).

Similar asymmetries are found in Latin America, Africa, and the MENA region, where science coverage is systematically marginalized compared to political or economic reporting. In Latin America, the lack of specialization among journalists covering science constitutes a persistent structural problem. Massarani et al. (2023) mapped 122 science communication teaching programs across 31 countries and found that

although the number of programs in Latin America has increased, they remain concentrated in a few countries such as Brazil, Mexico, and Argentina, with limited options elsewhere in the region, reflecting an uneven infrastructure for professional development in the field. Similarly, Vilicic et al. (2025) found that science communication in Chile is carried out within a centralized professional field dominated by scientific institutions rather than media outlets, where self-education remains the primary mode of professional development due to limited formal training opportunities. Martin-Neira et al. (2024) showed that Chilean science journalists identify misinformation, the need for constant digital specialization, and the challenge of keeping audiences engaged as their most pressing professional concerns, underscoring the pressures of operating in a rapidly digitizing environment with inadequate institutional support. In the MENA region and parts of Africa, when public communication about science does occur, the content tends to reinforce state narratives or follow donor agendas rather than opening spaces for deliberative public participation (Khamis & Al-Jaber, 2022; Mellor, 2024). Across these regions, the absence of specialized infrastructure, including science desks, science editors, and trained correspondents, undermines journalism's capacity to translate science into meaningful public debate.

These conditions reflect the ongoing inequalities in the global epistemic economy. Knowledge institutions in the Global North continue to dominate research funding, access to publication, and agenda-setting, thereby reinforcing what Santos (2016) theorizes as epistemic extractivism and coloniality of knowledge (Grosfoguel, 2013; Ndlovu-Gatsheni, 2018a). Recent studies confirm this pattern, showing that research from the Global South that receives global attention remains heavily dependent on funding from the North (Chankseliani, 2023). Kamruzzaman (2025) explains that Southern academics are systematically excluded from knowledge-production roles, and epistemic hierarchies persist even within European Union (EU) research collaborations (Fishberg et al., 2024). Global media platforms further reinforce this asymmetry by prioritizing content from centers of hegemony (Bucher, 2018; Srnicek, 2021). Moreover, norms such as "scientific rigor" and "journalistic objectivity" are not neutral, but are embedded in Northern institutional history that is not always contextual with the reality of the media and research ecosystem in the Global South (Nyamnjoh, 2009; Wasserman, 2018). As decolonial scholars emphasize, epistemic justice is not enough to be achieved through inclusion in the dominant framework, but instead requires a fundamental transformation of the framework itself (Chakrabarty, 2000; Stengers, 2010). Thus, efforts to bridge science and journalism cannot be reduced to mere improvements in communication but rather require a radical rethinking of who has the right to produce knowledge, for whom, and under what socio-political conditions.

Efforts to create mutual literacy, in which scientists understand the logic of media work and journalists understand scientific reasoning, are important but insufficient without structural changes. A critical dimension of this problem is the communication training deficit among scientists. Research funding agencies increasingly mandate public dissemination, yet scientists receive minimal training in public communication or media engagement throughout their careers (Besley et al., 2018; Peters, 2013). Swords et al. (2023) found that only 51% of scientists communicated with non-expert audiences before formal training, confirming that the deficit is institutional rather than attitudinal. Dudo and Besley (2016) showed that scientists' willingness to engage with media depends primarily on perceived institutional support and self-efficacy, both of which remain underdeveloped. This asymmetry harms the science-journalism interface directly: scientists lacking communicative competence produce jargon-laden responses, while journalists encountering such responses resort to oversimplification.

Addressing these divergences requires structural reforms such as investment in cross-disciplinary education, the creation of collaborative editorial spaces, and the strengthening of community-based science communication infrastructure that values pluralistic and local epistemologies (Massarani et al., 2025; Ottinger, 2020). In the Global South, this need is compounded by the absence of university press offices, media training programs, and science communication units (Massarani et al., 2023; Navarro & McKinnon, 2020). Only in this way can the convergence between science and journalism become a means of epistemic democracy, not just a field of asymmetrical reproduction of power.

3. Misalignments and Dilemma

One of the fundamental sources of tension between science and journalism lies in the striking difference in their temporalities. Science is slow — it is uncertain, rigorous, replicable, and peer-reviewed. In contrast, journalism operates under tight time pressures, with a rhythm of coverage that demands speed, proximity, and a constantly rolling cycle of events. This temporal inequality creates structural inconsistencies in how each field interprets uncertainty, authority, and urgency (Knorr-Cetina, 1999; Latour & Woolgar, 1979; Peters, 2013).

Producing scientific knowledge can take many years, starting from hypothesis formulation, funding submission, research implementation, and peer-reviewed publication of results. Scientific language tends to be cautious, expressed in terms of probabilities and protected by mitigating phrases (Hyland, 1998). Kuhn (1962) described, the paradigm shift in science occurs only after a long time, through the accumulation of anomalies in the "normal sciences." This delay is not a weakness but an internal protection mechanism that guarantees scientific validity, replicability, and integrity.

Journalism, by contrast, operates within a 24-hour or faster news cycle in which news value is determined by novelty and timeliness. Journalists must compose, edit, and publish within hours, and even in-depth or investigative reports rarely enjoy extended timelines unless supported by nonprofit or independently funded institutions. Journalistic authority is now fundamentally mediated by platform logics: algorithmic ranking, click metrics, engagement optimization, and digital visibility have restructured how news is produced, distributed, and consumed (Carlson, 2020; Diakopoulos, 2019; Napoli, 2019). These platform-driven dynamics accelerate and commodify information production in ways that Zelizer (2004) anticipated but that have intensified dramatically under contemporary conditions of social media saturation and algorithmic curation.

This temporal discord becomes especially acute in situations marked by high uncertainty, such as pandemics or climate emergencies. During the COVID-19 pandemic, science tried to accelerate itself through preprints, open access, and rapid peer-reviewed publication (Fleerackers et al., 2024; Fraser et al., 2021), while journalism must promptly communicate unverified findings to an eager public. This inequality leads to information mismatches, speculation amplification, and disinformation, eroding trust in science and the media (Blanco-Herrero et al., 2025; Ioannidis, 2020).

Inequality in conditions fraught with uncertainty often leads to early findings being framed as breakthroughs despite limited scientific evidence. Even after retraction or correction, false narratives continue to circulate through news reports and social media. Mechanisms designed for rapid scientific communication, such as

preprints, are often misunderstood by journalists and laypeople unfamiliar with provisional norms and peer review processes (Caulfield et al., 2021). This epistemic problem is compounded by a transformation in reporting practices that has degraded the verification function of journalism itself. Journalists increasingly rely on press releases, hyperlinks, and algorithmically curated content rather than conducting source verification through direct contact with researchers (Macnamara, 2016; Sumner et al., 2014).

The integration of generative AI tools into newsroom workflows introduces further risks, as AI-generated summaries may reproduce errors, fabricate citations, or flatten the nuances of scientific uncertainty (Pavlik, 2023). This degradation is not merely technological but structural, driven by the economic precarity of journalism, the reduction of specialist science desks, and the acceleration of production cycles under platform capitalism (Pickard, 2020; Waisbord, 2019). When journalists no longer go to the source, the epistemic ecosystem that once distinguished professional journalism from informal information circulation is fundamentally weakened, and the temporal misalignment between science and journalism becomes a compounding crisis of public trust in both institutions.

This mismatch also plays out in the differential valuation of uncertainty. In science, uncertainty is an integral part of epistemology and is explicitly articulated; in journalism, it is often considered a flaw that must be solved narratively or hidden. As a result, distortions such as "false balance," dramatization of conflict, or oversimplification of scientific findings emerge in public discourse (Boyce, 2007; Brüggemann & Engesser, 2017). Funtowicz and Ravetz (1993) warned, uncertainty must be communicated with values, not against them; this is a lesson journalism practice has only partially adopted in post-normal science communication.

In response to these challenges, two parallel movements — slow science and journalism — have emerged as critiques of neoliberal acceleration (Le Masurier, 2015; Stengers, 2018). Slow science advocates for reflective, community-engaged research unconstrained by publish-or-perish ecosystem metrics (Edwards & Roy, 2017). This criticism is more pronounced in the Global South because donor agendas and technocratic logic often compromise local knowledge production (Crane, 2010; Leach et al., 2021; Ndlovu-Gatsheni, 2018b; Santos, 2016).

Some platforms, such as The Conversation, Project Multatuli, ProPublica, and Zetland, demonstrate that scientific norms of verification, context, and depth can be integrated into journalistic work. These platforms present narratives explaining not only what is known but how and why that knowledge is evolving, opening space for understanding science as a dynamic process rather than a fixed product (Felt & Fochler, 2010; Waisbord, 2019).

However, slow science and journalism remain on the fringes of mainstream institutional structures. Funding models, editorial incentives, and audience expectations continue to privilege speed and visibility. The challenge is not to slow down the entire ecosystem but to create institutional buffer mechanisms where speed can be consciously negotiated based on the epistemic value at stake, for example, establishing science desks managed by specialist journalists, embedding scientists as collaborators in newsrooms, or creating joint editorial features between research institutions and public media (Buschow et al., 2022; Heinisch et al., 2021).

At the same time, the slow journalism ideal must contend with a parallel transformation reshaping the science communication landscape: the rise of scientist-influencers on social media. Scientists increasingly bypass journalistic mediation by communicating directly with publics through YouTube, TikTok, and

Instagram, adopting short-form video, humor, and algorithmic optimization to reach audiences that traditional journalism struggles to engage (Bucchi & Trench, 2021; Scheufele & Krause, 2019). This disintermediation raises significant epistemic questions. Scientists who communicate directly to the public often lack training in source triangulation, narrative balance, or editorial accountability, and their authority rests on perceived expertise rather than institutional verification mechanisms (Brossard, 2013). In the Global South, these dynamics are particularly consequential. In Indonesia, physician-influencers gained massive followings during COVID-19 by providing health advice that sometimes contradicted official public health guidance (Sastramidjaja, 2023). Across Southeast Asia and Latin America, scientist-influencers operate where professional science journalism is weak or absent, becoming de facto primary sources of scientific information for large publics (Massarani et al., 2023; Navarro & McKinnon, 2020). Any framework for science-journalism collaboration must therefore reckon with the fact that the boundaries of legitimate science communication are being redrawn by platform logics.

4. Two-Way Reflexivity in Scientist-Journalist Collaboration

Despite structural and temporal differences, science and journalism converge in their normative commitments to accuracy, transparency, and public accountability. Both disciplines cultivate trust through verification systems—peer review in science, source triangulation in journalism—and institutionalized norms that demand integrity. However, these norms operate under different constraints and are being reconfigured by contemporary challenges such as algorithmic mediation, politicization of expertise, and the crisis of credibility in the public sphere (Carlson, 2020; Massarani et al., 2021; Peters, 2014).

In science, epistemic objectivity is operationalized through standardized methodologies, hypothesis testing, and institutionalized review systems. Although scientific paradigms vary—from positivism to critical theory—methodological rigor remains a pillar of scientific legitimacy (Guba & Lincoln, 1994; Phillips & Burbules, 2000). einstruments such as the Singapore Statement on Research Integrity emphasize the importance of honesty, responsibility, and accountable data management (Resnik & Shamoo, 2011; Singapore Statement on Research Integrity, 2010). Violations of this principle—such as data fabrication, plagiarism, or undisclosed conflicts of interest—may be subject to institutional sanctions, including publication revocation, professional exclusion, or loss of research funding (Armond et al., 2024; Fanelli, 2010).

Journalism, although it lacks a standard methodological protocol like science, still maintains its epistemic authority through norms of verification, editorial supervision, and public accountability. The 2014 Society of Professional Journalists (SPJ) code of ethics emphasizes the responsibility to "seek the truth and report it," "minimize harm," and "act independently." In contrast to science, where internal ethics are more procedural and institutional, journalistic ethics are public and responsive to audience pressure and constant political intervention (Hanitzsch, 2007; Ward, 2010). Correction of errors must be made openly and quickly; Protection of sources and editorial independence are also fundamental principles.

However, both professions are currently facing ethical reconfiguration due to digital dynamics. In journalism, algorithmic logic and visibility metrics — clicks, reposts, watch time — have shifted traditional editorial values, creating a tension between economic continuity and epistemic integrity (Bucher, 2018; Srnicek, 2021). In science, publication pressures, competition for funding, and obsession with citation indexes have

created destructive incentives: the proliferation of superficial studies, data manipulation, and the reproduction of an unequal research agenda (Edwards & Roy, 2017; Smaldino & McElreath, 2016).

This crisis is felt most acutely in the Global South, where limited institutional autonomy, infrastructure, and political pressure severely affect ethical practices in both domains. In Vietnam and Indonesia, for example, journalists face censorship, commercial pressure, and limitations on reporting sensitive issues—including science—that indirectly shape the boundaries of editorial space (Haryanto, 2011; Rachman, 2024; Tran & Nguyen, 2023). Meanwhile, scientists are often reluctant to reveal findings contradicting the state's narrative for fear of political or administrative consequences (Badenschier & Wormer, 2012; Nguyen, 2024). Under these conditions, adhering to the norms of transparency, accuracy, and freedom of thought becomes a political act—ethical practice turns into a form of resistance.

Nevertheless, the space for ethical convergence remains open and even more urgent. Both fields have developed self-correction mechanisms: academic revocation and meta-analysis in science reflect the role of news correction and ombuds in journalism. New initiatives in science communication are now beginning to promote collaborative ethics: shared knowledge, social accountability, and epistemic humility (Heinisch et al., 2021; Ottinger, 2020). These practices drive a shift from a one-way communication model to a dialogical approach that questions how we communicate knowledge and the knowledge of who is recognized and on what value basis.

This shift is seen in the emergence of hybrid spaces such as knowledge-based journalism, collaborative media, and interdisciplinary training. Platforms such as *The Conversation* and *SciDev.Net* develop context-based editorial models, co-production between scientists and journalists, and civic orientations that prioritize participatory values (Bruns, 2017; Buschow et al., 2022). In this way, they challenge the assumptions of journalistic neutrality and academic rigor, offering a pluralistic approach to public knowledge that is more reflective and responsive to social contexts.

Ultimately, the convergence between science and journalism brings together two claims to truth and two institutions equally vulnerable to public delegitimization. Both must navigate the pressures of anti-intellectual populism, disinformation, and the dominance of monopoly platforms. In situations like this, the main challenge is filtering the complexity into a meaningful narrative without sacrificing depth or precision. The visibility paradox becomes real: the greater the public exposure, the higher the risk of commodification, politicization, and epistemic exploitation.

To respond to this moment, ethical practice must be reconceptualized not as a set of static principles but as a contextual and anticipatory relational process. Being factually correct is not enough; ethical imperatives now include accountability to communities, audiences, and the social consequences of knowledge. In both science and journalism, this means committing to transparency about limitations, openness to dissent, and loyalty to the public interest, especially in a social life where even the definition of truth is contested.

5. From Verification to Visibility: Norms, Methods, and Ethics

The constant friction between scientific research and journalistic practice should not be understood as an irreconcilable contradiction. Instead, these tensions mark the need for a new institutional imagination—a recalibration of the interface of science journalism that is no longer seen as a transactional relationship but as mutual co-production spaces. This demands a shift from a linear knowledge deficit model towards a collaborative ecology underpinned by reciprocal literacy, shared values, and co-productive infrastructure (Brüggemann et al., 2020; Bucchi, 2008; Reincke et al., 2020; Seethaler et al., 2019; Trench, 2008).

This kind of collaborative model must take root in two-way reflexivity. Scientists need to understand that conveying uncertainty, temporal limitations, and complexity is not a rhetorical weakness but an ethical action. Instead, journalists must move beyond the tendency to simplify or dramatize scientific findings and make room for processes, contexts, and diverse perspectives. This approach requires epistemic humility: honestly articulating what is known, what is not, and why uncertainty is essential (Douglas, 2009; Peters et al., 2014).

At the institutional level, reflexive collaboration presupposes a thorough reconfiguration of education, funding, and editorial norms. Journalism education should include understanding scientific methodology, statistical reasoning, and research epistemology. In contrast, scientific training also needs to include communication ethics, media engagement, and public dialogue (Fähnrich et al., 2023; Heinisch et al., 2021). Hybrid institutions such as Science Media Centers, academic–media partnerships, and collaborative fellowships can serve as mediating infrastructures, provided they are inclusive, locally embedded, and resistant to technocratic co-optation (Buschow et al., 2022; Massarani et al., 2025).

More than that, this reflexive model must uphold equality and epistemic justice. Colonial legacies and institutional inequality are still strong in the Global South, so the collaborative model should not reproduce long-standing extractive relationships. Adiprasetio (2026) revealed that journalism education in authoritarian states was formed not to build intellectual autonomy, but to serve the interests of the state and the market. Normative and procedural curricula fail to equip journalists with a critical theoretical framework for questioning epistemic authority or reflective science mediation. Without this transformation in education, reflective collaboration will only become a normative slogan that is difficult to realize structurally.

Therefore, science-journalism collaborations in the South should not uncritically import Northern models but build on local knowledge practices, vernacular media, and community-based research approaches (Chabibah et al., 2024; Nguyen & Tran, 2019; Santos, 2016). For example, a journalist in Aceh, Indonesia, working with marine biologists on coral reef degradation or a public health researcher co-authoring stories with journalists during dengue outbreaks in the Mekong River, Vietnam, are not just isolated incidents but models for context-sensitive collaboration.

In its implementation, reflexive collaboration requires co-authorship, mutual interpretation, and validation. Journalists and scientists must negotiate the meaning of how findings are framed, whose expertise is raised, which audiences are prioritized, and what forms of uncertainty are expressed. This kind of practice—boundary work in Gieryn (1983) terms—requires institutional support through time-consuming newsrooms, resources for narrative translation, and flexible ethical frameworks in political and everyday life (Hanitzsch & Vos, 2018; Hartley, 2017; Nisbet & Fahy, 2015; Valenti, 2000).

It is also important to note that this form of collaboration need not culminate in consensus. Instead, productive dissensus needs to be nurtured: a space to debate norms, acknowledge value conflicts, and build coordination without having to standardize. This becomes especially crucial in post-normal contexts, where collective decisions involve high risk and profound uncertainty, such as in the case of vaccinations, pandemic crises, or climate change adaptation (Brüggemann & Engesser, 2017; Funtowicz & Ravetz, 1993). Within this framework, journalism can be critical of science without undermining its legitimacy, and science can guide journalism without co-opting it. The key is to create a communication ecosystem that prioritizes integrity over proximity and oversimplification.

Models like these have already begun to emerge: investigative coverage of deforestation and zoonotic risk in Indonesia (Rochmyaningsih, 2022), co-designed community engagement campaigns during health crises (Davies, 2022; Hallin et al., 2023), or collaboration between indigenous communities and data journalists for environmental monitoring (Matsilele et al., 2024). These cases show that when trust is built through common goals, collaborative ethics, and recognition of epistemic plurality, science and journalism no longer operate in parallel monologues but become interlocking and mutually evolving democratic practices.

Table 1: Framework for Two-Way Reflexivity in Scientist-Journalist Collaboration

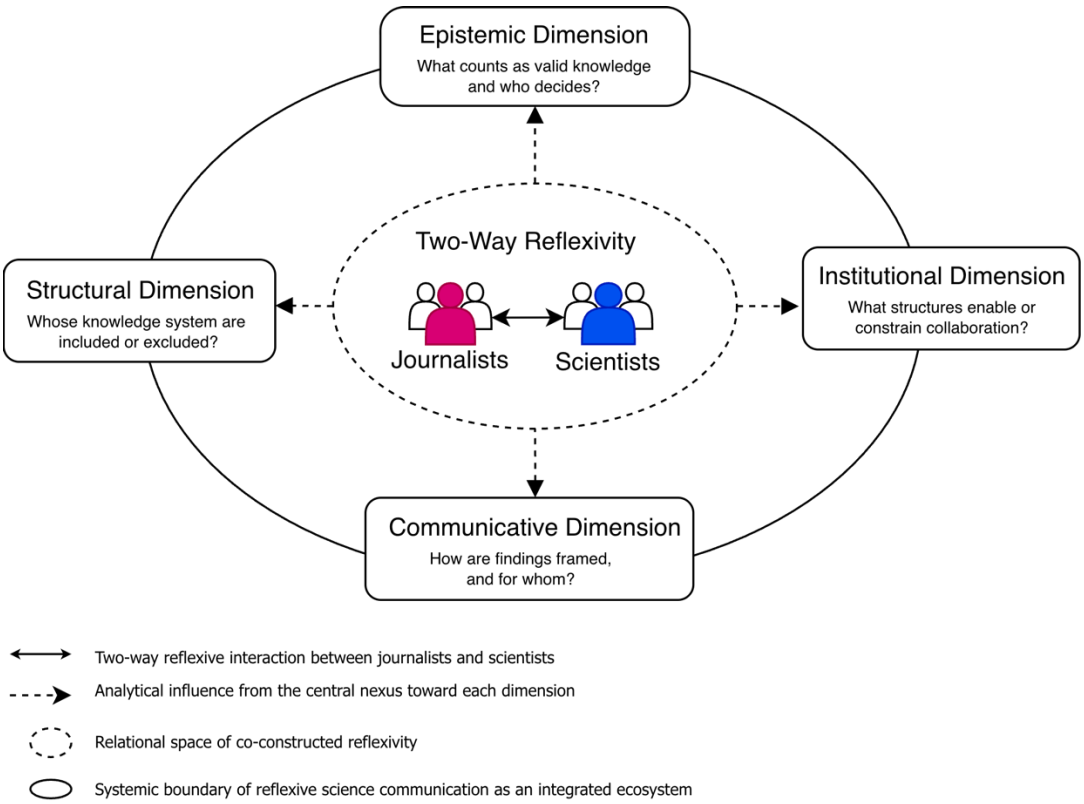
Dimension	Guiding Question	Reflexive Task		Practical Implications
		Scientist	Journalist	
Epistemic	What counts as valid knowledge and who decides?	Acknowledge that scientific authority is socially negotiated; recognize lay and indigenous knowledge systems	Move beyond deficit-model assumptions; resist treating scientific uncertainty as narrative weakness	Joint epistemology workshops; co-designed public deliberation formats
Institutional	What structures enable or constrain collaboration?	Invest in communication training; resist publish-or-perish incentives that discourage public engagement	Invest in specialist science desks; resist click-driven editorial incentives; create space for slower reporting	Science Media Centers; academic-media fellowships; embedded scientist programs in newsrooms
Communicative	How are findings framed, and for whom?	Communicate uncertainty as epistemic strength; adapt language without distorting substance; practice epistemic humility	Foreground process and context, not only results; represent disagreement without false balance	Co-authorship protocols; joint editorial guidelines for uncertainty communication
Structural	Whose knowledge systems are included or excluded?	Challenge North-South asymmetries; build partnerships with local communities; resist epistemic extractivism	Platform local and indigenous knowledge; resist algorithmic biases; advocate for science journalism infrastructure	Community-based science communication hubs; vernacular media partnerships; equitable funding models

Source: Authors

Reflexive collaboration should be understood as complex social relations rather than just technical solutions. Improving factual accuracy or refining press releases is not the end goal. At stake is the democratic role of journalism and science in shaping society's understanding of risk, responsibility, and collective reality. Institutional reform needs to extend to how funding is channeled, how performance is evaluated, and how civic infrastructure enables slower, deeper, and more inclusive forms of public reasoning. To operationalize this vision, Table 1 above synthesizes the framework of two-way reflexivity across four analytical dimensions,

specifying the core questions, reflexive tasks for both scientists and journalists, and recommended institutional actions that emerge from the analysis developed throughout this essay.

Figure 1: Framework for Two-Way Reflexivity in Scientist-Journalist Collaboration



Source: Authors

Figure 1 conceptualizes the proposed framework as a circular and relational configuration in which four analytical dimensions, epistemic, institutional, communicative, and structural, are arranged around a central nexus of two-way reflexivity connecting journalists and scientists. The enclosing boundary signifies reflexive science communication as an emergent and systemic condition rather than a linear outcome. This configuration underscores that reflexivity operates through simultaneity and mutual reinforcement across dimensions, rather than through sequential stages. The bidirectional linkage between journalists and scientists indicates that reflexivity is co-constructed through interaction, shaping, and being shaped by each dimension. Epistemic reflexivity involves the negotiation of knowledge legitimacy; institutional reflexivity concerns the organizational conditions that enable or constrain engagement; communicative reflexivity addresses the framing and orientation of knowledge for publics; and structural reflexivity situates these processes within broader dynamics of inclusion and exclusion. Accordingly, the co-production of public knowledge is understood as a continuous and distributed process within this integrated communicative ecosystem.

6. Conclusion

In a context marked by overlapping crises, the public's ability to understand complex scientific and social phenomena is increasingly under strain. Political polarization, populist distrust of expertise, and persistent global inequalities are eroding the authority of scientific institutions, while journalism faces declining

credibility, financial instability, and epistemic distortions associated with a platform-driven media ecosystem. In this environment, the convergence of science and journalism emerges as a structural necessity for democratic life, not merely a normative ideal.

This convergence, however, does not imply epistemic uniformity. Science and journalism remain distinct knowledge systems, characterized by different norms, timeframes, and institutional logics. Interactions between the two are marked by constant tension, particularly regarding the speed of production, the communication of uncertainty, ethical representation, and claims to narrative authority. This tension is further exacerbated by structural imbalances, especially in the Global South, where limited research infrastructure and fragile media systems constrain the development of pluralistic, context-sensitive science communication.

Rather than viewing this tension as an obstacle, it can be reconceptualized as a productive space for institutional innovation. Reflective and interdisciplinary collaboration enables the formation of new epistemic configurations that emphasize contextualization, dialogic engagement, and accountability. This transformation requires systemic investment in narrative translation, institutional reform, professional training, alternative funding models, and participatory public platforms that facilitate inclusive dialogue and mutual recognition among various actors.

A key requirement of this approach is epistemic caution. Simplification for the sake of speed or premature consensus risks undermining the integrity of public reasoning. Instead, both scientists and journalists must adopt roles that support informed civic deliberation without claiming epistemic certainty. This involves critically engaging with their respective limitations and opening the knowledge-production process to broader participation, including communities, policymakers, and civil society actors.

The relevance of this framework is particularly evident in the context of post-normal communication, where uncertainty prevails, and the consequences of miscommunication can be systemic. Traditional dichotomies—such as experts versus laypeople or facts versus opinions—are increasingly inadequate. Therefore, an epistemic model grounded in inclusive deliberation, epistemic justice, and collective negotiation of knowledge is required.

The main contribution of this essay lies in conceptualizing two-way reflexivity as a multidimensional analytical framework encompassing epistemic, institutional, communicative, and structural dimensions. This framework expands existing models by viewing science communication carried out by journalists and scientists as a simultaneous, interactive process rather than a linear transfer of knowledge. It also incorporates a Global South perspective, highlighting the structural and political conditions that shape reflective collaboration.

However, this framework remains theoretical and has not yet been empirically validated. Its illustrative cases are not systematically comparative, and its analytical categories may overlap in practice. Future research should test this framework through comparative and experimental studies, including investigations into AI-mediated verification and the role of emerging new actors in digital science communication.

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Declaration of AI usage
Generative AI tools were used to translate Spanish-language scientific articles for citation in this paper.

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