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The Dilemma and Path of Legal Regulation on "Big Data Price Discrimination": A Two-Dimensional Perspective on Regulating Platform Operators' Algorithmic Power and Protecting Consumer Rights

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Abstract: ***The essence of "Big Data Price Discrimination" lies in the abuse of "algorithmic power" by platform operators, resulting in algorithmic discrimination that violates individual rights such as consumers' rights to fair trade and information. Under the manipulation of data, algorithmic automation decision-making becomes the technical pathway, wherein operators with access to vast amounts of data create precise profiles of consumers and set different prices accordingly. However, legal regulation of this phenomenon faces numerous challenges, including legislative lag, difficulties in consumer evidence provision, high litigation costs, and the complexity of holding platforms accountable. To address these challenges, the paper proposes a two-pronged approach: Firstly, enhancing the path for protecting consumer rights through detailed legislation, implementing public interest litigation, adopting the principle of "reversed burden of proof", and improving rights remedies mechanisms to effectively safeguard consumer rights. Secondly, constructing governance pathways for platform operators' algorithmic power, emphasizing a dual-mode of legal and technical governance, improving platform algorithm accountability mechanisms, implementing scenario-based and refined algorithmic supervision, and promoting effective linkage between platform governance and algorithm governance. Through these measures, it is possible to effectively address the "Big Data Price Discrimination" phenomenon and achieve a balance and coordination between consumer rights protection and platform operator responsibilities.***

Keywords: "Big Data Price Discrimination"; Algorithmic Discrimination; Algorithmic Power Governance; Consumer Rights Protection; Data Manipulation.

1. INTRODUCTION

In the era of the digital economy, algorithmic technology has rapidly emerged as a core driving force in contemporary business and social management. However, accompanying phenomena such as "Big Data Price Discrimination," "Data Manipulation," and "Algorithmic Dominance" have raised public concerns, highlighting emerging issues in the digital age. Particularly in the past two years, consumers have encountered a growing number of instances of "Big Data Price Discrimination" in areas such as ride-hailing, hotel bookings, ticket purchases, and online shopping. So, what is the legal characterization, technical pathways, and basic operational logic of "Big Data Price Discrimination"? What harm does it inflict upon consumers' legitimate rights and interests? Can current laws effectively regulate it? If not, what are the avenues for improvement? These questions not only pertain to the protection of consumers' legitimate rights and interests and the fair competition of socialist markets but also involve crucial issues such as the healthy development of the platform economy and digital industries, as well as governance of operators' algorithmic power. The resolution of this series of issues requires not only effective protection of consumer rights and interests at the legal level but also strengthened supervision and governance of platform algorithms at the technical level to safeguard consumer rights, ensure fair market competition, strike a balance between the protection of consumer rights and the regulation of platform operators' algorithmic power, and promote the healthy and sustainable development of the digital economy.

2. THE LEGAL CHARACTERIZATION OF "BIG DATA PRICE DISCRIMINATION" AND ITS IMPACT ON CONSUMER RIGHTS

The so-called “Big Data Price Discrimination” refers to operators using complex pricing algorithms to differentiate prices for goods and services based on a large amount of consumer data. Specifically, platform operators collect vast amounts of personal information from consumers, including but not limited to geographical location, device usage, consumption preferences, price tolerance, and payment ability, and then analyze this data using big data technology to categorize consumers based on their purchasing behavior, consumption preferences, trust in the platform, etc. This categorization enables precise profiling of each consumer, allowing operators to set different prices accordingly, achieving “a price for every person.” These price differences are not due to cost disparities but rather unjustified differential treatment. “Big Data Price Discrimination” violates the principles of cost-benefit pricing and general market transaction rules, infringing upon consumers’ rights to information, fair trade, and personal information [1]. It is characterized by greater concealment, higher accuracy, wider scope, and greater difficulty in regulation. Essentially, it involves platform operators abusing “algorithmic power,” using algorithmic pricing technology to implement differential treatment for different categories of consumers, dynamically adjusting prices for goods or services, and maximizing profits by capturing consumer surplus.

2.1 The Legal Characterization of “Big Data Price Discrimination”: Algorithmic Discrimination Infringing Upon Individual Civil Rights

From an economic standpoint, some argue that “big data price discrimination” should be classified as price discrimination, specifically as a form of first-degree price discrimination (also known as perfect price discrimination) facilitated by algorithmic technology [2]. This perspective argues that platforms utilize algorithms and big data to create precise digital profiles of consumers. Based on these user profiles, platform businesses can implement different pricing strategies for different users. This implies that although users may purchase the same goods or services, they are required to pay different prices due to their individual characteristics and behavioral data. “Big Data Price Discrimination” may carry monopolistic tendencies in certain situations, particularly when market leaders exploit their data and algorithmic technological advantages to exclude competition or implement unfair pricing strategies towards consumers [3]. The opposing view contends that price discrimination is a reasonable pricing strategy in product marketing, considering the variability and elasticity of consumer demand. In some cases, price discrimination is considered a neutral economic phenomenon due to differences in consumer preferences. Therefore, categorizing “Big Data Price Discrimination” simply as price discrimination may not be entirely appropriate. Another perspective views “Big Data Price Discrimination” as a form of price fraud [4]. According to Article 3 of *China’s Regulations on Prohibiting Price Fraudulent Acts*, price fraud refers to the conduct of operators deceiving or inducing consumers or other operators into transactions through false or misleading price means. Platform operators, after collecting and analyzing user data, implement personalized pricing, which violates consumers’ general expectation of clear pricing. The platforms fail to fulfill their obligation to inform, leading users into erroneous perceptions, thus constituting passive price fraud [5]. However, opponents argue that when purchasing goods, consumers typically consider multiple factors such as product quality, services, and brand reputation, rather than solely focusing on price. Furthermore, differentiated pricing is the result of computer algorithms analyzing user data, making it a technical tool rather than deliberate deception by platform operators. Not informing consumers of alternative prices does not equate to fabricating facts or concealing the truth. Personalized pricing aims to better meet differentiated demands, and users have the freedom to accept or reject prices based on their own judgments, aligning with the principle of market freedom of choice [6].

The author believes that categorizing “Big Data Price Discrimination” as either price discrimination or price fraud only scratches the surface. Essentially, “Big Data Price Discrimination” is a form of algorithmic discrimination that infringes upon individual civil rights. Algorithmic bias or discrimination refers to the unjust treatment of specific individuals or groups by algorithmic technology and decision-making forms employed by algorithm applicators. Its typical manifestation is the generation of unfair and irrational outcomes for different individuals, even when conditions are similar or identical. Depending on the scope of the affected subjects and the categories of interests, algorithmic discrimination can be classified into three types: those harming basic public rights, competitive interests, or specific individual rights. Among them, algorithmic bias that harms individual civil rights is primarily reflected in “Big Data Price Discrimination” [7].This phenomenon is most typical in industries such as hotels and ride-hailing apps, where the same product or service is priced differently for different consumers. Compared to other forms of algorithmic discrimination, “Big Data Price Discrimination” is more covert in its technological approach, making it harder for consumers to detect and pursue grievances. Consumers find themselves ensnared in a cocoon of product information curated by operators through algorithmic technology, ultimately trapped in an “algorithmic prison” from which they find it difficult to escape.

2.2 The Impact of "Big Data Price Discrimination" on Consumer Rights

"Big Data Price Discrimination" violates consumers' rights to fair trade, information, autonomous choice, and personal information as stipulated in the Consumer Rights Protection Law. The implementation of differential treatment through big data contradicts the principle of "same product, same price," directly compromising consumers' rights to fair trade. Internet platform companies use algorithmic tools to raise prices for "frequent customers" based on user profiles. This differential treatment not only undermines the fairness of transactions but also makes consumers feel unfairly treated. Through personalized recommendation algorithms like "Recommended for You," internet platform companies restrict the range of goods consumers can compare and choose from, trapping them in an "information cocoon" and severely infringing upon their right to autonomous choice. Additionally, internet platform companies collect excessive amounts of consumer personal information, constructing "simulated profiles" to achieve "a price for every person," directly violating consumers' rights to personal information [8].The misuse of consumers' personal information for pricing and recommendation purposes constitutes a severe infringement upon consumers' control and privacy rights over their personal information. Overall, the practice of "Big Data Price Discrimination" results in various infringements upon consumers' rights, including the right to fair trade, information, autonomous choice, and personal information, posing a serious threat to consumers' legitimate interests, which contradicts the original intention of *the Consumer Rights Protection Law*, which aims to safeguard consumer rights, and should therefore prompt heightened attention and intervention from legal and regulatory authorities.

3. THE ESSENCE OF "BIG DATA PRICE DISCRIMINATION": THE ABUSE OF PLATFORM OPERATORS' "ALGORITHMIC POWER"

The technological pathway of "Big Data Price Discrimination" can be traced back to algorithmic decisions under the guise of "Data Manipulation." Platform merchants, through pre-set algorithms, assign corresponding weights to non-market value factors based on massive consumer data, ultimately achieving precise control over personalized pricing. A thorough examination of the "Big Data Price Discrimination" phenomenon, focusing on the technical pathway of algorithmic decisions, will reveal how platform operators abuse algorithmic power, manipulate consumer decisions, and maximize the extraction of consumer surplus, which involves utilizing massive data as raw material and leveraging algorithmic decisions as a tool for achieving these ends.

3.1 The Technological Pathway of "Big Data Price Discrimination": Algorithmic Automation Decisions under "Data Manipulation"

The technological pathway of "Big Data Price Discrimination" is manifested in the algorithmic decision-making process under "data manipulation". Its essence lies in platform merchants harnessing massive consumer data to assign weights to non-market value factors such as willingness to pay, purchasing power, buying habits, and trust in the platform through pre-set algorithms. This ultimately results in consumers facing prices for goods that deviate from traditional price norms. In this process, the same product may present different prices to different consumers, giving rise to the phenomenon of "a price for every person." Behind this personalized pricing is a typical manifestation of the alienation risks associated with algorithmic power in the commercial domain [9]. In the business environment, platform operators leverage their advantages in technology, knowledge, and information resources to maximize the acquisition of consumer data. Through precise utilization of big data analytics, they create detailed consumer profiles and effectively "segment" consumers. This enables them to successfully implement personalized pricing, enhancing the accuracy of pricing and thereby gaining dominance, control, and influence over consumers. The rise of this algorithmic power allows merchants to more accurately understand and manipulate consumers. Through in-depth computational analysis of consumer behavior patterns, personality traits, economic conditions, and other information, they achieve control, dominance, and influence over consumers. By devising product prices tailored to maximize each user's willingness to pay, they maximize the capture of consumer surplus.

3.2 The Essence of "Big Data Price Discrimination": The Abuse of Platform Operators' Algorithmic Power

Algorithms are a series of ordered steps or instructions designed to solve problems, with the aim of achieving specific goals or generating expected outcomes given certain initial conditions. Widely utilized in fields such as computer science, mathematics, and engineering, algorithms serve various purposes including information processing, problem-solving, and decision-making. In the digital era where "code is law" [10], algorithms function as tools for designers and operators to achieve objectives and address issues. However, for the subjects targeted by algorithms, they become the "laws" of the virtual world that must be adhered to. This form of law is not established by legislative bodies and does not necessarily reflect the collective will and public interest of all citizens; instead, it primarily embodies the individual intentions and private interests of algorithm designers and operators[11]. Originally, algorithmic power referred to the influence and control possessed by intelligent algorithms with autonomous learning and decision-making capabilities in the era of artificial intelligence and big data. This power, derived from the processing and analysis of massive data by algorithms, directly influences and regulates the behavior, decisions, and experiences of individuals or groups. In the context of “Big Data Price Discrimination,” algorithmic power refers to the potential influence and control exerted by operators who possess massive data and algorithmic technology over consumers. In the scenario of online shopping, consumers are required to follow the algorithmic logic and steps designed by operators to engage in transactions within the algorithmically constructed virtual world. Operators wielding algorithmic power typically prioritize individual interests and are more likely to utilize search and recommendation algorithms to maximize the platform’s own profits. A common example is operators manipulating consumer judgment and behavior through algorithmic reward and punishment mechanisms, leading consumers to immerse themselves in an “information cocoon” tailored for them and ultimately becoming targets of “Big Data Price Discrimination.”

Algorithms embody the intentions and interests of their designers and operators. While operators can use algorithmic power to provide better goods and services, they may also abuse this power to infringe upon consumer rights. “Big Data Price Discrimination” is a typical manifestation of operators abusing algorithmic power to seek undue benefits [12]. In actual transactions, platform operators abuse algorithmic power in information collection, search recommendations, and differential pricing. Operators typically only need to acquire consumers’ basic information such as name, address, contact details, and payment methods to complete transactions and provide delivery services. However, in the context of “Big Data Price Discrimination,” platforms collect unnecessary personal information on a large scale, including gender, age, contact lists, and device information. Even if users only provide basic information, platforms engaging in price discrimination will use various means to achieve their goals. Among these, the most direct method is to restrict or prohibit users who do not provide sufficient information from using the platform [13].After obtaining vast amounts of personal information, platform operators leverage their advantage in algorithmic power to create precise digital profiles of consumers and implement differential pricing. This disrupts pricing rules based on costs and reasonable profits, making “price discrimination” the norm. In this process, consumers are objectified by algorithmic power and become targets for businesses chasing profits.

4. THE LEGAL CHALLENGES OF REGULATING “BIG DATA PRICE DISCRIMINATION” IN THE DIGITAL ECONOMY ERA

The challenges faced in regulating “Big Data Price Discrimination” are evident in three main areas: Firstly, at the level of legal norms, Chinese laws exhibit a lag and generality in addressing emerging issues like “Big Data Price Discrimination,” “Algorithmic Discrimination,” and “Personalized Pricing” in the digital economy era. Secondly, regarding consumer judicial protection, the opacity of algorithmic technologies poses difficulties for ordinary consumers to detect practices such as “Price Discrimination” on platforms. Consumers encounter challenges in providing evidence and incur high costs when seeking legal remedies. Lastly, in terms of platform accountability, factors such as algorithmic black boxes, information cocoons, and potential risks of algorithmic discrimination further complicate holding platforms accountable for their actions.

4.1 The Legislative Dilemma of “ Big Data Price Discrimination”

The Chinese Consumer Rights Protection Law, stipulated in Articles 8, 10, 20, and 24, outlines a series of measures to protect consumer rights, emphasizing consumers’ rights to be informed about the true nature of goods, quality assurance, reasonable pricing, and returns and exchanges. However, these provisions are still insufficient to fully regulate the phenomenon of “big data price discrimination.” The law’s coverage of new scenarios such as personalized pricing in the digital economy era is relatively narrow, failing to effectively address this complex and widespread issue. *The Personal Information Protection Law*, implemented in 2021, grants additional rights to individuals regarding their personal information and establishes a presumption of fault to alleviate the burden of proof for users. However, it does not clearly establish corresponding legal liability clauses. Users still bear the burden of proving platform infringement, which is difficult for ordinary users to bear, thus providing significant legal loopholes for platforms to infringe on users’ personal information rights. Article 14, Clause 5 of *the Price Law* prohibits operators from discriminating against other operators with the same trading conditions. However, it does not provide effective basis for cases where consumers encounter price discrimination. The legal constraints are relatively narrow and have not kept pace with the emerging issues in the internet era, especially in the field of personalized pricing. *The Anti-Monopoly Law* mainly targets operators with dominant market positions and has limited applicability to smaller-scale platforms [15]. Its purpose is to regulate price discrimination practices that lead to monopoly objectives by restricting and excluding fair competition. However, if platform price discrimination does not substantially hinder fair and orderly market competition, it is difficult to invoke this law as a basis for judgment. This makes it challenging to effectively regulate new phenomena such as personalized pricing in the era of big data. These legal limitations have made it difficult to effectively regulate the practice of "big data price discrimination" and other related issues in China, highlighting the need for comprehensive legislative updates to address the challenges posed by the digital economy era.

4.2 The Judicial Dilemma of "Big Data Price Discrimination" in the Context of Consumer Rights Protection

The dilemma surrounding judicial enforcement of consumer rights in the face of "big data price discrimination" is primarily manifested in the technical opacity of such discriminatory practices, the difficulty consumers face in providing evidence, and the exorbitant costs associated with seeking legal redress. Firstly, the technical opacity of algorithms makes it difficult for consumers to detect instances of being subjected to "big data price discrimination." In the era of the internet, platforms utilize algorithmic techniques to implement personalized pricing, resulting in each user inhabiting an isolated information bubble, unaware of disparities in transaction prices compared to others. The closed nature of information further obscures users' awareness of differential pricing strategies employed by platforms. Coupled with consumers' limited understanding of the complexities of algorithmic operations, platforms' practices of "price discrimination" remain clandestine. Secondly, consumers encounter challenges in providing evidence to substantiate claims of discrimination. While prevailing civil procedural laws in China adhere to the principle of "the burden of proof lies with the party making the claim," the intricate nature of algorithmic operations often necessitates specialized knowledge possessed only by industry insiders. For ordinary consumers, who may lack even basic understanding of algorithmic functioning, proving the existence of algorithmic discrimination becomes nearly impossible. Moreover, platforms, as controllers of information, may deliberately delete relevant digital logs or other data, hindering consumers' ability to obtain evidence favorable to their case. Consequently, courts typically apply the principle of "ordinary negligence," placing the burden of proof on the consumer alleging harm, a task that is exceedingly challenging for those unfamiliar with technology. Furthermore, determining the actual extent of consumer losses is challenging. Cases of "big data price discrimination" often involve relatively minor damages, making it difficult to ascertain the specific amount of harm suffered by consumers. Consumers typically struggle to ascertain the standard prices of products or services and to determine whether the surcharges they paid were unreasonable. Additionally, pursuing compensation for such relatively small losses entails significant time and financial costs, including litigation fees, attorney expenses, and lost wages due to time spent pursuing legal remedies. Consequently, the prohibitive costs associated with consumer litigation render seeking redress economically burdensome. Overall, these challenges underscore the complexity and inadequacy of current legal frameworks in effectively addressing the multifaceted issues arising from "big data price discrimination" and highlight the urgent need for reforms to better safeguard consumer rights in the digital age.

4.3 The Technological Dilemma of "Big Data Price Discrimination" in the Era of Platform Accountability

The dilemma of platform accountability in the context of "big data price discrimination" primarily manifests in aspects such as algorithmic opacity, information cocooning, and the potential for discrimination during the algorithm development phase. The accountability dilemma of "big data price discrimination" is primarily reflected in the opaque nature of platform algorithms. The internal mechanisms of algorithms are complex and non-transparent, making it difficult for users and regulatory bodies to fully understand the specific processes of algorithmic decision-making. This complicates the tracing and penalization of platform infringements. The opacity of algorithmic processes undermines transparency and feasibility in accountability. Users have limited understanding of the technical pathways and underlying logic of algorithmic discrimination. Consequently, even if they encounter unequal treatment, it is challenging for them to provide evidence for legal recourse. Additionally, platforms reinforce users' cognitive biases by providing personalized recommendations through algorithms, creating an information cocoon. This isolation confines users to a limited information space tailored to their interests and perspectives. Users within the information cocoon can only access product information recommended by the platform's algorithm, which aligns with their interests and personal characteristics, thus compromising their autonomy in decision-making. However, due to the platform's filtering mechanisms, users are grouped and presented with information in ways that serve the platform's commercial interests. As a result, users in different groups are exposed to vastly different information, making it challenging for them to perceive instances of "price discrimination" targeting them [15]. The specific values held by algorithm developers and operators may infiltrate the formulation of algorithms unnoticed by users. This value bias could involve particular social groups, cultures, or individuals, resulting in unfair treatment when algorithms make decisions [16]. Such potential discrimination occurs in the early stages of algorithm development, and its effects may already be embedded before algorithms are deployed to users. This renders users unable to perceive the excessive collection and utilization of their personal information and makes it difficult for them to understand why they are experiencing the phenomenon of "price discrimination." Consequently, users face challenges in holding algorithms accountable for unfair treatment, exacerbating the accountability dilemma. The proprietary nature of algorithms weakens users' rights to be informed and control the use of their personal data. The effectiveness of accountability mechanisms typically relies on external independent reviews. However, due to the commercial sensitivity of algorithms, external reviews struggle to access detailed internal information about algorithms. This limitation restricts the comprehensive assessment of potential algorithmic issues, thereby constraining the feasibility of accountability mechanisms.

5. THE PATH OF ENHANCING LEGAL REGULATIONS ON "BIG DATA DISCRIMINATION"FROM A BINARY PERSPECTIVE

Under the dual perspective of regulating platform operators' "algorithmic power" and protecting consumer rights, the improvement of legal regulations on "big data discrimination" primarily involves two aspects: the establishment of pathways for protecting consumer rights in the context of "big data discrimination" and the enhancement of governance pathways for platform operators' "algorithmic power." The construction of pathways for protecting consumer rights in the context of "big data discrimination" is mainly achieved through refining legislation, implementing public interest litigation, adopting the principle of "reversal of the burden of proof," and improving consumer rights relief mechanisms. Meanwhile, the enhancement of governance pathways for platform operators' "algorithmic power" requires adhering to a dual governance model of legal governance and technical governance, improving platform algorithm accountability mechanisms, implementing scenario-based and fine-grained algorithmic regulatory mechanisms, and promoting effective coordination between platform governance and algorithm governance.

5.1 Enhancing Consumer Rights Protection in the Context of "Big Data Price Discrimination"

To begin with, legislation should be refined to clarify the legal definition of "big data price discrimination." Effective legal regulation can be achieved through a binary approach, where monopolistic practices of "big data price discrimination" are governed by *the Anti-Monopoly Law*, while situations not constituting monopolistic behavior should be regulated by other relevant laws and regulations such as *the Consumer Rights Protection Law*, *Personal Information Protection Law*, and *E-Commerce Law*. Refining *the Anti-Monopoly Law* could involve changing traditional market share assessment methods, incorporating additional factors such as user activity index, user retention, usage time, and click quantity to determine whether an operator possesses market dominance. Regarding the refinement of *the Consumer Rights Protection Law* and *the Price Law*, it's essential to define clear criteria for distinguishing between normal price differences and algorithmic personalized pricing. There is a need to promote effective alignment among *the Consumer Rights Protection Law*, *Personal Information Protection Law*, and *E-Commerce Law*, accurately distinguishing between "big data price discrimination" and personalized recommendations. Enhancements should be made to the "informed consent rule" stipulated in Article 16 of *the Personal Information Protection Law* and Article 41 of *the Cybersecurity Law*. Although Article 16 of *the Personal Information Protection Law* provides a basis for consumers to withhold authorization for product or service usage, operators can still argue based on the exceptions provided by this provision. Therefore, it's necessary to refine and specify the "informed consent rule." Operators should clearly and explicitly state the purpose, scope of data collection and usage, and the potential impact on consumer rights in documents such as privacy policies and user agreements. A phased consent mechanism should be designed, allowing users to selectively agree to different terms rather than being forced to consent to all terms at once, granting consumers the right to choose. Users should be allowed to selectively agree to specific items rather than having all terms bundled together. Legislation should be refined to clarify the legal definition of "big data price discrimination." The actors involved should be online platform operators or operators who utilize algorithms on platforms to provide goods or services to consumers. The target of price discrimination should be limited to regular customers, defined as consumers who have made purchases on a specific online platform at least twice or have been designated as platform members due to multiple purchases. In terms of the object, it should be clearly defined as the price difference caused by the same goods or services offered by the same online platform and the same merchant, distinguishing it from price strategy differences across different platforms. Regarding the aspect of infringement damage, it should be explicitly stated that damages include not only monetary losses but also multidimensional factors such as time costs and loss of trust.

Secondly, the implementation of public interest litigation and the adoption of the “reversed burden of proof” principle are crucial. Article 55, Paragraph 1 of *the Civil Procedure Law of the People’s Republic of China* clearly delineates the scope of public interest litigation. It enables designated authorities and relevant organizations, as stipulated by law, to bring lawsuits before the people’s court for actions that harm the public interest, such as environmental pollution or infringement of the legitimate rights and interests of numerous consumers. Additionally, Article 70 of *the Personal Information Protection Law of the People’s Republic of China* explicitly states that when personal information handlers violate regulations and infringe upon the rights and interests of numerous individuals, the People’s Procuratorate, consumer organizations, and others have the right to file lawsuits with the people’s court in accordance with the law. Although the phenomenon of “big data price discrimination” primarily infringes upon the individual’s right to personal information, its pervasive nature implicates the broader public interest of society as a whole. Consumers and relevant organizations can, in accordance with legal provisions, jointly initiate public interest litigation to hold accountable operators who abuse their algorithmic power and excessively collect personal information. Moreover, in such litigation, adherence to the principle of reversed burden of proof, established by Article 69 of *the Personal Information Protection Law*, is essential. This principle shifts the burden of proof to the personal information handler, namely the operator. Such measures not only strengthen the accountability for misconduct but also better protect the rights of consumers in legal proceedings, encouraging operators to handle personal information more cautiously.

Finally, improving Consumer Rights Remedies Mechanism. The clandestine nature of “big data price discrimination” makes it difficult for consumers to promptly detect infringements on their rights. To address this issue, incorporating price discrimination into the scope of punitive damages could be considered. This approach would increase societal attention when instances of price discrimination are exposed, leading to more severe legal consequences for operators. By establishing corresponding compensation mechanisms, more effective measures can be taken to combat price discrimination and achieve more comprehensive protection of consumer rights. To address the challenge consumer face in providing evidence in civil litigation, a reversed burden of proof approach can be adopted. Under this approach, consumers would only need to prove that their rights have been infringed, while platform operators would be required to prove the legitimacy, necessity, and reasonableness of their actions and demonstrate that they have not engaged in price discrimination. This method can help mitigate information asymmetry, strengthen the protection of the rights of vulnerable consumers, and ensure greater fairness in the legal process. Improvements to the consumer complaint mechanism could involve establishing dedicated complaint websites to handle complaints related to “big data price discrimination” and providing real-time notifications to increase consumer awareness. Additionally, regular information disclosure and public announcements regarding operators utilizing big data for price discrimination and the outcomes of their handling can enhance the effectiveness of consumer complaints. To enhance the efficiency of consumer complaint handling, regulatory authorities and complaint platforms should establish information-sharing mechanisms, strengthen coordination, and promote regulatory efforts.

5.2 Constructing Governance Pathways for Platform Operators’ Algorithmic Power in the Context of “Big Data Price Discrimination”

Firstly, adhering to the dual governance model of legal and technological governance. As algorithmic technology continues to advance, online platforms have established complex governance systems within their autonomous spaces characterized by technical codes and autonomous ethics. In this context, traditional legal governance models are evidently insufficient to address the complexity of algorithmic power, thus a dual governance model demonstrates innovation and foresight. Legal governance ensures that the generation, operation, and regulation of algorithmic power are conducted within the framework of the rule of law, while technological governance enables platforms to flexibly utilize advanced technological means to autonomously regulate and adjust algorithms. While upholding legal governance, it is encouraged and supported for online platforms to actively explore technological governance methods. Transforming technical norms into legal norms or enforcing them through the force of law can help effectively utilize technological means to regulate algorithmic power within the legal framework.

Secondly, enhancing platform algorithmic accountability mechanisms. The platform accountability rules in our country primarily focus on strict liability and indirect liability after the fact, resulting in less-than-satisfactory accountability for “big data price discrimination.” Therefore, emphasis should be placed on prior supervision. By establishing clear algorithm transparency principles and disclosing key information, including data usage and model design, trust in algorithm operation can be enhanced. Establishing an algorithm audit system is crucial, covering aspects such as algorithm design, selection of training data, weighting of various calculation variables, and output results of the model. Through internal audits and independent evaluations, the fairness and nondiscrimination of algorithm results can be ensured, effectively preventing the phenomenon of "big data price discrimination." After the occurrence of harmful outcomes, mechanisms for algorithm explanation, hearings, and defense should be set up to safeguard users' participation rights and the fairness of algorithmic decisions. The content of algorithm explanation should include the legality and rationality of algorithm design, and platforms should be required to provide sufficient evidence to prove the legality and rationality of their algorithm design and decisions, ensuring that algorithms do not generate undue bias and discrimination during operation. Implementing an algorithm filing system enables regulatory agencies to obtain potential risk information and strengthen administrative supervision. Filing information should include key information such as algorithm design, data usage, and expected outcomes, enabling regulatory agencies to fully understand and supervise the operation of algorithms.

Thirdly, implement a scenario-based and refined algorithm regulatory mechanism [17]. Considering the technical differences among various types of algorithms and the diversity of application scenarios, simple regulatory standards are obviously insufficient to address this complex issue. Algorithm governance requires flexible adaptation. Through scenario-based regulatory mechanisms, for algorithmic decisions involving significant public interests and higher risk costs, a cautious and strict accountability mode should be adopted, strengthening the professionalism and technical capabilities of regulatory agencies. In cases where individual action space is relatively large and social risks are limited, a more flexible individual empowerment approach can be chosen, emphasizing autonomous negotiation among algorithm developers, users, and users. This ensures both individual choice and collective decision-making on matters related to values. Improving the algorithm governance system should focus on scenario-based and refined governance as the core approach, skillfully integrating the advantages of individual empowerment and external accountability paths, to address diverse aspects of public interest and potential risks with more detailed regulatory mechanisms. This refined regulation not only requires the establishment of professional algorithm regulatory agencies, combined with multidisciplinary teams of technical experts, legal experts, and others but also requires precise supervision of algorithm behavior in different scenarios through classification regulation of algorithm predictability, interpretability, and generality, thereby ensuring fair, transparent, and responsible exercise of algorithmic power. This comprehensive governance model aims to compel platforms to adhere to clear norms in the exercise of algorithmic power, effectively regulate the phenomenon of "price discrimination based on big data," and promote the sustainable development of algorithms.

Fourthly, promote effective alignment between platform governance and algorithm governance. Firstly, platform governance needs to strengthen the protection of personal information, establish sound mechanisms for the collection, storage, and use of personal information, ensure the privacy of user data is not infringed upon, and limit the possibility of platforms abusing user information for "price discrimination based on big data." Secondly, enhance algorithm transparency; platforms should disclose the design principles, operational mechanisms, and influencing factors of algorithms, enabling users and regulatory agencies to understand the basic logic behind algorithmic decisions, thus facilitating effective oversight of algorithms. In terms of algorithm governance, emphasis should be placed on data quality and algorithm fairness. Platforms need to ensure the accuracy and integrity of data during the data collection stage to avoid algorithmic results being unfairly influenced by data bias. Furthermore, in addressing the opacity of algorithmic decisions, efforts should be made to encourage algorithm designers to adopt highly interpretable algorithm models, making the decision-making process clearer and more understandable. Effectively aligning platform governance and algorithm governance requires the establishment of comprehensive regulatory mechanisms that can supervise both internal platform operations and review algorithm design and execution processes. This necessitates collaborative efforts among governments, industry associations, and third-party organizations to ensure the comprehensiveness and professionalism of regulation. Promoting the alignment between platform governance and algorithm governance is a necessary measure to establish an effective regulatory system and regulate platform algorithmic power. By strengthening internal governance mechanisms, enhancing algorithm transparency, emphasizing data quality and fairness, and establishing a comprehensive regulatory framework, the phenomenon of "price discrimination based on big data" can be effectively curbed, consumer rights can be safeguarded, and the healthy development of the digital economy can be promoted.

6. CONCLUSION

The essence of 'price discrimination based on big data' is the algorithmic discrimination where platform operators abuse their "algorithmic power" to infringe upon individual rights, violating consumers' rights to fair transactions, information, and other legitimate interests. The technical path for such algorithmic automated decision-making under "data manipulation" involves operators, armed with vast amounts of data, creating "precise portraits" of consumers through algorithms and then setting different prices based on this information. Legal regulation faces challenges such as legislative lag and generality, difficulty for consumers to provide evidence, high costs of seeking legal remedies, and challenges in holding platforms accountable. Addressing this dilemma can be approached from two dimensions: protecting consumer rights and governing the “algorithmic power” of platform operators.

Firstly, enhancing the path for protecting consumer rights is fundamental to safeguarding their rights to fair transactions, information, and other legitimate interests. By refining legislation, it becomes possible to more precisely regulate the practice of using big data for price differentiation and strengthen oversight of platform operators. Implementing public interest litigation provides consumers with a more convenient path to seek legal remedies, reducing the burden of proof. The principle of “reversed burden of proof” is particularly powerful in imposing legal constraints on platforms, ensuring the effectiveness of legal enforcement. Simultaneously, improving rights relief mechanisms provides timely and effective remedies for consumers who have been unfairly treated.

Secondly, constructing a governance path for platform operators’ “algorithmic power” is key to achieving long-term algorithmic regulation. Emphasizing a dual mode of legal and technical governance ensures comprehensive oversight of algorithmic decision-making. Improving algorithmic accountability mechanisms clarifies the responsibilities of platforms in the use of big data algorithms, helping to prevent algorithmic discrimination. Scenario-based and refined algorithmic regulation provides more precise means for regulatory work, making regulation more efficient. Promoting effective alignment between platform governance and algorithm governance establishes a closer link between law and technology, driving the development of the entire governance system.

Looking ahead, we anticipate more rigorous and practical regulations to be enacted to further refine measures for protecting consumer rights and enhance legal constraints on platform operators’ abuse of “algorithmic power.” Additionally, we hope for advancements in technical governance to ensure greater transparency and fairness of algorithms. With coordinated efforts between law and technology, we can expect a win-win situation for consumers and platforms in the digital age, thus ensuring the sustainable and healthy development of the digital economy.

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