

Platform-Based Governance of Fake News in the Digital Information Ecosystem

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Abstract

The rise of digital media has fundamentally transformed the production, dissemination, and consumption of news, enabling fake news to circulate at unprecedented speed and scale. In this platform-mediated information environment, fake news has become a structural phenomenon capable of generating systemic public harms across multiple domains, including democratic governance, public health, public safety, and economic stability. The existing ex post regulatory frameworks in the United States are ill-suited to address such harms, while constitutional constraints under the First Amendment significantly limit the feasibility of ex ante governmental regulations. This paper examines the regulatory challenges posed by fake news through a combination of conceptual reasoning and legal analysis. It identifies the systemic harms associated with fake news and analyzes the current public-private regulatory structure against the Constitution and judicial precedents. Building on the analysis, this paper proposes an editorial process-based labeling mechanism, centered on source transparency at the platform level, to regulate fake news. By shifting regulatory focus from content-based to process-based, the proposed mechanism offers a constitutionally compatible, scalable, and transparency-oriented solution for mitigating the harms of fake news in the digital ecosystems.

Keywords

fake news, First Amendment, public harms, ex ante regulation, platform-based governance

1. Introduction

Debates over false or misleading news content long predate the term “fake news”. However, the 2016 U.S. presidential election marked a turning point: the phrase “fake news” surged into public consciousness and political discourse, rapidly evolving into a catch-all label and rhetorical weapon [1], provoking widespread concern about its effects on public trust, democratic institutions, and information integrity [2]. Today, very few dispute that fake news, whether state-sponsored disinformation or viral hoaxes, demands regulatory attention [3].

News is no longer produced and disseminated primarily through traditional media with editorial oversight and gatekeeping, but circulates through decentralized, user-generated content amplified by algorithms. The rise of digital platforms has fundamentally reshaped the contemporary information environment, enabling false

or misleading information to travel at unprecedented speed and scale [4]. This shift diminishes the role of editorial oversight and replaces it with algorithmic visibility and user-driven amplification [4,5]. Content circulates not based on accuracy or institutional credibility, but on engagement and shareability [6]. The algorithmically amplified dissemination has made fake news more difficult to regulate than traditional news [7].

Within this transformation, fake news has been identified by existing scholarship to produce systemic harm in multiple domains and threaten public welfare [8–11]. Fake news can distort beliefs and thereby influence behaviors, resulting in measurable cognitive and behavioral consequences [12], which can endanger collective interests of the public across various domains, including democratic governance, public health, public safety, and the economy [3,9–11,13,14].

To address the issues revolving around fake news, existing scholarships have navigated ways to regulate fake news and mitigate its impact through public and private governance. Legal and policy discussions have largely focused on ex post remedies to address the harms associated with fake news, such as defamation and fraud [15]. However, these doctrines are designed to remedy individualized harm associated with false information through case-by-case adjudication, which cannot effectively address the systemic harm fake news produces [16,17]. Government efforts to regulate fake news also face constitutional constraints, as implementing content-based regulation violates the First Amendment [18–21]. On the other hand, private governance has risen as the dominant pathway to regulate fake news [22]. Platforms can detect fake news using algorithms and artificial intelligence, then moderate or flag the problematic post [23]. However, unlike traditional media's editorial review, since social media allows instant publication, platforms can only exercise these measures after the fake news has been published and circulated, creating impacts that are not easily traceable and measurable online [4,17,23,24]

These conditions give rise to a persistent regulatory gap, which is the structural mismatch between the untraceable nature of the public harms of fake news and the ex post regulatory structure. This gap raises a central question for digital information governance: how can harm associated with fake news be effectively addressed in a manner that is both operationally feasible and consistent with constitutional principles?

This paper addresses this question through a combined conceptual and legal analysis. Section 1 begins with proposing a functional definition of fake news. Section 2 examines the systemic harms associated with fake news and identifies the scope of the issue. In Section 3, the paper analyzes the limitations of the current regulatory framework. Building on this analysis, the paper evaluates the constitutional constraints that shape the boundaries of permissible regulation. Finally, in Section 4, the paper proposes a process-based governance approach centered on editorial transparency, shifting the regulatory focus from content evaluation to transparency of the origin of information.

2. Fake News in the Digital Information Context

Effective regulation of fake news requires definitional clarity. Before evaluating how legal systems should respond, this paper must first clarify what qualifies as “fake”. This section provides the conceptual foundation by offering definitions of fake news suited to the realities of digital media. Rather than accepting fake news as a colloquial label, the analysis deconstructs it into functional components—format, editorial verification, and potential for harm. These elements are intended not as theoretical abstractions, but as analytical tools for assessing what kinds of content might legitimately trigger regulatory concern.

Although the term “fake news” has become ubiquitous in public discourse, it lacks precision and often functions as a weaponized label. On social media, the label is sometimes applied indiscriminately. A study by Ribeiro et al. found that political polarization strongly correlates with the use of the hashtag #FakeNews on Twitter, suggesting that the term frequently serves expressive rather than descriptive purposes [25]. This rhetorical drift complicates efforts to define fake news in ways that are analytically coherent and legally operational [3,26].

Scholarly definitions of fake news distribute along a conceptual spectrum, ranging from narrowly confined legal definitions to broad understandings. At one end, researchers anchor the definition in intentionality and fabrication [15,26–28]. Some influential conception of fake news divides fake news into three deliberate forms: serious fabrications, hoaxes, and satire [27], excluding negligent error and editorial lapses [26]. Law, stricter

than others, centers on malicious intent and removes satire altogether, relying on the media literacy of the audience to identify parody [15]. At the opposite end of the spectrum, one common understanding classifies any untrue or misleading information as fake news, regardless of the speaker's intent [29]. These competing frameworks illustrate the definitional tension: the narrower the definition, the more limited its regulatory reach, whereas the broader the definition, the more vulnerable it is to overreach and subjective enforcement.

While intent- and content-based definitions dominate the discourse, a line of scholarship has emphasized the editorial process as a third axis of distinction. Some point out that fake news, as fabricated content that mimics the form of journalism, lacks its organizational editorial process [2,26]. This approach shifts focus from the speaker's motives or the surface plausibility of the content to the institutional procedures that ensure accountability and credibility. These mechanisms not only promote factual accuracy but also distribute responsibility for informational harm. In contrast, most digital content circulates without comparable internal review or external accountability [4]. The absence of editorial norms allows misleading or false material to travel widely while still appearing legitimate, thereby complicating efforts to distinguish genuine reporting from its imitation.

To operationalize the definition of fake news considering the digital information environment, building on the distinctions discussed above, this paper adopts a hybrid framework for defining fake news. It refers to false or misleading content pushed on all media platforms that meet all of the following conditions: (1) adopts the formal features of news, (2) lacks editorial authentication, and (3) risks producing harm, regardless of intent. By focusing on structural unreliability and editorial verification, this definitional framework provides a consistent basis for distinguishing credible reporting from deceptive imitation of news in legal and regulatory analysis, especially within an increasingly platform-mediated information environment.

3. The Systemic Harms Associated with Fake News

Fake news can generate tangible effects on both society and individuals, manifesting systemic harms in various dimensions. Exposure to misinformation can distort beliefs, influence behavior, and produce measurable cognitive and behavioral consequences, rather than remaining confined to the realm of opinion or expression [8,30]. From a legal perspective, the significance of fake news lies in the concrete and observable harms it produces, focusing on circumstances in which misleading or false information gives rise to civil or criminal liability by causing reputational injury, economic loss, or other forms of damage that implicate protected interests [15]. Harm produced by fake news can be categorized into two dimensions, public harm and individual harm, based on the interests affected [3]. Individualized harms are often addressed through lawsuits brought by private individuals [15], while public harms arise when fake news undermines collective interests and social systems that depend on reliable information to function. The following analysis will focus mainly on what has not been sufficiently addressed—the public harms associated with fake news. Public harms manifest at the level of shared decision-making, social coordination, and institutional operation [3,15], which can be broadly grouped into four major domains: democratic governance, public health, public safety, and economic stability.

Democratic harm arises when the informational conditions necessary for collective judgments and participation in democratic decision-making are compromised. Since democracy depends on the public to make fair and informed decisions, idealistically, information circulating in the media plays a crucial role in educating the public and aiding them to make collective decisions [31,32]. However, the circulation of fake news on digital platforms pollutes the information the public receives and ultimately deteriorates the quality of democratic governance [32]. At the level of circulation mechanisms, misinformation in digital media ecosystems spreads at unprecedented speed and scale, often without institutional filtering or editorial verification, and is further amplified by engagement-driven algorithms [5]. These dynamics alter the distribution of attention and information in the public sphere, allowing false information to crowd out information produced through established journalistic or institutional processes [30]. At the behavioral level, the circulation of fake news may impair the public's ability to accurately understand relevant circumstances and influence voter behavior and decision-making, influencing voters' perceptions through repeated exposure to fake news [8]. According to an analysis by BuzzFeed News in regard to the 2016 presidential election, by election day, related fake news on Facebook gained one million more engagements than mainstream news regarding the election, among which pro-Trump fake news stories were shared tens of millions of times, far

more than pro-Clinton ones [33]. While it remains difficult to assess the impact on the electoral outcomes, the presence of information manipulation speculations illustrates how circulation dynamics can mediate individual political behavior. Ultimately, fake news harms manifest at the structural level [3,8,32]. Large-scale fake news circulation and abusive use of the term as a weapon against unflattering information undermines shared factual baselines and erodes public confidence in the integrity of democratic processes and institutions [3,8,26,32]. The degradation of the information conditions under which democratic participation occurs constitutes a distinct and public harm to democratic governance [8,15,28,32].

Public health has long depended on the availability, reliability, and circulation of information; fake news can produce concrete harms by distorting the information environment. In the digital era, individuals live within a continuous information environment structured by digital media and networked technologies [14]. Online fake news undermines the reliability of health-related information and interferes with the public's capacity to make informed health decisions globally [34,35], especially in some cases, when public health information is politicized and weaponized, which significantly increases its reach and impact [36–38]. Therefore, fake news is capable of producing public health harms at scale. The most immediate and tangible harm arises from pseudoscientific misinformation [39]. False or misleading claims about disease prevention, treatment, or cures directly affect health behavior by encouraging ineffective or dangerous practices [39,40]. For example, during the COVID-19 pandemic, hundreds of Iranians died from alcohol poisoning due to believing rumors on social media about the efficacy of neat alcohol as a cure for the coronavirus [39]. Fake news can also generate indirect harms that weaken the institutional and social foundations of public health, by distorting public risk perception, particularly during public health crisis [35]. Studies have shown, during COVID-19, on certain social media platforms, while the volume of content produced by questionable sources was 30% less than that of reliable sources, the engagement it received was 3 times more than that of reliable sources [10]. These indirect harms do not manifest as isolated medical outcomes but as systemic constraints on public health capacity, limiting institutions' ability to respond effectively to health emergencies.

Fake news can harm public safety when false or misleading information disrupts these institutional functions or undermines the informational conditions that support collective coordination and social stability [41]. At the institutional function level, fake news can interfere with the operation of public safety institutions, particularly law enforcement and investigative authorities, by generating inaccurate reports, fabricated threats, or misleading narratives that overwhelm police and intelligence services, divert resources, and delay responses to credible risks [41]. At the collective coordination level, public safety harm occurs when fake news disrupts coordinated emergency response in time-sensitive contexts. When fake news on social media misdirects evacuation efforts, provides inaccurate safety guidance, or impedes access to emergency services, it increases physical danger and reduces response effectiveness [13,38,42]. For example, during Hurricane Sandy, there were false reports of damage and emergency instructions circulating on Twitter, causing public confusion and chaos, and misallocation of resources in relief efforts [13]. Ultimately, at the systemic level, public safety harm arises when fake news destabilizes social conditions by amplifying collective anxiety, allowing social instability to become a source of public safety risk, especially during a crisis [41,43,44], which can sometimes materialize as direct physical safety risks and violence [41]. For example, during the COVID-19 pandemic, fake news circulated claiming that Chinese evacuees had tested positive for the virus, leading to physical attacks on buses carrying the evacuees [41].

Fake news has increasingly been recognized as a source of economic risk that can undermine economic efficiency and public welfare at a systemic level [45–47], as it distorts the expectations of the public on which economic activities and decisions depend [12,46]. Domestic and international economic scholars and institutions have stressed the danger of fake news to public welfare and the health of the economy [11,48]. The World Economic Forum positioned misinformation and disinformation at the fifth ranking on current global risks overall, second in short-term risks severity ranking, and fourth in long-term risks severity [11]. The economic harm associated with fake news can be understood as a set of distinct distortions [11], operating at the consumer, market, and systemic levels. At the consumer-level, fake news can generate economic harm to a mass population when falsely cultivating belief-driven panic purchasing that causes misallocation of money and resources [49]. This can lead to congestion, shortages, and non-price rationing mechanisms, causing allocation to deviate from marginal urgency or marginal benefits [49]. Market-level economic harm arises when fake news is incorporated into prices and distorts price formation and asset valuation [50]. Fake news can alter trading behavior by disseminating false market information and fabricated reports, producing short-

run mispricing and increasing downside risk [50]. For example, in 2013, a hacked Associated Press Twitter account falsely reported explosions at the White House, triggering an immediate decline in U.S. equity indices [51]. From a broader perspective, fake news can impose systemic-level economic risks by degrading the informational conditions necessary for reliable economic coordination due to heightened uncertainty and weakened trust of the public [11]. Fake news about economic risks increases disagreement about baseline facts and erodes the public's confidence in authoritative information sources, confusing the public between the truth and fake news [11,12]. As uncertainty rises, economic actors are more likely to adopt defensive or precautionary strategies, which can amplify volatility [11,12]. In this way, fake news interacts with pre-existing economic stresses, intensifying their effects by synchronizing expectations around pessimistic or distorted narratives. Consequently, fake news ultimately raises the cost of collective action and reduces the reliability of both market signals and policy interventions [11].

4. The Limits of the Current Regulatory Framework

4.1 The Existing Regulatory Structure

The regulation of fake news in the United States does not operate through a single statutory framework or unified doctrine but is instead distributed across multiple legal and institutional domains [52]. Governance emerges from a combination of ex post legal doctrines, platform-based private community standards, and intermediary liability rules [53].

At the level of public law, the primary regulatory tools available to address false or misleading information are sector-specific remedies [19]. They are designed to remedy discrete violations rather than to structure the broader informational environments, such as defamation doctrine, fraud and consumer protection statutes, and securities law that protects market transactions [16,19]. Each of these doctrines intervenes after harm has occurred and requires identifiable injury, causation, and legally cognizable damages [17]. However, these legal remedies operate retrospectively and within narrow doctrinal boundaries.

Therefore, a substantial portion of misinformation governance occurs at the intermediary level through platform-authored rules and enforcement systems [52]. This intermediary governance functions through terms of use contract rather than statute, which authorizes the platform to enforce community standards and take moderation actions [52]. This system often resembles public regulatory regimes in structure: they define prohibited categories, articulate enforcement tiers, and provide limited appeal procedures [52]. Major platforms such as Meta, YouTube, Facebook, and X maintain Community Standards and integrity policies that address misinformation, election interference, and public health claims [54–58]. These policies typically authorize a range of responses – including content removal, warning labels, reduction in algorithmic amplification, and account restrictions – carried out through a combination of automated detection systems and human review processes.

Such an intermediary regulatory framework is supported and encouraged by § 230 of the Communications Decency Act [22]. It shields platforms from liability for third-party speech while allowing them discretion to remove, restrict, or label content [59]. It grants immunity to interactive computer services for good-faith content moderation of material deemed objectionable, which, while not mandated, permits platform moderation [59]. As a result, § 230 establishes the legal space within which platform governance operates, but it does not prescribe substantive misinformation standards [53]. In addition, congressional hearings, regulatory investigations, and public criticism frequently prompt revisions to moderation policies [53]. Even in the absence of direct statutory mandates, platform governance unfolds in the shadow of public law and public interests [53].

Taken together, the current regulatory landscape reflects a hybrid framework composed of ex post public law remedies, statutory liability protections for intermediaries, and privately designed content regulation systems [22,53]. This hybrid structure reflects both constitutional constraints on state intervention and the practical centrality of platforms in regulating the circulation of online information.

4.2 Structural Limitations of the Current Ex Post Regime

Although the existing U.S. regulatory landscape reflects a hybrid structure, the system remains fundamentally anchored in corrective, ex post regulatory logic, which is well-suited to the context where harm is individualized and discrete [17,24]. Traditional doctrines such as defamation and fraud presuppose identifiable injury, traceable causation, and case-by-case adjudication capable of allocating responsibility and compensating victims [24]. Where injury is reputational or transactional, retrospective enforcement can meaningfully restore disrupted interests and internalize private costs [24]

Public harm, however, often cannot be efficiently regulated and compensated through an ex post mechanism in the context of digital platforms.¹ The harms associated with large-scale dissemination of fake news are diffuse and cumulative [60]. Several structural characteristics of digital ecosystems render ex post mechanisms less effective than desired. First, the volume of content circulating across platforms makes post-by-post adjudication and corrective measures inherently infeasible [22,24]. For example, on average, there are over 600 million videos uploaded to YouTube monthly; in the reported statistics in 2025, an average of around 10 million videos were removed from the platform monthly [61,62].² YouTube relies on teams to review and determine the appropriate actions [61]. Considering the volume of the uploads and the time of the review, the cost of the adjudication is immense, and the error margin is unclear. Second, the algorithmically amplified speed and the widespread exposure of online dissemination produce impacts that cannot be traced and accurately measured [63], especially when fake news tends to travel faster and farther than correct and factual information online, making its impact broader and with more engagement. Studies found that fake news stories are 70% more likely to be retweeted than factual information on Twitter, reaching between 1,000 and 100,000 people [64]. Given that false information impacts the perceptions and sometimes decisions of individuals at various levels, it is infeasible to map the collective impact of each false post accurately. Third, the fake news associated public harms may not have clearly identifiable victims, assignable liability, and measurable damage, making compensation or remedies by corrective measures less effective than desired [53]. Once fake news shapes beliefs, influences market behavior, or distorts collective responses, subsequent removal or remedies do not restore the impact [63]. Furthermore, in an algorithmically mediated ecosystem, responsibility is fragmented across speakers, users, and platforms, which makes it inherently impossible to assign liability and identify victims within the traditional frameworks.

The above analysis shows a structural misalignment between systemic informational harm and a regulatory model oriented towards individualized adjudication, which exposes the limits of corrective logic as a primary governance strategy for systemic informational harm. Ex post remedies remain normatively coherent in contexts of individualized injury, with discrete victims and traceable causations. However, when harm is infrastructural, probabilistic, and collectively distributed, an ex post regulatory framework cannot reliably stabilize the informational environment. Therefore, when harm is systemic, cumulative, and infrastructural, regulatory emphasis must shift from corrective ex post measures to a preventive design.

4.3 Constitutional Constraints on Ex Ante Regulation and Governmental Actions

Despite the limitations discussed above, the persistence of ex post regulation is a result of the doctrinal constraints of the First Amendment [65,66]. The First Amendment protects the right to “free exercise” of “speech” and “press” and strictly limits government control over the exercise of this right [67]. The protection of speech is rooted in the deep concerns that granting the government authority to determine what counts as truth risks power abuse and distorts the information available to the public [65].

These concerns are reflected in the strong suspicion of prior restraints, establishing a strong presumption against the restriction of speech before publication. In *Near v. Minnesota*, the court stated that the foundational principle that preventing prior restraints on publication is the primary purpose of the First Amendment [68], which was later reinforced in *New York Times Co. v. United States*, where the court imposed a heavy presumption against the constitutional validity of such restraints [69]. The court limits prior restraints to apply only to the most extraordinary circumstances [69]. Together, these cases establish that pre-dissemination control of speech is not only disfavored but also unconstitutional in most cases.

¹ See Section 2 for public harm analysis.

² This number is recalculated to unify the time units based on statistics provided on [61,62].

Even though some argue that false speech lacks the same value as truthful speech, the Supreme Court has made clear that false speech is protected speech [19]. In *United States v. Alvarez*, the Supreme Court rejected the government's attempt to create a new unprotected speech category based on falsity [20]. It is because the court considers false speech regulation as content-based regulation, which, as established in *Reed v. Town of Gilbert*, content-based regulation of speech is subject to First Amendment protection, triggering strict scrutiny review for government restriction [21]. The court emphasized that content-based regulation on speech must be the least restrictive means among available, effective alternatives [20]. This principle renders governmental regulation of speech extremely difficult to pass the judicial standards [20,22]. Therefore, in practice, the government's efforts to regulate disinformation as an umbrella category are particularly vulnerable to such demanding standards because of the vagueness and overbreadth of the categorization [70].

While these constraints render governmental *ex ante* restrictions on false speech practically infeasible, the court allows private platforms to regulate and moderate speech. In *Marsh v. Alabama*, the court held that intermediaries are not limited by the government's constraints under the First Amendment [22,71]. In *Moody v. NetChoice, LLC Reporter*, the court affirmed that content moderation on platforms is considered the platform's protected editorial rights under the First Amendment [72]. Therefore, the law cannot interfere with the platform's rights to moderate content [72]. The editorial freedom allows private platforms to act as the "governor" of speech within their interfaces and perform *ex ante* and *ex post* regulation of the speech without constitutional restrictions [22].

While it may seem plausible for the government to manipulate the platforms to impose prior restraints on speech, there are restrictions against government coercion [73]. While the government may cooperate with the platform to provide guidance, threatening platforms with adverse consequences, such as collateral censorship, or "significantly encouraging" platforms into favorable regulatory decisions, is where the law draws the red line [73]. As established in *Bantam Books v. Sullivan*, even without formal legal actions, the government pressuring or intimidating publishers into giving up publication may constitute a form of unconstitutional prior restraints [74]. This principle was taken further in *Murthy v. Missouri* [75]. In *Murthy*, the U.S. District Court ordered injunctions prohibiting the government from coercing or significantly encouraging digital platforms to moderate content [75]. Even though the Supreme Court finally decided that the parties lacked standing to sue due to failure to prove a direct association between their damage and the governmental actions, the suspicion of government suppression and coercion persists in the opinion of the judges [76,76]. This case has had chilling effects on the cooperation between governments and the private platforms [73]. Various government institutions reconsidered or suspended assistance and communications with private companies, including the National Institute of Health, which directed its employees to stop reporting misleading health-related content [73]. While there are discussions of ways the government might regulate speech through soft power and influence on digital platforms, the government may act ever so cautiously after *Murthy* [73,77].

5. Reimagining Ex-Ante Private Governance: A Process-Based Solution

Due to the current constitutional constraints, private platforms emerge as actors, more viable than the government, capable of implementing *ex ante* regulation on fake news online [22]. Unlike state actors, platforms are not subject to First Amendment constraints when moderating speech on their services [22,71]. Courts have recognized that platforms possess the editorial right to prioritize, remove, and moderate content within their domains, which constitutes protected expressive activity of the platforms [72]. In addition, platforms have independent incentives to moderate content without government coercion or encouragement [75]. The platforms can be economically and operationally responsive to user expectations, reputational concerns, and the maintenance of functional information environments [22]. As a result, platforms are both constitutionally permissible and practically motivated regulators of online speech [22]

Traditionally, content-based regulation is often applied in regulating false speech, but it triggers constitutional constraints and lacks efficiency and efficacy in *ex ante* regulation [21,65]. As established by the courts, content-based regulation of false speech triggers strict scrutiny in reviewing its constitutionality [20], requiring the regulation to be the least restrictive among all available alternatives, which makes speech regulation extremely difficult [65,78]. In addition, content-based regulation is by design ineffective and insufficient for *ex ante* regulation. Content-based regulation requires the platform to first capture the

problematic post and then adjudicate the content's accuracy and credibility prior to taking any measures, which cannot be effectively *ex ante* when applying to social media, where users can instantly publish content [23]

5.1 Source Transparency: Editorial Process-Based Mechanism

This paper proposes a shift from content-based regulation to an editorial process-based labeling mechanism. Rather than moderating content after falsity has been identified, platforms can introduce mechanisms that signal the reliability of content by targeting the editorial process of content production. It is acknowledged that social media platforms, allowing everyone to share information, lack the gatekeeping mechanisms characteristic of traditional media and knowledge institutions, which allows false information to spiral while weakening the ability of these institutions to decide what counts as true.³ Meanwhile, fact-checking, part of the editorial norm of the traditional media outlets to ensure credibility and verifiability of the information, is absent in the publication process on social media [4,65]. To fill in that gap and establish credibility, the editorial process-based approach draws from the editorial practices of traditional media institutions [79], which targets procedural norms of content production, such as sourcing, verification, and attribution.

The proposed mechanism is a voluntary source disclosure system integrated into the content publication process. Prior to posting, users would be provided with an option to submit the sources underlying their content, including the type, origin, and identity of the source, in accordance with the fact-checking norm of the journalistic practice [79]. While this submission and labeling shall be inclusive of all content published on the platform, this submission would be optional and would not condition the user's ability to publish. If submitted, the source information would be displayed alongside the content as a visible label. If the submission is omitted, the interface may indicate that no source has been specified or verified. Crucially, the platform does not restrict dissemination based on the absence of such a submission. The mechanism functions as a form of structured disclosure that supplements content with contexts.

To promote and implement this mechanism, the boundary between private governance and governmental influence shall remain clearly defined. As established in cases such as *Bantam Books* and more recently examined in *Murthy v. Missouri*, the government may not pressure or induce platforms to adopt or enforce specific regulatory measures [73–75]. However, the government may cooperate with the private platforms by providing general guidance, supporting research efforts, and lending technical support [73,77]. In addition, the government may also provide positive incentives, such as granting legal immunity to platforms, to motivate platforms to consider adopting new measures [73,77].

5.2 Advantages and Constitutional Compatibility of the Proposed Mechanism

By shifting the focus from content evaluation to source transparency, this model alleviates the administrative burden of the platforms. It reconfigures the allocation of responsibility in verifying credibility and disclosing warnings from the platforms to the readers and the publishers of the posts, respectively, enabling users to make independent assessments based on available knowledge about the origin of the information. In addition, this model can serve to complement other regulatory measures that the platforms are currently implementing.

This mechanism also aligns with the judicial principle favoring counter speech over suppression. The Supreme Court has emphasized that the appropriate remedy for false speech is often “more true speech” [20]. Scholarly discussions also argue that arbitrarily banning or punishing false speech would have numerous negative consequences to the information environment [19]. First, the governor's judgment of falsity is not necessarily reliable [19]. Second, banning or punishing false speech would have chilling effects on speech altogether, driving the unpopular beliefs underground and depriving people of the educational opportunities to understand what others think [19]. And, false speech can motivate people to strengthen the counterarguments and thereby better educate the public of the truth [19]. A source disclosure mechanism operationalizes this principle by enriching the informational context and facilitating user evaluation rather than substituting it. Source labeling may also contribute to improving media literacy by encouraging source-awareness, reinforcing norms of verification, and naturally reducing the spread of unsupported claims [80,81].

³ Section 1.2 has discussed the absence of organizational editorial process of fake news, distinguishing fake news from credible traditional media by its lack of editorial authentication. See also [4,65].

Importantly, the proposed model remains compatible with constitutional doctrine. First, it does not constitute a prior restraint [82]. The mechanism does not prohibit, delay, or condition publication on approval by authority. Second, it does not amount to content-based regulation that would trigger strict scrutiny or judicial concerns [21]. Platform does not assess or classify speech based on its meaning, viewpoint, or truthfulness, but instead introduces a neutral and process-oriented feature, which is applicable across categories of content. Third, the model avoids constraints on governmental regulation. The mechanism is designed for and implemented by private platforms, which are not limited to the constitutional constraints [71], yet labeling and flagging are considered the editorial freedom of the platform protected by the First Amendment [73,83].

6. Conclusion

Fake news in the digital information environment presents a structural challenge that generates systemic harm across multiple domains. Misinformation circulating through platform-mediated ecosystems can distort democratic decision-making, undermine public health, disrupt public safety operations, and destabilize the economy. The harms fake news produces are diffuse, cumulative, and embedded in the informational conditions that shape collective behavior.

The United States currently adopts an ex post regulatory structure against fake news, which remains largely ill-suited to address such harms. Existing legal doctrines, including defamation, fraud, and sector-specific liability regimes, operate through ex post remedies designed for individualized injury but struggle to respond to large-scale informational harms that lack clear boundaries, measurable damage, or assignable responsibility. Meanwhile, private platforms exercise their editorial rights to regulate and moderate content in response to identified violations and complaints after the publication. However, such measures cannot effectively prevent or remedy the large-scale impacts of fake news circulation online. The result is a structural misalignment between the nature of fake news harm and the ex post regulatory framework.

While ex ante regulation seems more viable in countering systemic harms, it faces significant constitutional constraints. The First Amendment imposes a strong presumption against prior restraint, subjecting content-based regulation to strict scrutiny. It makes ex ante regulation on fake news, judicially recognized as protected speech, extremely difficult to pass the constitutional scrutiny. As a result, these constraints shape a regulatory environment that is reactive rather than preventive. Moreover, the courts have established that even informal government involvement in pressuring private actors into speech regulation is unconstitutional, making cooperation between the governments and private platforms in regard to speech a particularly delicate matter, especially after *Murthy v. Missouri*.

To address the regulatory issue of fake news in consideration of the legal constraints, this article has proposed an editorial process-based labeling mechanism centered on source transparency. By introducing a voluntary source disclosure and labeling mechanism at the pre-publication stage on the platforms, the proposed model shifts regulatory focus away from content and toward the informational context. Rather than restricting speech, the mechanism supplements it by enabling the readers to assess credibility through the transparency of the source of the information.

This approach is viable under the constitutional constraints and in the current digital informational environment, while implementing ex ante measures to reduce the impacts of fake news online and increasing media literacy of the readers. The mechanism remains compatible with constitutional doctrine by avoiding prior restraint and content-based restrictions. It operates at scale within platform environments while alleviating administrative burden to verify information. Furthermore, it may contribute to the improvement of public media literacy by encouraging source awareness and critical evaluation.

References

- [1] Allcott, H., & Gentzkow, M. (2017). Social Media and Fake News in the 2016 Election. *Journal of Economic Perspectives*, 31(2), 211–236. <https://doi.org/10.1257/jep.31.2.211>
- [2] Lazer, D. M. J., Baum, M. A., Benkler, Y., Berinsky, A. J., Greenhill, K. M., Menczer, F., Metzger, M. J., Nyhan, B., Pennycook, G., Rothschild, D., Schudson, M., Sloman, S. A., Sunstein, C. R., Thorson, E.

- A., Watts, D. J., & Zittrain, J. L. (2018). The science of fake news. *Science*, 359(6380), 1094–1096. <https://doi.org/10.1126/science.aao2998>
- [3] Wardle, C., & Derakhshan, H. (2017). *Information Disorder: Toward an interdisciplinary framework for research and policymaking* (DGI(2017)09; DGI Reports). Council of Europe. <https://rm.coe.int/information-disorder-toward-an-interdisciplinary-framework-for-researc/168076277c>
- [4] Vosoughi, S., Roy, D., & Aral, S. (2018). The spread of true and false news online. *Science*, 359(6380), 1146–1151. <https://doi.org/10.1126/science.aap9559>
- [5] Tufekci, Z. (2015). Algorithmic Harms Beyond Facebook and Google: Emergent Challenges of Computational Agency. *Colorado Technology Law Journal*, 13(203), 206–207.
- [6] Bakir, V., & McStay, A. (2017). Fake News and The Economy of Emotions: Problems, causes, solutions. *Digital Journalism*, 6(2), 154–175. <https://doi.org/10.1080/21670811.2017.1345645>
- [7] Douek, E. (2021). GOVERNING ONLINE SPEECH: FROM “POSTS-AS-TRUMPS” TO PROPORTIONALITY AND PROBABILITY. *Columbia Law Review*, 121(3), 759-.
- [8] Adams, Z., Osman, M., Bechlivanidis, C., & Meder, B. (2023). (Why) Is Misinformation a Problem? *Perspectives on Psychological Science*, 18(6), 1436–1463. <https://doi.org/10.1177/17456916221141344>
- [9] Kavanagh, J., & Rich, M. D. (2018). *Truth Decay: An Initial Exploration of the Diminishing Role of Facts and Analysis in American Public Life*. https://www.rand.org/pubs/research_reports/RR2314.html
- [10] Cinelli, M., Quattrocioni, W., Galeazzi, A., Valensise, C. M., Brugnoli, E., Schmidt, A. L., Zola, P., Zollo, F., & Scala, A. (2020). The COVID-19 social media infodemic. *Scientific Reports*, 10(1), 16598. <https://doi.org/10.1038/s41598-020-73510-5>
- [11] *The Global Risks Report 2026*. (2026). [Insight Report]. World Economic Forum.
- [12] Shiller, R. J. (2017). Narrative Economics. *American Economic Review*, 107(4), 967–1004. <https://doi.org/10.1257/aer.107.4.967>
- [13] Hilberts, S., Govers, M., Petelos, E., & Evers, S. (2025). The Impact of Misinformation on Social Media in the Context of Natural Disasters: A Narrative Review. *JMIR Infodemiology*, 5(e70413). <https://doi.org/10.2196/70413>
- [14] Morley, J., Cows, J., Taddeo, M., & Floridi, L. (2020). Public Health in the Information Age: Recognizing the Infosphere as a Social Determinant of Health. *Journal of Medical Internet Research*, 22(8), e19311. <https://doi.org/10.2196/19311>
- [15] Klein, D. O., & Wueller, J. R. (2017). Fake News: A Legal Perspective. *Journal of Internet Law*, 20(10), 5–13.
- [16] Klein, D. O., & Wueller, J. R. (2017). *Fake News: A Legal Perspective*.
- [17] Issacharoff, S. (2007). Regulating after the Fact. *DEPAUL LAW REVIEW, Symposium - Is the Rule of Law Waning in America?*, 56(2), 375.
- [18] Balkin, J. M. (2016). Information Fiduciaries and the First Amendment. *UC Davis Law Review*, 49(4), 1185–1221.
- [19] Sunstein, C. R. (2020). Falsehoods and the First Amendment. *Harvard Journal of Law & Technology*, 33(Number 2 Spring 2020). <https://doi.org/10.2139/ssrn.3426765>
- [20] United States v. Alvarez, 567 U.S. 709 (Supreme Court of the United States 2012). <https://supreme.justia.com/cases/federal/us/567/709/>
- [21] Reed et al. v. Town of Gilbert, Arizona, et Al., 576 U.S. 155 (Supreme Court of the United States 2015). <https://tile.loc.gov/storage-services/service/ll/usrep/usrep576/usrep576155/usrep576155.pdf>
- [22] Klonick, K. (2018). The New Governors: The People, Rules, and Processes Governing Online Speech. *Harvard Law Review*, 131(6), 1598–1670.

- [23] Gillespie, T. (2019). *Custodians of the Internet: Platforms, Content Moderation, and the Hidden Decisions That Shape Social Media*. Yale University Press. <https://doi.org/10.12987/9780300235029>
- [24] Chiao, V., & Harel, A. (2023). CONTENT MODERATION ONLINE: REGULATION EX ANTE VERSUS EX POST. *University of Illinois Law Review*, 2023, 1537–1588.
- [25] Ribeiro, M. H., Calais, P. H., Almeida, V. A. F., & Jr, W. M. (2017). “Everything I Disagree With is #FakeNews”: Correlating Political Polarization and Spread of Misinformation (arXiv:1706.05924). arXiv. <https://doi.org/10.48550/arXiv.1706.05924>
- [26] Tandoc, E. C., Lim, Z. W., & Ling, R. (2018). Defining “Fake News”: A typology of scholarly definitions. *Digital Journalism*, 6(2), 137–153. <https://doi.org/10.1080/21670811.2017.1360143>
- [27] Rubin, V. L., Chen, Y., & Conroy, N. K. (2015). Deception detection for news: Three types of fakes. *Proceedings of the Association for Information Science and Technology*, 52(1), 1–4. <https://doi.org/10.1002/pra2.2015.145052010083>
- [28] Gelfert, A. (2018). Fake News: A Definition. *Informal Logic*, 38(1), 84–117. <https://doi.org/10.22329/il.v38i1.5068>
- [29] Levy, N. (2017, July 24). The Bad News About Fake News. *Social Epistemology Review and Reply Collective*. <https://social-epistemology.com/2017/07/24/the-bad-news-about-fake-news-neil-levy/>
- [30] Baptista, J. P., & Gradim, A. (2020). Understanding Fake News Consumption: A Review. *Social Sciences*, 9(10), Article 10. <https://doi.org/10.3390/socsci9100185>
- [31] Soroka, S. N., & Wlezien, C. (2022). *Information and Democracy*. Cambridge University Press.
- [32] Giusti, S., & Piras, E. (2020). *Democracy and Fake News: Information Manipulation and Post-Truth Politics* (1st ed.). Routledge. <https://doi.org/10.4324/9781003037385>
- [33] *Stanford study examines fake news and the 2016 presidential election*. (n.d.). Retrieved December 22, 2025, from <https://news.stanford.edu/stories/2017/01/stanford-study-examines-fake-news-2016-presidential-election>
- [34] Van Der Linden, S. (2022). Misinformation: Susceptibility, spread, and interventions to immunize the public. *Nature Medicine*, 28(3), 460–467. <https://doi.org/10.1038/s41591-022-01713-6>
- [35] Broniatowski, D. A., Jamison, A. M., Qi, S., AlKulaib, L., Chen, T., Benton, A., Quinn, S. C., & Dredze, M. (2018). Weaponized Health Communication: Twitter Bots and Russian Trolls Amplify the Vaccine Debate. *American Journal of Public Health*, 108(10), 1378–1384. <https://doi.org/10.2105/AJPH.2018.304567>
- [36] J. Scott Brennan, Simon, F., Howard, P. N., & Nielsen, R. (2020). *Types, sources, and claims of COVID-19 misinformation*. <http://reutersinstitute.politics.ox.ac.uk/types-sources-and-claims-covid-19-misinformation>
- [37] Wang, X., Zhang, M., Fan, W., & Zhao, K. (2022). Understanding the spread of COVID-19 misinformation on social media: The effects of topics and a political leader’s nudge. *Journal of the Association for Information Science and Technology*, 73(5), 726–737. <https://doi.org/10.1002/asi.24576>
- [38] Muhammed T, S., & Mathew, S. K. (2022). The disaster of misinformation: A review of research in social media. *International Journal of Data Science and Analytics*, 13(4), 271–285. <https://doi.org/10.1007/s41060-022-00311-6>
- [39] Naeem, S. B., Bhatti, R., & Khan, A. (2021). Regular Feature: International Perspectives and Initiatives. *Health Information & Libraries Journal*, 38(2), 143–149. <https://doi.org/10.1111/hir.12320>
- [40] Loomba, S., de Figueiredo, A., Piatek, S. J., de Graaf, K., & Larson, H. J. (2021). Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA. *Nature Human Behaviour*, 5(3), 337–348. <https://doi.org/10.1038/s41562-021-01056-1>

- [41] Gradoń, K. (2020). CRIME IN THE TIME OF THE PLAGUE: FAKE NEWS PANDEMIC AND THE CHALLENGES TO LAW-ENFORCEMENT AND INTELLIGENCE COMMUNITY. *Society Register*, 4(2), 133–148. <https://doi.org/10.14746/sr.2020.4.2.10>
- [42] Rocha, Y. M., De Moura, G. A., Desidério, G. A., De Oliveira, C. H., Lourenço, F. D., & De Figueiredo Nicolete, L. D. (2023). The impact of fake news on social media and its influence on health during the COVID-19 pandemic: A systematic review. *Journal of Public Health*, 31(7), 1007–1016. <https://doi.org/10.1007/s10389-021-01658-z>
- [43] Vasu, N., Ang, B., Teo, T.-A., Jayakumar, S., Faizal, M., & Ahuja, J. (2018). *Fake News: National Security in the Post-Truth Era* [Policy Report]. S. Rajaratnam School of International Studies, Nanyang Technological University.
- [44] Gruzd, A., Soares, F. B., & Mai, P. (2023). Trust and Safety on Social Media: Understanding the Impact of Anti-Social Behavior and Misinformation on Content Moderation and Platform Governance. *Social Media + Society*, 9(3), 20563051231196878. <https://doi.org/10.1177/20563051231196878>
- [45] *Disinformation and misinformation*. (n.d.). OECD. Retrieved January 13, 2026, from <https://www.oecd.org/en/topics/disinformation-and-misinformation.html>
- [46] Kavanagh, J., & Rich, M. (2018). *Truth Decay: An Initial Exploration of the Diminishing Role of Facts and Analysis in American Public Life*. RAND Corporation. <https://doi.org/10.7249/RR2314>
- [47] *The OECD Truth Quest Survey: Methodology and findings* (OECD Digital Economy Papers No. 369; OECD Digital Economy Papers, Vol. 369). (2024). <https://doi.org/10.1787/92a94c0f-en>
- [48] *OECD Legal Instruments*. (n.d.). Retrieved January 13, 2026, from <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0505>
- [49] Hofmann, K., & Reinmuth, K. (n.d.). *Consumer Welfare and Misallocation in Panic Buying of Gasoline*.
- [50] Fan, J., Liu, Q., Song, Y., & Wang, Z. (n.d.). *Measuring Misinformation in Financial Markets*.
- [51] Selyukh, A. (2013, April 23). Hackers send fake market-moving AP tweet on White House explosions. *Reuters*. <https://www.reuters.com/article/technology/hackers-send-fake-market-moving-ap-tweet-on-white-house-explosions-idUSBRE93M12Y/>
- [52] Klonick, K. (2018). THE NEW GOVERNORS: THE PEOPLE, RULES, AND PROCESSES GOVERNING ONLINE SPEECH. *Harvard Law Review*, Vol. 131(No. 6), 1598–1670.
- [53] Keller, D. (2019). *Who Do You Sue? State and Platform Hybrid Power Over Online Speech* (Paper No. 1902; Aegis Series). Hoover Institution. https://www.hoover.org/sites/default/files/research/docs/who-do-you-sue-state-and-platform-hybrid-power-over-online-speech_0.pdf
- [54] *Medical misinformation policy—YouTube Help*. (n.d.). Retrieved February 10, 2026, from https://support.google.com/youtube/answer/13813322?visit_id=639063472263463320-308509733&rd=1#zippy=%2Charmful-substances-practices-as-prevention-methods%2Cvaccine-misinformation%2Ctransmission-information%2Charmful-substances-practices-as-treatment-methods%2Cguaranteed-treatment-misinformation%2Charmful-alternative-methods-discouragement-of-professional-treatment
- [55] *Misinformation | Transparency Center*. (n.d.). Retrieved February 10, 2026, from <https://transparency.meta.com/policies/community-standards/misinformation/>
- [56] *Misinformation policies—YouTube Help*. (n.d.). Retrieved February 10, 2026, from <https://support.google.com/youtube/answer/10834785?sjid=14616067756967319357-NC#zippy=%2Cmanipulated-content%2Csuppression-of-census-participation%2Cmisattributed-content>
- [57] *Reporting false information on X for France*. (n.d.). Retrieved February 10, 2026, from <https://help.x.com/en/rules-and-policies/france-false-information>
- [58] *Community Standards | Transparency Center*. (n.d.). Retrieved February 10, 2026, from <https://transparency.meta.com/policies/community-standards/>

- [59] Communication Act of 1934, §230, Pub. L. No. 104-104, 47 United States Code (1996). <https://www.law.cornell.edu/uscode/text/47/230> Telecommunications Act of 1996
- [60] Glaeser, E. L., & Ujhelyi, G. (2010). Regulating misinformation. *Journal of Public Economics*, 94(3–4), 247–257. <https://doi.org/10.1016/j.jpubeco.2010.01.001>
- [61] *YouTube Community Guidelines enforcement*. (n.d.). Google Transparency Report. Retrieved February 17, 2026, from <https://transparencyreport.google.com/youtube-policy/removals?hl=en>
- [62] *YouTube for Press*. (n.d.). Blog.Youtube. Retrieved February 17, 2026, from <https://blog.youtube/press/>
- [63] Bendor, A. L., & Tamir, M. (2019). Prior Restraint in the Digital Age (Pt. 1155). *William & Mary Bill of Rights Journal*, 27 (2018-2019)(4). <https://scholarship.law.wm.edu/wmborj/vol27/iss4/7>
- [64] Greenemeier, -Larry, & Greenemeier, S. A. L. (2018, March 9). False news travels 6 times faster on Twitter than truthful news. *PBS News*. <https://www.pbs.org/newshour/science/false-news-travels-6-times-faster-on-twitter-than-truthful-news>
- [65] Lakier, G. (2023). *Lies and the Law: An Introduction* (Nos. 23–03). Knight First Amendment Institute at Columbia University. <https://knightcolumbia.org/content/lies-and-the-law-an-introduction>
- [66] *U.S. Constitution—First Amendment | Resources | Constitution Annotated | Congress.gov | Library of Congress*. (n.d.). Retrieved March 24, 2026, from <https://constitution.congress.gov/constitution/amendment-1/>
- [67] *U.S. Constitution—First Amendment | Resources | Constitution Annotated | Congress.gov | Library of Congress*. (n.d.). Retrieved April 9, 2026, from <https://constitution.congress.gov/constitution/amendment-1/>
- [68] *Near v. Minnesota*, 283 U.S. 697 (U.S. Supreme Court 1931). <https://tile.loc.gov/storage-services/service/ll/usrep/usrep283/usrep283697/usrep283697.pdf>
- [69] *New York Times Co. v. United States*, 403 United States Reports 713 (Supreme Court of the United States 1971). <https://tile.loc.gov/storage-services/service/ll/usrep/usrep403/usrep403713/usrep403713.pdf>
- [70] Henricksen, W. (2022). Disinformation and the First Amendment: Fraud on the Public. *St. John's Law Review*, 96(3). <https://doi.org/10.2139/ssrn.3860211>
- [71] *Marsh v. Alabama*, 326 U.S. 501 (1946). (n.d.). Justia Law. Retrieved March 28, 2026, from <https://supreme.justia.com/cases/federal/us/326/501/>
- [72] *Moody v. NetChoice, LLC Reporter*, 603 U.S. ____ (U.S. Supreme Court 2024). https://www.supremecourt.gov/opinions/23pdf/22-277_d18f.pdf
- [73] Citron, D. K., & Stautberg, J. (2025). Public-Private Partnerships After *Murthy v. Missouri*. *100 Indiana Law Journal* 791, 100(2). <https://www.repository.law.indiana.edu/ilj/vol100/iss2/7>
- [74] *Bantam Books, Inc. et al. v. Sullivan et Al.*, 372 U.S. 58 (U.S. Supreme Court 1963). <https://tile.loc.gov/storage-services/service/ll/usrep/usrep372/usrep372058/usrep372058.pdf>
- [75] *Murthy v. Missouri*, 603 U.S. 43 (U.S. Supreme Court 2024). https://www.supremecourt.gov/opinions/23pdf/23-411_3dq3.pdf
- [76] *Murthy v. Missouri* (2024). (n.d.). *The Free Speech Center*. Retrieved March 28, 2026, from <https://firstamendment.mtsu.edu/article/murthy-v-missouri-2024/>
- [77] Balkin, J. M. (2014). OLD-SCHOOL/NEW-SCHOOL SPEECH REGULATION. *Harvard Law Review Forum*, 127(8). <https://harvardlawreview.org/print/vol-127/old-schoolnew-school-speech-regulation/>
- [78] *Ashcroft v. American Civil Liberties Union*, 542 U.S. 656 (Supreme Court of the United States 2004). <https://tile.loc.gov/storage-services/service/ll/usrep/usrep542/usrep542656/usrep542656.pdf>
- [79] *The Truth in Journalism Fact-Checking Guide*. (n.d.). The Trust in Journalism Project. Retrieved March 11, 2025, from <https://thetijproject.ca/guide/the-editorial-process/>

- [80] Kim, B., Xiong, A., Lee, D., & Han, K. (2021). A systematic review on fake news research through the lens of news creation and consumption: Research efforts, challenges, and future directions. *PLoS ONE*, 16(12), e0260080. <https://doi.org/10.1371/journal.pone.0260080>
- [81] Jia, C., & Lee, T. (2024). Journalistic interventions matter: Understanding how Americans perceive fact-checking labels. *Harvard Kennedy School Misinformation Review*. <https://doi.org/10.37016/mr-2020-138>
- [82] *Prior restraint*. (n.d.). LII / Legal Information Institute. Retrieved April 7, 2026, from https://www.law.cornell.edu/wex/prior_restraint
- [83] *O’Handley v. Weber*, 62 F.4th 1145 (U.S. Court of Appeals for the Ninth Circuit 2023). <https://cdn.ca9.uscourts.gov/datastore/opinions/2023/03/10/22-15071.pdf>

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Conflicts of Interest

The authors declare no conflict of interest.

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