

Constructing an Ex Ante Necessary Measures Framework for Copyright Infringement in Algorithmic Recommendation Services

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Abstract

Algorithmic recommendation is now the dominant way of distributing content. Infringing contents are easily spread by algorithmic means. Traditional "notice-and-takedown" rule and general provisions regarding necessary measures fail to deal with algorithmic context, leading to great divergence in judicial practice. Academic discussion focuses only on whether it is legitimate to establish ex ante preventive obligations without developing any systematic criteria for its application. Ex ante necessary measures represent a private law duty of care incumbent upon platforms different from those based on public law review obligation. Algorithmic recommendation platforms shall be considered technical service providers; algorithmic intervention only changes the intensity of their duties instead of changing their status as service provider. Good-faith preventive rules should also be introduced to relieve platform's concern about the dilemma that "greater efforts may lead to greater liability." Typological construction of ex ante measures should be determined according to technical features of algorithms, control capability of platforms, risk of copyright infringement, and the principle of proportionality. Clarification of the boundary of preventive obligations will enable us to set up a hierarchy of ex ante preventive measures: automated copyright filtering, differentiated tiered preliminary review, algorithmic distribution permission control and supportive compliance mechanisms. Together they form a complete chain of ex ante infringement prevention. This approach follows the principle of technological neutrality and prohibits general and comprehensive monitoring. It helps harmonize judicial standards, balance copyright protection and freedom of information, improve the application of safe harbor rules in algorithmic contexts.

Keywords

Algorithmic recommendation; ex ante necessary measures; systematic construction; platform duty of care; indirect infringement.

1. Introduction

Widespread use of algorithmic recommendation has transformed the environment of information dissemination.[1] The infringing content is able to spread massively among users in a very short amount of time which greatly magnifies the infringement consequences and makes it hard to identify and prevent infringement risks. As an ex post measure, the traditional necessary measures framework based on "notice-and-takedown" mechanism becomes challenging to address infringement prevention under algorithmic context. Often, infringing content has been widely disseminated before the notice from right holders and completion of the deletion procedure by platforms; and effective enforcement of rights still faces difficulties once deleted.[2]. Besides, current copyright regulatory frameworks regarding necessary measures only offer generic list of ex post remedies like deletion, blocking or disconnection of links without providing any specific regulations for algorithmic recommendation scenario, also

failing to explain if necessary measures could be extended at the stage of infringement prevention. Therefore, different standard are applied by courts in assessing obligation of the platform: some courts require that major platforms should take proactive filtering measures,[3], whereas other courts strictly interpret the traditional safe harbor rules.[4]; thus causing frequent inconsistency in judgment in similar cases.

Thus, some scholars argue that despite keeping the basic rules governing platform liability, the shortcomings of the notice-and-takedown mechanism should be remedied by taking ex ante preventive measures (such as reasonably applying technological tools) so as to detect and prevent infringing contents at an earlier stage.[5] Existing studies mainly focus on justifying whether there should be ex ante obligations,[6] but fail to discuss which type of ex ante obligations should be imposed. On the other hand, some studies ignore the objective difference between technological capabilities among platforms or variation in infringement risk with regard to different types of works, leading to a one-size-fits-all solution when determining necessary measures.[7] Clearly, because of the lack of unified classification and determination rules, existing theoretical achievements are not easily applied during judicial adjudication and cannot offer clear guidance for practice. Thus, based on existing research, we need to build up a typology of ex ante necessary measures in algorithmic recommendation scenarios. Categorization and definition of the boundary of preventive obligations applicable to different entities and contexts will help us establish a foundation for harmonizing judicial standards while balancing copyright protection, platform industry development and the free dissemination of information.

2. The Normative Positioning of Ex Ante Necessary Measures for Algorithmic Recommendation Service Providers

2.1. Expansion of the Connotation of the Necessary Measures Rule and Its Systematic Connection with the Duty of Care

Under the “information finds people” dissemination model of algorithmic recommendation, legislation has substantially reshaped the normative framework of the necessary measures rule. Article 1195 of the *Civil Code* and Article 53 of the revised *Copyright Law* of 2020 jointly establish the “notice-necessary measures” rule. By replacing the closed-ended enumeration under the *Regulations on the Protection of the Right to Network Dissemination of Information* with the open-ended design of “necessary measures and other measures,” this legislative adjustment essentially reflects a transformation in governance philosophy from “prescribing specific obligations” to “flexible adaptation.” This legislative change provides normative space for incorporating ex ante preventive measures, such as infringement warnings, content filtering, and the banning of accounts involved in repeated infringement. It also promotes the transformation of necessary measures from a mere defense for exemption from liability into a statutory duty of care. Where a platform fails to adopt necessary measures commensurate with infringement risks and thereby causes damage, it shall bear joint liability for the expanded portion of the damage.[8] Legal scholarship has also reached a basic consensus that the regulatory focus of necessary measures should be extended to the ex ante stage.[9] In other words, necessary measures serve not only as the basis for determining whether a platform may be exempted from liability but also as the core criterion for determining whether the platform “should have known” of the infringement in the assessment of fault.[10] If a platform adopts ex ante measures that correspond to the level of infringement risk, it may be deemed to have fulfilled its duty of care and therefore does not constitute a situation in which it “should have known” of the infringement.[11] However, the platform’s failure to adopt a particular measure alone should not automatically lead to the conclusion that it has failed to fulfill its duty of care.

After clarifying the normative nature of such obligations, it is also necessary to distinguish two sets of boundaries in order to prevent the distortion of obligations. First, ex ante necessary measures are essentially statutory duties of care under private law imposed on platforms, rather than obligations of public-law review. In the *Xin Chuan Online v. Tudou* case, the court, on the ground that the platform had undertaken content review activities resembling public law review, held that the platform should bear a higher copyright-related duty of care, which triggered concerns over the “the more a platform does to prevent infringement, the greater liability it may face” dilemma. Actually, the public law review targets illegal and harmful information for maintaining public order while the private-law duty of care targets copyright infringement for protecting the rights and interests of civil subjects; they belong to different legal systems, differing on their regulatory objects, review standards as well as legal consequences. Fulfillment of public-law review does not necessarily mean that the duty of care is enhanced.[12] Secondly, it should clarify the line between the general monitoring obligation and the special prevention obligation. Ex ante necessary measures are specific means of fulfilling the ex ante duty of care. It requires limited preventive measures against specific high-risk content. Its intensity is located between passive duties of care and general monitoring obligations but shall not exceed the boundaries of reasonable care.[13]. Specific forms develop dynamically along with technological developments and changing infringement patterns. At present, infringement warnings, screening of high-risk content, governance of repeat infringing accounts, algorithmic traffic restrictions, etc., recognized by judicial practice all fall into the category of limited prevention targeted at specific circumstances. In terms of normative hierarchy, ex ante necessary measures are specific manifestations of the duty of care, constituting a corresponding relationship between abstract standards and concrete means.[14]

2.2. Determination of the Legal Nature of Algorithmic Recommendation Service Providers

Legal position of algorithmic recommendation service providers is the basis for establishing a system of ex ante necessary measures. The subject's nature, technical features, and liability structure define the scope, strength, and form of ex ante measures. Without clarifying the nature of the subject discussing ex ante measures will lead to an over-expansion towards general monitoring obligations or a hollowing out of these obligations.

In the field of online copyright, a dual distinction exists between technology service providers and content service providers.[15] The former merely provide technical support as intermediaries, do not directly engage in acts of utilization, and assume indirect infringement liability under the safe harbor rule. The latter directly disseminate content and bear direct infringement liability for the legality of such content.[16] Algorithmic recommendation service providers merely provide technical support for information distribution and do not edit or control the content uploaded by users; therefore, they should be categorized as technology service providers. The corresponding ex ante necessary measures should therefore be limited to targeted preventive measures against specific high-risk content and should not be transformed into comprehensive and indiscriminate monitoring obligations.[17] As a general-purpose information distribution technology, algorithmic recommendation has substantial non-infringing uses and should not result in direct attribution of liability to platforms merely because it is used for infringement. Even where platforms incorporate operational preferences into algorithm design, such choices remain within the realm of technological application and do not alter the nature of the technology as a tool. Ex ante necessary measures must be limited by technological feasibility and cost reasonableness, and platforms should not be required to undertake preventive obligations beyond their capabilities.[18]

Algorithmic recommendation platforms possess stronger dissemination control capabilities than traditional information storage service providers. Therefore, their duty of care should

correspond to their degree of technological control; however, the extent of algorithmic intervention only adjusts the intensity of obligations and does not alter the fundamental nature of the subject.[19] Under personalized recommendation models, platforms exercise the lowest level of intervention and therefore bear basic duties of care. In terms of ranking based selection, trending lists, paid promotion or any model that involves increasing degrees of intervention, there is an increase in their duties for care and prevention as well. However these platforms still fall under the realm of a technology service provider and have only indirect infringement liability.[20]

3. Typological Determination of Ex Ante Necessary Measures

3.1. The Justification for the Typological Classification of Ex Ante Necessary Measures

First, unified criteria remain absent for determining whether algorithmic recommendation service providers have fulfilled their duty of care and whether they should adopt ex ante measures. The abstract nature of existing legal provisions has resulted in different courts reaching opposite conclusions regarding platform conduct in similar technological contexts.[21] In the first algorithmic recommendation case in China, the court held that platforms possess stronger control over content dissemination and therefore should bear a higher duty of care with respect to users' infringement. The court further held that platforms should adopt certain ex ante filtering measures for popular content within their platforms; otherwise, they could not be deemed to have fulfilled their reasonable duty of care.[22] Another court held that a distinction should be made between human-based recommendation and automated distribution. Platform operators should bear a higher duty of care only under the human-based recommendation model, whereas automated distribution alone does not increase their duty of care.[23]

Second, the ambiguity of legal norms generates uncertainty in judicial application. If the intensity of preventive measures is insufficient, platforms may bear joint infringement liability for failing to fulfill their duty of care. Conversely, excessive preventive measures adopted to avoid liability risks may encroach upon users' space for expression and increase platforms' operational costs. The typo-logical classification sets up graduated obligations according to the platform's level of control capability and risk of work infringements so that different-sized platforms with various business models can take appropriate preventive measures without spending too much resource on extensive monitoring just to avoid liability risks.

Thirdly, by building up the typo-logical construction for ex ante necessary measures, we do not overthrow the traditional safe harbor rule but expand its connotation and develop its rules under the current institutional framework. The traditional safe harbor rule focuses on ex post handling mechanisms which cannot adapt to the dissemination mechanism of algorithmic "information finding people." By incorporating ex ante necessary measures in the necessary measures framework based on technological neutrality as the fundamental premise and limited prevention as the boundary, this remedy the deficiency of traditional rules focusing solely on post-infringement responses, contributing to keeping the stability and continuity of the copyright platform liability system so that the safe harbor rule regains its vitality.

3.2. Core Factors for the Typo-logical Determination of Ex Ante Necessary Measures

The typo-logical structure of ex ante necessary measures is based on three questions – Can we prevent infringements? Should we implement prevention? To which degree should we conduct prevention?. They are associated with three core determination factors – technological

characteristics of algorithms and platforms' control capabilities; the level of infringement risk for works; the principle of proportionality.

3.2.1. Algorithmic Technological Characteristics and Platform Control Capabilities

Technological control by the platform over content dissemination forms the basis for assessing the intensity of preventive obligations. Generally speaking, the logical rationale followed by judges is a positive correlation between the level of intervention and the intensity of obligations.[24] With regard to the technology of algorithms, different algorithms will have fundamentally different effects on content dissemination.[25] In terms of algorithmic models, personalized recommendation algorithms are characterized by the least amount of intervention; thus they should bear basic preventive obligations. Ranking and selection algorithms take part in the screening and distribution of content traffic, which greatly increases the control power of platforms, requiring an enhanced preventive obligation accordingly.[26] Models including trending lists, paid promotion or exclusive content sections include human intervention and targeted traffic allocation, indicating the greatest degree of intervention and correspondingly the strongest ex ante preventive obligations.[27]

In terms of the scale of operations for platforms: preventive obligations must match the ability of platforms to apply technological solutions.[28] Leading platforms have developed their own identification technology across various media formats and human-machine collaboration review system,[29], which could require them to regularly employ expensive preventive measures.[30]. Medium-sized platforms can meet basic preventive obligations through buying third-party technological services.[31]; small-scale platforms who are limited in both technology and finance should not face strict ex ante preventive obligations but merely need to fulfill the responsibility of timely post-infringement handling.[32]. In relation to the burden of proof, if there is an allegation from one party that a platform has exercised a high degree of control over content dissemination, then this party bears the burden of proof. A reversal of the burden of proof applies when determining whether a platform possesses control capability; if a platform cannot present any counter-evidence, then it will be presumed as having the same level of control capability as leading platforms.

3.2.2. Infringement Risk Levels of Works

Only certain content at high risk of infringement shall fall under ex ante preventive obligations. It is therefore an objective limit in terms of the scope of the obligation which forms the central basis for the targeted use of preventive resources.[33] In general it will follow the principle that the greater the risk, the stronger are the preventive measures.

There are various factors that affect an infringement risk for a work; therefore, courts need to make thorough evaluations according to the specific situation of every case. First, there is the market value and popularity of the work. For theatrical films and television series during their popular period or at its initial release, box office revenue and audience ratings will dictate commercial returns, which means that early distribution of infringing content can inflict significant harm upon the legitimate market. Especially if a piece of work is on a platform's trending list, recommendation homepage or ranks as one of the platform's top viewed content, then the necessity of ex ante prevention increases proportionally. Under these conditions, it would seem appropriate to deem that the platform has knowledge of the infringement risk and bears greater duty of preventive care.[34]

The second factor is the timeliness of the work. The stronger the timeliness of a work, the higher the irreversibility of infringement damage.[35] The commercial value of live sports broadcasts and currently airing television series depends heavily on the immediacy of dissemination. When algorithmic aggregation of topics and recommendation channels rapidly accelerate the spread of such content, subsequent deletion cannot compensate for the resulting losses.

Therefore, targeted enhancement of ex ante preventive measures is required, and platforms should bear stronger ex ante preventive obligations for works with high timeliness value.[36]

The third factor is the identifiability of the work.[37] Theatrical films, popular television series, and similar works possess complete audiovisual characteristics and can be automatically identified through technological comparison. In individual cases, courts have held that when similar infringing segmented content is aggregated and widely disseminated through algorithms within a platform, thereby forming content with stable and recognizable characteristics, the feasibility and accuracy of technological prevention are significantly enhanced. Under such circumstances, platforms are better positioned to adopt targeted filtering measures. Conversely, for content with relatively simple characteristics, greater identification difficulties, and higher false-positive rates, the intensity of preventive obligations should be correspondingly reduced.[38]

The fourth factor is the market substitutability of the work. Infringing content that directly substitutes for the legitimate market of an original work is significantly more harmful than content involving secondary creation.[39] A final effective judgment has explicitly recognized that segmented video clips of films and television works disseminated on a large scale through algorithmic recommendation, which directly extract core plot segments from the original works and enable the public to obtain the substantial content of the works, may create market substitution for the original works and substantially increase the harmfulness of infringement. By contrast, highly transformative secondary creations lack such market substitutability and therefore present lower infringement risks.[40]

Based on the above considerations, the higher the infringement risk of a work, the greater the intensity of corresponding ex ante preventive measures should be. Differentiated allocation of obligations can effectively prevent the most harmful forms of infringement while avoiding the imposition of unnecessary burdens on platforms, thereby achieving the rational allocation of preventive resources.

3.2.3. Principle of Proportionality

The capabilities of the subject and the risks associated with the object only define the general scope of obligations, while the ultimate boundary is determined through the final review under the principle of proportionality. That it does not excessively impair platform operations or users' freedom of expression, for a single purpose of protecting copyright.[41]

Firstly, the principle of suitability. Preventive measures need to have substantial relation with the purpose of infringement prevention, and be able to effectively restrain the spread of infringement. Simply announcing the prohibition of infringement in user agreements or deleting individual pieces of infringing content due to continuous and repeated infringement of the same type is merely form complying and fails to reach the goal of substantive prevention.[42] Secondly, the principle of necessity. Among various ex ante preventive measures which are capable of realizing the prevention objective, those causing relatively little impact on users should be prioritized. It has been pointed out judicially that only if similar infringing content becomes an identifiable and concentrated target does it require the adoption of targeted filtering measures by the platform; comprehensive review of all content goes beyond reasonable bounds.[43] For instance, regarding content suspected of infringement, the platforms should first use measures like algorithmic traffic restriction and limiting dissemination scope instead of directly deleting the content. Only after measures like traffic restriction do not remove the infringement risk will more severe measures such as deletion, blocking, and disabling access links be used. Thirdly, the principle of proportionality in the narrow sense. The benefits brought about by preventive measures in terms of copyright protection shall exceed its cost and the infringement of rights and interests caused by preventive measures.[44] A preventive measure that reduces infringement to some extent

while greatly increasing the operating costs of the platform or leads to the mistaken deletion of lawful content affecting users' freedom of expression lack rationality. Moreover, the risk of technological misidentification cannot be used to excuse platforms from preventive obligation; however, platforms should set up supporting mechanisms (such as user appeal procedures and manual review mechanisms) to minimize the impact of erroneous restrictions or removals. At last, as a supporting rule of the principle of proportionality, we should apply at the same time the exemption for good-faith prevention.

To sum up, the three elements form a whole determination framework in which algorithmic control capabilities set out the boundaries for obligations; infringement risks of works set out the scope of obligations; and the principle of proportionality performs the last review on reasonableness. The hierarchical constraints from them guarantee that establishing ex ante necessary measures is consistent with technology reality as well as achieve a dynamic balance between copyright protection, platform development and freedom of information dissemination.[45]

3.3. Typo-logical Development of Ex Ante Necessary Measures

According to these three core determination factors, there is an ex ante necessary measure which forms a complete preventive system with four types of graduated preventive measures through the whole chain "content uploading–traffic access–dissemination and diffusion."

3.3.1. Automated Copyright Filtering Measures

The most intense ex ante preventive measure is automated copyright filtering: using technologies like audio-video fingerprinting or textual semantic recognition, this method creates a database containing the characteristics of legitimate copyrighted materials that can be used for automatic interception of very similar pirated content in the upload phase by users, thus preventing the spread of infringement from its source.

The application is based upon two limitations: First at the subject level, it requires that highly controllable leading platforms equipped with self-developed comprehensive media recognition systems implement these measures regularly; platforms having moderate control capabilities can buy special screening services if needed; for those having low control capabilities no obligation shall be imposed. Second at the object level, the scope of filtering must be restricted to high risk contents (such as key warning works identified by the National Copyright Administration) or currently popular films and television programs. The indiscriminate coverage must be banned so as not to transform this measure into a general monitoring obligation.

A good judgment has noted that on the basis of textual interpretation "and other necessary measures" in "deletion, blocking, disabling links, and other necessary measures", it means that legislation is not restricting necessary measures to only these three kinds of ex post disposal methods; filtering and interception belong to the semantic scope of legally recognized necessary measures. On the basis of technological implementation, leading platforms have mature AI identification technologies and human–machine collaborative review capabilities, even without obtaining original copies of works, filtering and interception of certain concentrated categories of infringing content can be achieved. On the basis of balancing rights and interests, platforms can deal with technological misidentification by appealing users, which cannot justify exemption from platform's preventive obligations.

3.3.2. Differentiated Tiered Ex Ante Review

The essence of a differentiated tiered ex ante review is that we reject the rationality of comprehensive content review and require limited specialized verification on high-risk content instead. The degree of review should be dynamic according to the level of infringement risk, rather than imposing uniform rigid standards.

Tiered rules must match different infringement risks. Highly risky works (on recommendation rankings, during a period of popularity, or having high market substitutability) require manual review prior to being placed into the public traffic pool; medium-risk content like works experiencing declining popularity or minor adaptations need only preliminary machine screening; low-risk content like user-generated original works, deeply transformative secondary creations, and works in the public domain can be exempted from ex ante review obligations.

In individual cases, courts have held that the rationality of tiered review should be assessed based on the “matching between preventive intensity and dissemination popularity and control capability.” First, for content entering the public traffic pool through categorized algorithms and ranking among the highest in views, platforms possess stronger control capabilities and therefore bear higher ex ante review obligations. By contrast, for ordinary content with limited dissemination scope and not included in recommendation sequences, platforms bear only post-infringement handling obligations. Second, this obligation also follows the principle of capability matching. Manual review is only required for leading platforms with professional review teams, while small and medium-sized platforms in specialized fields may be deemed to have fulfilled their reasonable duty of care through machine-based preliminary screening.[46]

Another good judgment enhanced the intensity of tiered review: if a platform voluntarily sets up dedicated channels for film and television content and performs category-based classification, these are high-risk zones where there shall be higher review standard compared with regular sections; if the infringing content appears in the homepage of a dedicated section, it attracts hundreds of thousands of followers, and the platform derives benefit through user tipping revenue associated with such content, then the platform has greater ex ante review and preventive duty of care. Publishing user agreements or doing loose manual inspection cannot fulfill a reasonable duty of care.[47]

3.3.3. Algorithmic Distribution Permission Control

Algorithmic distribution permission control is a lightweight ex ante preventive measure. Its core approach is to limit the dissemination scope of content by adjusting recommendation weights rather than deleting uploaded content. As this measure causes the least interference with users’ creative rights, it conforms to the minimum harm requirement under the principle of necessity and represents a preventive solution prioritized in judicial practice. Courts have indicated that the priority application of such measures is mainly based on the consideration that they cause the least damage to users’ rights and interests and therefore satisfy the minimum harm requirement of the principle of proportionality. First, where platforms actively label content as recommended or increase its exposure priority, such conduct may be regarded as actively amplifying the harmful consequences of infringement and constitute subjective fault. Second, when platforms adopt lightweight control measures against suspected infringing content, they preserve channels for content display and avoid the harm caused by direct deletion. Therefore, such measures are preventive approaches encouraged as a priority at the judicial level. Compared with direct deletion and blocking, these measures are more compatible with the technological characteristics of algorithmic recommendation and can achieve a balance between infringement prevention and protection of freedom of expression.[48]

The specific forms of such measures can be divided into two categories. The first is content-based traffic regulation. For suspected infringing content, platforms may reduce recommendation weights, remove eligibility for ranking lists, and disable paid promotion functions, thereby reducing exposure from the source of dissemination and preventing further expansion of infringement damage. The second is temporary account-based weight regulation. For accounts that upload suspected infringing content, platforms may simultaneously reduce the basic recommendation weight of such accounts’ content, include them within the scope of

key algorithmic monitoring, and prevent their subsequent content from entering the public traffic pool without screening.

3.3.4. Supporting Mechanisms for Basic Compliance

These are minimum *ex ante* compliance measures. There are no thresholds on their subject/object, they must be applied by all algorithmic recommendation platforms; these supplements the blind spots created by technology-based preventive measures.

General application rules include: (1) A blacklist mechanism for repeat infringing users. It is a pre-established subject control system. The platforms need to set up corresponding rules on how to handle infringement frequency in advance, and adopt tiered management for repeatedly infringing accounts, including reduction of recommendation weight and restriction of distribution permission as well as suspension or ban of account. This mechanism can overcome the difficulty of governing repeated infringement. In judicial decision, it has been pointed out that if the same user repeatedly upload infringing content about the same work of the same rights holder during a short period of time and still continue to upload such content even though deleted by the platform, this behavior is considered as repeated infringement with obvious subjective intent. Algorithmic recommendation platforms that merely delete individual items fail to satisfy the effectiveness requirement of necessary measures and should adopt graduated measures, including restrictions on publication, suspension of services, and permanent account bans.[49]

Second, a dedicated rapid complaint channel for rights holders and a copyright early-warning coordination mechanism. These mechanisms simplify the rights protection process for legitimate rights holders and enable advance prevention for popular works. Where rights holders have previously issued copyright warning notices regarding popular works and fully provided proof of rights and information regarding work characteristics, platforms should initiate specialized preventive plans through coordination mechanisms. Failure to respond and resulting continued expansion of infringement may be deemed a defect in the fulfillment of the platform's duty of care.[50]

Third, a regular risk inspection mechanism for popular rankings and aggregated topics. This mechanism conducts routine inspections of highly exposed content and enables timely handling of infringement. Courts have indicated that dedicated film and television sections and aggregated channels established by platforms constitute high-risk and high-exposure areas for infringement under algorithmic recommendation systems. Whether platforms have established regular inspection mechanisms for such sections will be considered in determining whether they have fulfilled their reasonable duty of care.[51]

Such mechanisms have relatively low operational costs. They supplement the coverage gaps of the first three types of technology-based preventive measures from three dimensions: subject control, rights-holder coordination, and inspection of key scenarios. They not only address loopholes arising from the ease of circumventing technical filtering and gaps in filtering newly released works, but also cover dynamic high-traffic areas, thereby constructing a graduated system ranging from individual content traffic restriction to full life-cycle account governance. The four categories of measures collectively establish an *ex ante* preventive system along the chain of algorithmic content uploading, traffic access, and dissemination. By adhering to the boundaries of technological neutrality and the principle of proportionality, this framework responds to the practical needs of infringement prevention in algorithmic environments and provides a determination standard for judicial adjudication.

4. Conclusions

Rapid spread of infringement enabled by algorithmic recommendations prompted a series of judicial decisions expanding platform's obligations beyond the limits set by legislation. They try

to enforce ex ante comprehensive filtering and control obligations with abstract legal concepts like risk control or the gatekeeper theory. While these decisions seem to satisfy the demand of copyright protection, in fact they make judicial criteria for platform liability swing back and forth between "mere post-infringement deletion" and "comprehensive proactive screening." System of ex ante necessary measures deals with this judicial pendulum effect by defining two institutional foundations—distinguishing direct infringement from indirect infringement and prohibition of general monitoring obligations. And then constraining the obligations via three factors—the platform's control capabilities, the risk level of works, and the principle of proportionality, and setting up graduated preventive measures. This system neither denies the institutional value of ex ante prevention but instead rejects the unlimited expansion of platform obligations beyond the legislative framework according only to abstract legal principles. Acknowledging the objective reality that algorithms magnify the damage inflicted by infringement, yet still limiting preventive measures to specific high-risk content and differentiating the boundaries between temporary traffic regulation and comprehensive banning, and between specialized filtering and general screening.

To counteract new infringements caused by technological developments, judicial adjudication should avoid bypassing special legislation or undermining the safe harbor system based on general theory of infringement liability; rather, it should use the tiered judicial assessment provided for in the typological system of ex ante necessary measures. It will be able to place ex ante restrictions on common infringement situations such as disseminating currently popular and simultaneously broadcast works and mass distribution of segmented video clips without compromising the neutrality of technology service providers. In this way, we can preserve a balanced state between copyright protection, content creation, and platform operation under a stable and predictable framework. This is a judicial approach that fits well into algorithmic environments but also remains faithful to legislative intent.

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