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Algorithmic Management and "Filter Bubbles": A Comparative Analysis of Regulatory Approaches in the European Union, the USA, Kazakhstan, and Russia

X. Wang *[1], L. Mukhtar[2], K. Nigmatullina[3]

[1,2] Al-Farabi Kazakh National University, Almaty, Kazakhstan
[2]Almaty Technological University, Almaty, Kazakhstan
[3]Saint Petersburg State University, Saint Petersburg, Russia

(E-mail: [1] wangxiaojing1001@gmail.com, [2]mukhtar.l@atu.edu.kz, [3]k.nigmatulina@spbu.ru)

Abstract. The “filter bubble”— a phenomenon driven by algorithmic recommendation systems — is reshaping the information ecosystem in the intelligent media era and has emerged as a critical governance challenge across jurisdictions.

This study compares algorithmic governance models in the European Union, the United States, Kazakhstan, and Russia across four analytical dimensions: normative values, regulatory instruments, effectiveness in mitigating filter bubble effects, and structural contextual constraints. Drawing on a qualitative, multi-source methodology that integrates comparative legal analysis, normative interpretation, and a systematic review of legislation, policy documents, and peer-reviewed scholarship, the research develops a multidimensional analytical framework.

Findings reveal distinct institutional logics and trade-offs. The EU prioritizes rights-based regulation anchored in fundamental freedoms and data protection; the United States emphasizes market-led self-regulation; Kazakhstan pursues a phased, sovereignty-oriented strategy; and Russia adopts a state-centric model grounded in digital sovereignty and centralized algorithmic control.

None of these models fully addresses the systemic nature of algorithmic risks. Rights-based frameworks may constrain innovation, market-driven approaches often lack accountability, and highly centralized control may undermine transparency and pluralism. Accordingly, this study advances the concept of “balanced collaborative governance”, promoting algorithmic transparency, institutional accountability, and cross-jurisdictional cooperation as a pathway toward sustainable algorithmic governance.

Key words: filter bubble; algorithmic governance; intelligent media; comparative regulatory analysis; collaborative governance.

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***author for correspondence**

Introduction

The 2025 edition of the Digital News Report, published by the Reuters Institute for the Study of Journalism at the University of Oxford, documents a sustained and significant increase in the consumption of news via video formats. Across all surveyed markets, the proportion of individuals accessing news through video content on social platforms rose from 52% in 2020 to 65% in 2025, while the overall percentage of those viewing any form of video news increased from 67% to 75% (Reuters Institute, 2025). Within this evolving media landscape, algorithmic recommendation systems have consolidated their position as the primary mechanism for information curation and dissemination. The evolution of these systems not only reconfigures the operational logics of media organisations and digital platforms but also fundamentally restructures the broader public information ecosystem—its architecture, dynamics, and normative foundations. However, algorithmic processes are inherently susceptible to biases that may intensify informational homogeneity, reinforce ideological polarisation, and entrench existing prejudices. In this context, algorithms transcend their technical function: they reshape the relationship between individual cognition, collective social consensus, and institutional technological power, thereby constituting a governance challenge of substantial practical urgency and acute scholarly significance.

Notwithstanding the prominence of algorithmic governance on the global policy agenda and within academic discourse, systematic research that integrates cross-jurisdictional comparison with constructive theoretical development remains at an incipient stage. The extant literature is predominantly oriented toward the exegesis of regional regulatory frameworks—most notably those of Europe and the United States—or toward critical assessments of technical ethics, yet it lacks sustained comparative inquiry into the political, economic, and cultural determinants that underpin divergent governance paradigms. Even more conspicuously absent are innovative efforts to synthesise a comparative governance framework on the basis of comprehensive cross-national analysis. While the societal ramifications of "filter bubbles"—including the fragmentation of the public sphere, the erosion of democratic deliberation, and the attenuation of cultural pluralism—have attracted extensive scholarly attention, current governance debates frequently devolve into binary oppositions: rights versus security, market versus state. What remains lacking is an integrated governance approach capable of effectively coordinating multiple stakeholders, reconciling competing values, and deploying a diversified toolkit of policy instruments.

Consequently, this study seeks to move beyond reductionist judgments of model superiority and instead endeavours to construct a more adaptive, resilient, and inclusive framework of "balanced collaborative governance." This framework is intended to meet the governance demands posed by complex algorithmic risks in the age of intelligent media, while offering both theoretical reference and practical insight for the cultivation of a more open, robust, and sustainable global digital information ecosystem.

Literature Review

As a paradigmatic manifestation of informational distortion in the intelligent media era, the phenomenon of "filter bubbles" warrants investigation through governance pathways grounded in robust theoretical traditions and diverse regional practices. This review systematically surveys the relevant literature across three axes: the conceptual genesis of the filter bubble

theory, cross-national regulatory models, and the limitations of existing scholarship, thereby establishing the theoretical departure point and academic positioning of the present study.

Conceptual Origins, Mechanistic Analysis, and Risk Evolution of Filter Bubble Theory

The concept of the "filter bubble" was first systematically articulated by Internet activist Eli Pariser in his influential monograph, The Filter Bubble: What the Internet Is Hiding from You. Pariser posited that personalised algorithms, by inferring user preferences through behavioural data, inadvertently construct an epistemic enclosure saturated with ideologically consonant information (Pariser, 2011). This mechanism progressively distances users from dissenting viewpoints and cognitively dissonant content. The concept establishes a profound dialogical and genealogical relationship with several canonical theories within the communication studies tradition. Kathleen Hall Jamieson and Joseph N. Cappella, in Echo Chamber: Rush Limbaugh and the Conservative Media Establishment, elaborated the notion of the "echo chamber," wherein homophilous social networks within digital media environments reinforce in-group beliefs and potentially accelerate processes of opinion extremisation (Jamieson & Cappella, 2008). By contrast, the filter bubble construct centres specifically on the passive, automated curation and dissemination of content performed by platform algorithms on the basis of user data. Zuiderveen Borgesius and colleagues, in their seminal article "Should We Worry About Filter Bubbles?" underscored the role of social network homophily, noting that its effects manifest primarily through group-level interactions, whereas filter bubbles operate directly at the individual level of information access interfaces (Zuiderveen Borgesius et al., 2016).

With respect to generative mechanisms, scholarly consensus has coalesced around the concept of "tripartite collusion." First, from a political economy perspective, the logic of "surveillance capitalism" constitutes the fundamental driving force within the platform economy. As Zuboff contends, the core business model of digital platforms entails the behavioural datafication of human activity and the algorithmic prediction and modulation of user behaviour for commercial gain (Zuboff, 2019). This imperative inevitably results in the maximal extraction of user attention, rather than the provision of informational welfare. The optimisation objectives of algorithms—whether click-through rates, session duration, or engagement metrics—are directly aligned with this capital logic.

Second, from the standpoint of cognitive psychology, Nickerson examined the role of "confirmation bias" and "cognitive heuristics", demonstrating that users exhibit a systematic tendency to access and credit information that corroborates their pre-existing beliefs (Nickerson, 1998). Algorithms continuously learn from and amplify such preferences, thereby rendering the individual's informational "comfort zone" increasingly entrenched. Third, from a philosophy-of-technology perspective, the complexity, proprietary nature, and opacity of algorithms constitute a "technical black box", rendering their decision-making processes resistant to external scrutiny, audit, and oversight. As Pasquale (2015) observes, this opacity not only gives rise to ethical quandaries concerning algorithmic fairness and accountability but also substantially compounds the difficulties of governance (Pasquale, 2015).

As research has progressed, the scope of filter-bubble-related risks has expanded from the individual cognitive level to encompass macroscopic social and global governance dimensions. At the individual level, Pariser explores the erosion of users' informational autonomy, independent decision-making capacity, and critical thinking faculties (Pariser, 2011). At the socio-political level, a substantial body of empirical work has demonstrated that filter bubbles exacerbate social group polarisation, undermine the foundations of rational deliberation in the public sphere, and have even influenced critical political processes, including electoral outcomes.

In the policy domain, the European Union model is widely regarded as paradigmatic of a rights-based regulatory approach. Existing scholarship has devoted considerable attention to its landmark legislative instruments. Voigt and von dem Bussche, in their comprehensive guide to the General Data Protection Regulation (GDPR), note that through the principles of "privacy by design" and "privacy by default," the GDPR endows users with a robust suite of rights—including the "right to erasure"—that directly constrain the data foundations of personalised algorithms (Voigt & von dem Bussche, 2017). The academic community generally recognises the high standards, deterrent effect, and systemic coherence of the EU model. Nonetheless, Bradford, in The Brussels Effect: How the European Union Rules the World, cautions that the high compliance costs associated with this framework may impede innovation, particularly for small and medium-sized enterprises, and emphasises the persistent gap between legal regulation and technological iteration (Bradford, 2019).

In contrast, the American approach has consistently been anchored in the constitutional tradition of free expression enshrined in the First Amendment and the ideology of free markets. Kosseff, in The Twenty-Six Words That Created the Internet, observes that Section 230 of the Communications Decency Act granted interactive computer service providers broad immunity from liability for third-party content, a provision widely regarded as the "cornerstone" of the U.S. internet industry's prosperity (Kosseff, 2019). The Federal Trade Commission's 2020 Annual Highlights indicate that U.S. enforcement relies primarily on ex post accountability for "unfair or deceptive acts or practices," complemented by soft regulatory measures such as industry self-regulation, technical ethics guidelines, and transparency reporting (FTC, 2020). However, as Citron and Wittes argue in their critique of Section 230 immunity, this model, while highly flexible and demonstrably conducive to technological innovation, exhibits increasingly pronounced "governance failures" in addressing systemic risks such as misinformation and social fragmentation, prompting intensifying calls for statutory reform (Citron & Wittes, 2017).

Kazakhstan, by contrast, has pursued a gradualist governance path under the guiding principle of "sovereignty guarantee." As the country's digitalisation accelerates and its distinctive role in the Eurasian digital governance landscape becomes more salient, scholarly interest has correspondingly grown. Academic observers suggest that Kazakhstan's digital governance has neither adopted a rigid, state-centric control model nor embraced a fully laissez-faire market approach. Rather, it has instituted a phased governance trajectory grounded in the foundational imperatives of digital sovereignty and national security, while actively pursuing alignment with international regulatory norms and technological development. The 2013 Personal Information Protection Law of the Republic of Kazakhstan (subsequently amended) represents a milestone legislative act, establishing core principles such as data localisation, thereby reflecting the state's sovereign prerogatives in regulating cross-border data flows. Simultaneously, its legislative process and regulatory practice evince a selective adoption and local adaptation of international standards—particularly the EU GDPR—aimed at reconciling the dual objectives of sovereignty control and integration into the global digital economy. Scholars have interpreted this as indicative of Kazakhstan's prudent exploration of a "third path" between the Russian "digital sovereignty" model, the EU "rights-regulation" model, and its own developmental exigencies.

In their examination of BRICS countries, Bronnikova et al. analyse how the "Sovereign Internet Law" seeks to achieve autonomous control over cyberspace through a combination of technical and legal measures (Bronnikova et al., 2025). Nocetti, in his study of Russia's internet policy, characterises this approach as a paradigmatic instance of pursuing absolute control over the information space under geopolitical duress (Nocetti, 2015). The literature generally concurs

that while this model may effectively mitigate external information threats in the short term, over the longer term it risks producing "digital islands" that undermine the openness of the internet and the nation's long-term technological competitiveness.

Notwithstanding the substantial corpus of country-specific research, systematic comparative studies that situate the four models—European, American, Kazakh, and Russian—within a unified analytical framework remain notably scarce. The existing comparative literature is predominantly concentrated on transatlantic (EU–U.S.) comparisons. Studies that incorporate Russia's "digital sovereignty" paradigm into a four-party comparative design are especially limited. Moreover, these comparative efforts frequently suffer from methodological constraints, often proceeding from a single disciplinary perspective—law or technology—and lacking a comprehensive analytical framework that integrates political, economic, cultural, and geostrategic dimensions.

Most such studies merely delineate model characteristics and enumerate respective advantages and disadvantages, without leveraging comparative insights to propose innovative, operational, and integrated governance solutions. The present paper therefore aims to address this lacuna. By constructing a systematic, multi-dimensional comparative analytical framework that positions the four models in a posture of equal dialogical engagement, it seeks to transcend simplistic superiority-inferiority judgments and conduct an in-depth examination of their generative logics and conditions of applicability. The ultimate objective is not merely descriptive or explanatory comparison, but "constructive" comparison—drawing on the wisdom embedded in divergent models to articulate a novel "balanced collaborative governance" pathway capable of responding to the complexities of the intelligent media era. This, we contend, constitutes the core academic contribution of the present research.

Materials and Methods

This study adopts a comparative case-study approach as its principal methodological strategy, guided by the principles of both "most similar systems design" and "most different systems design". The selected cases—the European Union, the United States, Kazakhstan, and Russia—represent four distinct and highly influential "ideal types" within the global digital governance architecture. Their divergence yields substantial explanatory power and affords robust contrastive leverage.

To ensure the reliability and validity of the findings, the study employs triangulation, drawing upon diverse data sources, as follows:

Legislative and Policy Documents

EU: The full text of the General Data Protection Regulation (Regulation (EU) 2016/679), the Digital Services Act (Regulation (EU) 2022/2065) along with its legislative interpretation, and the text of the Artificial Intelligence Bill (Proposal).

USA: The original version of Section 230 of the Communications Decency Act (47 U.S.C. § 230), relevant guidelines, and enforcement cases of the Federal Trade Commission (FTC).

Kazakhstan: The full-fledged text of the Law of the Republic of Kazakhstan on Personal Information and Its Protection, the key provisions of the Information and Communication Technology Law of the Republic of Kazakhstan, and relevant regulations regarding information infrastructure in the National Security Law of the Republic of Kazakhstan.

Russia: The text of Federal Law No. 90-FZ "On Ensuring the Stable Operation of the Russian

Internet" (i.e., the Sovereign Internet Law), associated presidential decrees, and government resolutions.

Official Reports and Statements:

Evaluation report by the European Commission and the European Data Protection Board (EDPB).

Record of the US Congress hearing and the FTC annual report.

Annual report and related policy clarifications issued by the Ministry of Digital Development, Innovation and Aerospace Industry of Kazakhstan.

Official statement from the Ministry of Digital Development, Communications and Mass Media of Russia.

Academic Literature

A systematic search was conducted across Web of Science, Scopus, and the China National Knowledge Infrastructure (CNKI), targeting highly-cited papers and authoritative reviews on topics including "filter bubble", "algorithmic governance", "platform supervision", and "digital sovereignty". In addition, relevant research reports and international organization documents were systematically collected.

Building upon this comprehensive review, the research endeavours to explore an algorithmic collaborative governance pathway that transcends any single model through systematic comparative analysis. To this end, a mixed-method approach, primarily qualitative in orientation, was employed, and a multi-level theoretical and analytical framework was established. The study is conducted from the theoretical vantage point of "New Institutionalism", with particular attention to the approaches of historical institutionalism and comparative institutional analysis. The research posits that cross-national variations in algorithmic governance pathways are not fortuitous but are the products of "institutional legacies" and "path dependence" shaped by specific political systems, legal traditions, economic models, and geopolitical strategic positions within the international system. Accordingly, understanding any given governance model requires situating it within a specific "institutional matrix". On this basis, the research develops a "concept–tool–efficacy–context" systematic comparative analytical framework (see Figure 1), which moves beyond the mere enumeration of policy instruments to probe deeply into the internal logics and external constraints of each model.

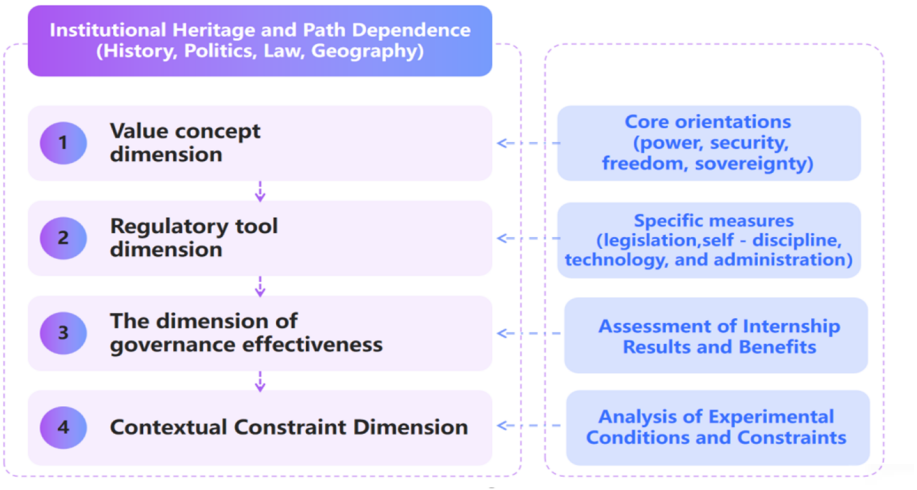


Figure 1: Schematic Diagram of the Four-Dimensional Analysis Framework
Note: Drawn by the author; no AI tools were used

To implement the aforementioned theoretical framework, the research employs specific methods, primarily qualitative content analysis and process-tracing. In the qualitative content analysis phase, textual materials were systematically coded using MaxQDA qualitative analysis software. The coding process proceeded in three stages: (1) Open coding: Initial concepts related to "filter bubbles" were extracted through close reading, encompassing causes, risks, governance philosophies, tools, effects, and challenges (e.g., "data rights," "platform responsibility," "algorithm transparency," "sovereign security"). (2) Axial coding: Initial concepts were classified into the pre-established four-dimensional framework (concepts, tools, efficacy, context), and relationships among categories were established. For instance, "the right to erasure" and "data minimisation" were categorised as "specific tools under the EU rights concept." (3) Selective coding: Core storylines were extracted to explain how each case proceeds from a specific concept, through a particular combination of tools, to generate specific effects and limitations within a given context. Concurrently, process-tracing was employed to conduct a diachronic examination of each case, exploring the dynamic processes by which key policies emerged, were debated, formulated, and implemented. Key actors, focal points of debate, and decision nodes were identified, and the causal mechanisms underlying the formation of each governance model were revealed.

Following the descriptive and interpretive comparative analysis, the final phase of the research adopts a "normative theory construction" approach. This enables a progressive movement from "deep description" to "causal explanation," and subsequently to "normative construction," systematically addressing the central question of how to overcome the governance predicament posed by "filter bubbles."

Discussion and Results

The research process adheres to the logical sequence of "data collection–coding analysis–in-depth case description–comparative integration," comprehensively employing qualitative content analysis and process-tracing to ensure systematicity and depth.

With respect to primary materials, core legal texts and policy documents were downloaded and organised from the official legislative and regulatory websites of each country. These included the full texts of the EU GDPR, DSA, AIA proposals, and legislative memoranda; the original text of Section 230 of the U.S. Communications Decency Act and a compilation of relevant FTC enforcement cases; key provisions of the Kazakhstan Personal Information and Protection Law, Information Communication Technology Law, and National Security Law, as well as the Russian Sovereign Internet Law and related presidential decrees. Concurrently, official developments such as European Commission and U.S. congressional hearing records, and official reports from the Kazakh and Russian ministries were tracked and archived. Statements from international organisations including the OECD and UNESCO were also collected. All materials were compiled into a chronological policy evolution archive. For secondary materials, combined keyword searches were performed in Web of Science, Scopus, and CNKI using English and Chinese keywords including "filter bubble," "algorithmic governance," "algorithmic recommendation governance," and "digital sovereignty." Academic papers with high citation rates, published in authoritative journals between 2020 and 2025, were selected. In addition, special reports from prominent domestic and international think tanks during the same period, as well as relevant

guidelines and assessment reports from the OECD and UNESCO, were systematically collected. All materials were classified and archived by country and theme, and imported into MaxQDA 2022 for unified management.

Following systematic data filing, the subsequent analytical procedures were formally initiated.

Step 1: Open Coding

Based on a comprehensive initial review of all materials, sentence-by-sentence or paragraph-by-paragraph tagging was performed to formulate initial concepts. From U.S. congressional hearing records, concepts such as "Section 230 exemption," "platform self-regulation," and "freedom of speech market" were extracted. From the Chinese "Algorithm Recommendation Management Regulations", concepts including "algorithm filing," "primary responsibility," and "mainstream value orientation" were derived. From Russian policy discussions, "information sovereignty," "technological autonomy," and "RuNet" were identified. From the academic literature, concepts such as "surveillance capitalism," "confirmation bias," "algorithm black box," and "social polarisation" were extracted.

Step 2: Axial Coding

Based on the pre-established "four-dimensional analysis framework", the initial concepts generated during the open coding were classified and interconnected to form more generalized categories.

Conceptual Dimension: "data rights" and "privacy protection" were classified under the "European rights-based concept"; "market freedom" was classified as "American market liberalism"; "technology development orientation" was classified under the "Kazakhstan balance of sovereignty concept"; and "digital sovereignty" was classified under the "Russian sovereignty control logic".

Tool Dimension: "Heavy fines" and "algorithm transparency reports" were classified as "rigid legal tools of the EU"; "liability exemption clause", "post-event FTC enforcement" and "industry self-regulatory guidelines" were classified as "soft regulatory tools of the United States"; "selective legislation" (e.g., data localization), "technical standard guidelines" and "flexible regulatory measures" were classified as "gradual adaptation tools of Kazakhstan"; "infrastructure disconnection", "data localization", and "mandatory content deletion" were classified as "technical control tools of Russia".

Performance and Challenges Dimension: Categories such as "high compliance costs" and "governance failure" were formed.

Contextual dimension: Elements including "post-Soviet transition countries", the "geographical location of Eurasian hub", and "geopolitical pressure" were incorporated as background categories to understand the genesis of each model.

Step 3: Selective Coding

Building on axial coding, each case was integrated around its core narrative, and the "storyline" traversing all dimensions was extracted.

EU Storyline: Guided by the highest principle of safeguarding basic rights, it establishes a systematic and high-standard legal framework to regulate the global platform economy in a reverse manner, attaining the "Brussels Effect". However, it confronts challenges such as legal lag and compliance burden.

US Storyline: In the context of the free-market tradition and freedom of speech, it relies on

platform self-discipline and post-event accountability to promote technological prosperity. Nevertheless, it experiences governance failures in the face of systemic risks and is currently in a period of paradigm loosening and adjustment.

Kazakhstan Storyline: As a crucial hub on the Eurasian continent, its governance strategy endeavors to strike a balance between safeguarding digital sovereignty and fostering technological advancement. It establishes fundamental regulations through a phased legislative process and leverages international expertise in key domains. The objective is to integrate into the global digital ecosystem while upholding national information security and social stability. The long-term challenge it faces is how to adapt to the rapidly evolving technological landscape with limited resources and prevent being placed in a disadvantageous position among major digital powers.

Russian Storyline: Driven by geostrategic security concerns, it strengthens control over the information space through legislation and technical means, achieving short-term defense objectives. However, this may result in long-term technological isolation and the formation of "digital islands".

After completing text encoding and pattern extraction, the study further employed process-tracing to conduct in-depth analysis of key policy cases. The key policy nodes in each case were tracked throughout the policy cycle. Taking the evolution of Kazakhstan's Personal Information Protection Law as an example, the entire process from initial legislative proposal to final implementation was traced. The legislative proposal was initially influenced by international regulations, such as those of the Eurasian Economic Union and the EU GDPR. Subsequently, the draft underwent multiple rounds of domestic consultations and revisions before final passage and the introduction of supporting implementation measures. By analysing revisions across draft versions, official explanations, and industry adaptation feedback, several key decision points were identified, including: establishing the basic framework for data localisation; clarifying the central role of national institutions in supervising data flows; and seeking a balance between the protection of individual rights and national security. This suggests that Kazakhstan tends to adopt and adapt international prevailing rules, employing "technical regulatory tools" while attaining the dual objectives of integrating into the international digital system and safeguarding "digital sovereignty and information security." Likewise, the numerous debates regarding the reform of Section 230 in the U.S. Congress were monitored, and the positional games of different interest groups (technology giants, civil society organisations, and political leaders from both parties) were examined, uncovering the internal and external pressures confronting the market self-regulatory paradigm. The discussion about the definition of "very large online platforms" in the EU DSA legislative process, along with analysis of the expedited implementation of Russia's "Sovereign Internet Law" after the Crimea crisis, enhanced our comprehension of "how ideas are transformed into tools and are constrained by context".

After conducting independent and in-depth analyses of each case, the four coding systems and storylines were presented in a single comparative table for side-by-side comparison (see Table 1). Through systematic comparison of the similarities and differences of each model across four dimensions, we moved beyond superficial distinctions to identify deeper, common governance dilemmas and logics. For instance, all models confront the challenge of "defining platform responsibilities"; the pursuit of ultimate values (such as rights, freedom, and security) frequently entails sacrifices in other dimensions; and there exists an inherent tension between the transnational nature of technology and the sovereignty of governance.

Table 1 - Four-Dimensional Comparison of Algorithm Governance Models among the EU, the US, Kazakhstan, and Russia

Dimension	EU model	USA model	Kazakhstan model	Russia model
Core concept	Rights-based: Protecting individual rights, privacy, and digital freedoms	Market freedom: Free speech, market self-regulation, and competition	Balance of sovereignty and development: State-led regulation for tech and national security	Digital sovereignty: Information control and national security
Main regulatory tool	1. Rigid laws (GDPR, DSA) 2. Heavy fines 3. Algorithm transparency 4. Data protection impact assessment	1. Section 230 (Liability Exemption) 2. Post-event enforcement 3. Self-regulation 4. Ethical guidelines	1. Data localization laws 2. National security integration 3. Progressive supervision 4. International rule adoption	1. Sovereign Internet Law 2. Data localization 3. Foreign platform pressure 4. Network monitoring
Governing effectiveness (advantages and limitations)	Pros: Promotes global standards Cons: High compliance costs, lag behind tech	Pros: Promotes innovation Cons: Governance failures, fragmented regulation	Pros: Flexibility, sovereignty protection Cons: Limited innovation, strategic pressure	Pros: Strong control, response to external threats Cons: Digital isolation, high control costs
Contextual constraints (political culture and tradition)	Supranational legal traditions, post-war human rights consensus, market integration anxiety	Liberal legal system, market-driven society, political polarization	Post-Soviet transition, balancing multiple models (Russia, EU, China), strong presidential governance	Nationalism, strategic response to sanctions, historical control mechanisms

Note: compiled based on the previous analysis and research

The comprehensive comparison indicates that the four models exhibit notably distinct logical starting points, tool preferences, and efficacy characteristics when addressing the challenge of "filter bubbles". These differences originate from their respective profound socio-political structures as well as historical trajectories. To offer a more comprehensive elucidation of these structural disparities, the following text provides an individual analysis of the core characteristics and internal logic of each governance model.

1. The EU model: Relying on the "Brussels effect" of market regulation through rights-based regulation

As Bradford indicates in his book "The Brussels Effect: How the EU Rules the World", the EU model emphasises high-standard regulation, prioritising the protection of personal data rights and digital citizenship over commercial interests (Bradford, 2019). This model facilitates systemic risk governance via risk assessment and independent auditing. Nevertheless, Veale and Zuiderveen Borgesius underscore the compliance burden of the proposed AI Act, its impact on existing business practices, and the potential disparate impacts on market participants in their article "Demystifying the Draft EU Artificial Intelligence Act: Analysing the good, the bad, and the unclear elements of the proposed approach" (Veale & Zuiderveen Borgesius, 2021). Moreover, the challenge of "technological catch-up" persists, as the pace of legislation fails to keep abreast of rapid technological development. For example, the development speed of generative artificial intelligence such as ChatGPT has already surpassed the scope predefined by the General Data Protection Regulation and the Digital Services Act.

2.The US Model: "Governance Failure" and Paradigm Adjustment in a Free Market

The American model has long adhered to the principles of market self-regulation and "technological neutrality". The US model champions market self-regulation and technological neutrality, with Section 230 granting platforms liability exemption. While it has fostered a prosperous internet industry, it struggles with systemic risks like filter bubbles. The conflict between commercial incentives and public interests undermines information diversity. Post-event supervision, led by the FTC, is inadequate for intervening in algorithm design. The US model is currently undergoing "paradigm loosening", with bipartisan calls for Section 230 reform to balance protecting startups and holding platforms accountable for harms caused by recommendation algorithms.

3. Kazakhstan Model: The "Balancing Art" and Progressive Regulation of the Eurasian Hub

Kazakhstan's model balances digital sovereignty with technological development and global integration. It adopts international rules like GDPR but localizes them, focusing on data localization and flexible, state-led regulation to avoid stifling innovation. However, internal tensions arise from limited execution capacity, the "balance dilemma" due to geopolitical pressures, and challenges in fostering a competitive innovation ecosystem. The model's success depends on achieving a sustainable balance between sovereignty protection and technological growth.

4. Russian Model: "Defensive Isolation" under Digital Sovereignty

The Russian model emphasizes national control over the information space to counter external "information aggression". Laws like the "Sovereign Internet Law" ensure "disconnectable" infrastructure, allowing for tighter control over foreign platforms. While it effectively controls information in the short term, it risks "digital isolation," weakening long-term technological innovation and competitiveness. Nevertheless, this model highlights the need for public oversight, potentially through mechanisms such as data cooperatives and algorithm literacy education.

Conclusion

This study carried out a systematic comparison of algorithmic governance models in the European Union, the United States, Kazakhstan, and Russia, uncovering the core contradictions and fundamental solutions to "filter bubble" governance in the intelligent media era. Overall, the research indicates that no single governance paradigm adequately addresses the complexity, trans-nationality, and value conflicts inherent in algorithmic systems. Any narrative that reduces

algorithmic governance to a binary opposition between "freedom" and "control," or "rights" and "security," is inherently partial. The practices of the four models disclose a fundamental reality: the essence of algorithmic governance is a continuous process of pursuing dynamic equilibrium among multiple, often conflicting, value objectives.

On the basis of this realistic assessment, a fundamental question arises: What should be the future direction of governance? The core conclusion of this article is that it is imperative to transcend the either-or model competition and transition towards a more resilient and adaptable new paradigm of "balanced collaborative governance". The rigid rights protection mechanism of the European Union, the market self-discipline approach of the United States, the gradual adaptation process under the sovereignty guarantee of Kazakhstan, and the sovereignty control measure of Russia are all outcomes of their specific historical institutional configurations and geopolitical strategies. Their efficacy and limitations are as inseparable as the two sides of a coin. Therefore, for other countries, particularly those in the "middle ground", the crucial lesson is not to select or imitate a single "optimal" model, but to comprehend the "value-tool-context" matching logic underlying each approach and, accordingly, to undertake localized creative transformation. The future effectiveness of governance does not depend on identifying a more powerful single authority (whether state, law, or market), but on whether an ecosystem of multi-stakeholder co-governance and diverse-tool collaboration can be established. This necessitates a triple fundamental transformation in governance thinking: from the pursuit of static "best practices" to the cultivation of dynamic "adaptability"; from the "single-center management" of government or platforms to the "networked collaboration" of multiple social forces; and from reliance on a single tool of "command and control" or "laissez-faire" to a "comprehensive toolkit" comprising legal, technological, market, and normative instruments.

How, then, can this governance concept be translated into a practical framework for implementation? Drawing on the aforementioned findings, this paper presents a framework of "balanced collaborative governance," which critically integrates and prospectively constructs upon existing theories. The core of this framework comprises three mutually supporting propositions, as depicted in Figure 2. First, there is the proposition of dynamic balance of values. The governance system should be capable of accommodating and judiciously weighing multiple values—security, development, rights, and innovation—so as to avoid sacrificing the overall resilience of the system in the pursuit of the extreme of any single value. Policies ought to be dynamically calibrated in accordance with specific risks, technological stages, and social consensus. Second, it is the proposition of networked co-governance. A balancing and collaborative network involving the government, platforms, industry, academia, and civil society needs to be constructed. The government's role should be that of a setter of bottom-line rules and a builder of collaborative platforms; platforms must fulfill the algorithm governance responsibilities commensurate with their technological power; independent social forces (such as auditing institutions, media, and user organizations) are essential for supervision and supplementation. Finally, the proposition of the combined application of tools: a composite regulatory toolkit of "law as the foundation, technology as empowerment, market as incentive, and literacy as basis" should be developed. Basic rules should be established through transparency laws, responsible innovation should be encouraged through regulatory sandboxes, social supervision should be empowered through open-source auditing tools, and a social cognitive defense line should be built through universal algorithm literacy education.

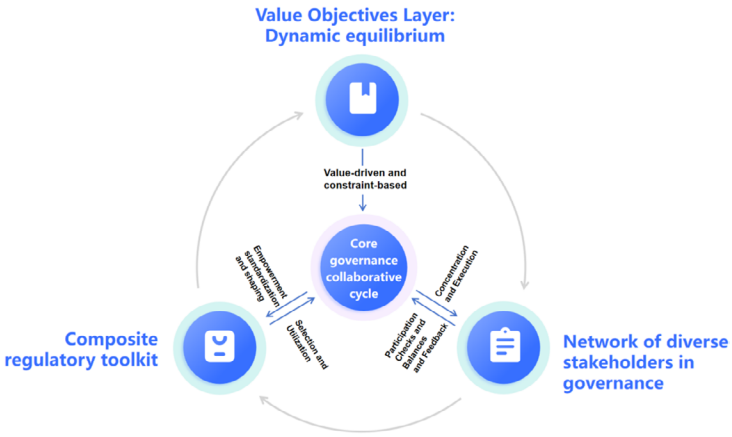


Figure 2 - The "Balanced Collaborative Governance" Framework
Note: Drawn by the author; no AI tools were used

To further clarify, the concept of "balanced collaborative governance" rests on three theoretical pillars. First, from historical institutionalism, the notions of path dependence and institutional complementarity explain why no single model can be universally optimal. Second, risk society theory highlights the complexity and uncertainty inherent in algorithmic systems, demanding adaptive governance. Third, deliberative democracy theory emphasizes multi-stakeholder participation and public reason as necessary for legitimacy. Together, these pillars provide the theoretical foundation for the proposed framework.

In summary, addressing the governance dilemma of "filter bubbles" involves more than just technical rectification. It pertains to whether we can protect human subjectivity, preserve social cohesion, and construct an intelligent civilization characterized by both vitality and order in the digital era. This necessitates that we relinquish the illusion of a "perfect blueprint" and instead develop the wisdom and capacity to engage in continuous learning, dynamic balancing, and collaborative governance amidst complexity and uncertainty.

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The contribution of the authors

X. Wang – conceptualized the study, conducted the research, analyzed the data, and wrote the manuscript.

L. Mukhtar, Prof. K. Nigmatullina – provided critical feedback and approved the final version.

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С. Ван[1], Л. Мұхтар[2], К. Нигматуллина[3]

[1],[2]әл-Фараби атындағы Қазақ Ұлттық университеті, Алматы, Қазақстан

[2]Алматы технологиялық университеті, Алматы, Қазақстан

[3]Санкт-Петербург мемлекеттік университеті, Санкт-Петербург, Ресей

Алгоритмдерді және «сүзгі көпіршігін» басқару: Еуропалық Одақ, АҚШ, Қазақстан және Ресейдегі реттеу тәсілдерінің салыстырмалы талдауы

Аңдатпа. Алгоритмдік ұсыным жүйелерінен туындайтын «сүзгі көпіршігі» құбылысы интеллектуалды медиа дәуірінде ақпараттық экожүйені қайта қалыптастырып, әртүрлі елдер үшін маңызды басқару мәселесіне айналды.

Бұл зерттеу Еуропалық Одақ, АҚШ, Қазақстан және Ресейдегі алгоритмдік басқару модельдерін төрт аналитикалық өлшем бойынша салыстырады: нормативтік құндылықтар, реттеу құралдары, «сүзгі көпіршігінің» әсерін азайтудағы тиімділік және құрылымдық контекстік факторлар. Заңнаманы, саяси құжаттарды және рецензияланатын ғылыми әдебиеттерді салыстырмалы-құқықтық және нормативтік

талдауды қамтитын сапалық көпдереккөзді әдіснама негізінде зерттеуде көпөлшемді талдамалық құрылым қалыптастырылды.

Зерттеу нәтижелері әрбір модельдің өзіндік институционалдық логикасы мен ерекшеліктерін көрсетті. Еуропалық Одақ адам құқықтары мен дербес деректерді қорғауға негізделген реттеуге басымдық береді; АҚШ нарықтық өзін-өзі реттеуге сүйенеді; Қазақстан цифрлық егемендікке бағдарланған кезең-кезеңімен даму стратегиясын ұстанады; ал Ресей цифрлық егемендік пен орталықтандырылған мемлекеттік бақылауға негізделген модельді қолданады.

Қолданыстағы модельдердің ешқайсысы алгоритмдік тәуекелдердің жүйелі сипатын толық қамти алмайды. Құқықтарға шамадан тыс басымдық беру инновацияны тежеуі мүмкін, нарықтық тәсілдер жеткілікті есептілікті қамтамасыз ете бермейді, ал шамадан тыс орталықтандырылған бақылау ашықтық пен пікір алуандығын шектеуі ықтимал. Осыған байланысты зерттеуде алгоритмдік ашықтықты, институционалдық есептілікті және мемлекетаралық ынтымақтастықты дамытуға бағытталған «теңгерімді бірлескен басқару» тұжырымдамасы ұсынылады.

Түйін сөздер: сүзгі көпіршігі; алгоритмдік басқару; интеллектуалды медиа; реттеудің салыстырмалы талдауы; бірлескен басқару.

С. Ван[1], Л. Мұхтар[2], К. Нигматуллина[3]

[1,2]Казахский национальный университет имени аль-Фараби, Алматы, Казахстан
[2]Алматинский технологический университет, Алматы, Казахстан
[3]Санкт-Петербургский государственный университет

Управление алгоритмами и «пузырь-фильтрами»: сравнительный анализ подходов к регулированию в Европейском союзе, США, Казахстане и России

Аннотация. «Пузырь фильтров» — явление, обусловленное алгоритмическими рекомендательными системами, — трансформирует информационную экосистему в эпоху интеллектуальных медиа и становится одной из ключевых проблем современного управления.

В статье проводится сравнительный анализ моделей управления алгоритмами в Европейском союзе, США, Казахстане и России по четырем аналитическим измерениям: нормативные ценности, инструменты регулирования, эффективность снижения последствий «пузыря фильтров» и структурные контекстуальные факторы. Исследование основано на качественной многоисточниковой методологии, объединяющей сравнительно-правовой анализ, нормативную интерпретацию и систематический обзор законодательства, политических документов и рецензируемой научной литературы, что позволило сформировать многомерную аналитическую модель.

Результаты демонстрируют различия в институциональной логике исследуемых моделей. Европейский союз отдает приоритет регулированию, основанному на защите прав человека и персональных данных; США опираются на рыночное саморегулирование; Казахстан реализует поэтапную стратегию, ориентированную на цифровой суверенитет; Россия использует государственно-централизованную модель, основанную на цифровом суверенитете и централизованном контроле.

Показано, что ни одна из существующих моделей не способна полностью учитывать системный характер алгоритмических рисков. Чрезмерная ориентация на защиту

прав может сдерживать инновации, рыночные механизмы не всегда обеспечивают достаточную подотчетность, а высокий уровень централизации способен ограничивать прозрачность и плюрализм. В этой связи предлагается концепция «сбалансированного совместного управления», направленная на развитие алгоритмической прозрачности, институциональной подотчетности и международного сотрудничества как основы устойчивого управления алгоритмами.

Ключевые слова: пузырь фильтров; управление алгоритмами; интеллектуальные медиа; сравнительный анализ регулирования; совместное управление.

Information about the authors:

Wang X. – corresponding author, Doctoral student, Al-Farabi Kazakh National University, Al-Farabi Avenue 71, 050040, Almaty, Kazakhstan

Mukhtar L. – PhD, senior lecturer, Al-Farabi Kazakh National University, Al-Farabi Avenue 71, 050040, Almaty, Kazakhstan; Almaty Technological University, Tole bi st. 100, 050012, Almaty, Kazakhstan

Nigmatullina K. – Doctor of Political Sciences, Professor, Saint Petersburg State University, 199004, Saint Petersburg, Russia.

Авторлар туралы мәлімет:

Ван С. – хат-хабарға жауапты автор, докторант, әл-Фараби атындағы Қазақ ұлттық университеті, Әл-Фараби даңғылы 71, 050040, Алматы, Қазақстан.

Мұхтар Л. Қ. – PhD, аға оқытушы, әл-Фараби атындағы Қазақ ұлттық университеті, Әл-Фараби даңғылы 71, 050040, Алматы, Қазақстан; Алматы технологиялық университеті, Төле би көшесі 100, 050012, Алматы, Қазақстан.

Нигматуллина К. Р. – саясаттану ғылымдарының докторы, профессор, Санкт-Петербург мемлекеттік университеті, 199004, Санкт-Петербург, Ресей.

Сведения об авторах:

Ван С. - автор-корреспондент, докторант, Казахский национальный университет имени аль-Фараби, проспект аль-Фараби, 71, 050040, Алматы, Казахстан.

Мұхтар Л. К. - PhD, старший преподаватель, Казахский национальный университет имени аль-Фараби, проспект аль-Фараби, 71, 050040, Алматы, Казахстан; Алматинский технологический университет, ул.Толе би, 100, 050012, Алматы, Казахстан.

Нигматуллина К. Р. – доктор политических наук, профессор, Санкт-Петербургский государственный университет, 199004, Санкт-Петербург, Россия.