

The Due Process Dilemma and Regulatory Path of Algorithmic Administration

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Abstract

In the context of the digital government's deepening development, algorithmic administration is reconstructing the paradigm of administrative power operation with the expansion of technological rationality, triggering a systemic crisis of the traditional due process principle. This paper deconstructs the tripartite procedural dilemmas in algorithmic administration, reveals the deep-seated contradictions such as the black box of technology leading to the idleness of the principle of procedural transparency, the algorithmic closed loop eroding the effectiveness of procedural participation, and the failure of the responsibility mechanism induced by the coding of power, and proposes a composite governance framework of 'technical regulation-procedural reconstruction-institutional coordination'. At the technical level, a gradient transparency mechanism and an algorithmic impact assessment system are constructed to solve the problem of explainability; at the procedural level, full-cycle dynamic disclosure rules and reverse verification relief procedures are designed to reshape the connotation of procedural justice in the digital age; at the institutional level, the intelligent transformation of administrative procedural law and the construction of a pluralistic co-governance ecosystem are promoted to achieve a deep coupling of legal rules and technical logic.

Keywords

Algorithmic Governance; Due Process; Technological Regulation.

1. The Evolution of Algorithmic Administration and the Procedural Crisis

1.1. Administrative Model Transformation Driven by Technological Iteration

Algorithmic administration emerges from the profound logic of digital government construction^[1]. From the "electronic process" in the era of e-government to the "intelligent decision-making" at the current stage, technological iteration has promoted a triple transformation of the administrative model: the basis for decision-making has shifted from manual experience to data modeling, the exercise of power has shifted from hierarchical transfer to algorithmic closed-loop operation, and administrative efficiency has shifted from local optimization to global calculation^[2]. As an example, we can look at the "AI-powered Traffic Police" system in Shenzhen, it uses computer vision to analyze tens of millions of traffic data in real time. In 2022, the proportion of automatically generated administrative penalty decisions reached 63%, marking that administrative power has begun to break away from the traditional "man in the loop" check and balance framework and form an autonomous decision-making chain of "data input-algorithm processing-result output". This technological embedding not only reconstructs how administrative behavior is carried out, but also gives birth to a "digital Leviathan" with self-learning ability, which gradually shifts the administrative system from "instrumental existence" to "subjective existence".

Technological leaps are reshaping the ontological structure of administrative power. Machine learning algorithms continuously absorb dynamic data to iterate decision-making models,

resulting in the "liquid" characteristics of administrative rules. In 2019, Hangzhou's "Qinqing Online" policy payment system automatically parsed policy texts through NLP technology, but caused 27% of misjudgment disputes during implementation due to semantic understanding deviations. Such cases reveal the deep paradox of algorithmic administration: there is a fundamental conflict between the maximization of efficiency pursued by technological rationality and the stability required by administrative rule of law. While administrative agencies have obtained computing power empowerment, they have also irreversibly ceded some of their right to interpret rules, laying institutional risks for procedural crises.

1.2. Deconstructive Challenges to Traditional Procedural Jurisprudence

Traditional administrative procedure jurisprudence faces the risk of systemic breakdown in the algorithmic context. The principle of procedural openness is undermined by the algorithmic black-box mechanism at the technical level. In the "health code" transcoding dispute during the COVID-19 pandemic, some complainants lost their effective defense basis because they could not obtain the input parameters and weight distribution of the algorithmic decision. The principle of procedural participation has fallen into a formal dilemma. At the hearing on the traffic optimization algorithm of Hangzhou's "City Brain", only two of the 37 suggestions put forward by citizens were included in the model variables, exposing the "pseudo-openness" of algorithmic decision-making. The principle of procedural remedies is facing institutional idleness. The algorithmic objection right stipulated in Article 22 of the EU GDPR lacks an operational mechanism in my country's administrative scenario. In 2022, the reconsideration rate of algorithmic penalty cases in the field of market supervision was less than 1.2%, reflecting the substantial shrinkage of the rights protection mechanism.

The deeper crisis lies in the alienation of the power structure. Algorithms quietly change the responsibility allocation mechanism through "technical unconsciousness". When the attribution of autonomous driving accidents involves multiple technical modules such as perception algorithms, path planning, and control execution, the traditional fault identification standard is completely ineffective; administrative agencies use algorithms to transform discretion into "technologically neutral" mathematical operations, which actually forms a recursive cycle of "power coding-code power". This power invisibility technique not only eliminates the constitutional principle of "consistency between power and responsibility", but also makes the procedural control mechanism on which the Weberian bureaucracy relies on become a decorative shell of digital governance.

2. The Core Challenge of Due Process Principle

2.1. The Paradox of Technical Black Box and Program Transparency

The 'technical black box' nature of algorithmic administration has subverted the practical foundation of the principle of procedural transparency^[3]. Taking the US COMPAS recidivism risk assessment algorithm as an example, it generates prediction results through 137 dynamic variables, but the unexplainable nature of the algorithmic logic made it impossible for the court to review the decision-making basis in the Loomis case, and ultimately refused to disclose the core code on the grounds of "trade secrets", exposing the deep conflict between algorithmic transparency and trade secrets. The nonlinear characteristics of deep learning models make it difficult to trace the decision path even if the source code is disclosed. Although the social security qualification review algorithm of a certain city discloses the model architecture, the dynamic adjustment mechanism of data feature weights causes some applicants to be wrongly screened out due to hidden variables (such as online shopping records and social media activity). More seriously, the self-iteration of the algorithmic system may cause the program to go out of control. For example, the Tesla Autopilot system changed the driving strategy through

OTA upgrades, but failed to fulfill the obligation of procedural notification, causing users to fall into the risk vortex of "algorithmic raids".

2.2. The Crisis of Formalization of Procedural Participation

The 'technical threshold' in algorithmic decision-making has turned procedural participation into a performative symbol of digital governance. Although the public opinion was collected at the Hangzhou "off-peak travel" algorithm hearing, 97% of the parameters of the traffic flow prediction model were set by technology companies, and the demands of citizens such as "exemptions from school pick-up and drop-off periods" were filtered out by the system because they could not be converted into mathematical variables. In the explanation link, administrative agencies often simplify their interpretation obligations on the grounds of "technical complexity". The environmental protection penalty algorithm of a certain province only outputs the conclusion of "exceeding the standard index of 11.7", but does not disclose the source of monitoring data and calculation standards, making it impossible for the counterparty to effectively defend. The objection right mechanism is facing structural failure. The right to request manual review stipulated in the EU GDPR is in name only in my country's algorithmic penalties. The delivery time algorithm of a food delivery platform has led to an increase in the violation rate of riders, but only 2 of the 1,987 reconsideration applications in 2022 initiated manual review, exposing the procedural alienation trend of "algorithmic final review".

2.3. Algorithmic Disruption of the Power and Responsibility Chain

The distributed decision-making characteristics of the algorithm system disrupt the traditional relationship between power and responsibility. In the field of market supervision, the "intelligent inspection algorithm" automatically generates penalty recommendations, but when the algorithm misjudges, the technology developer is exempted from responsibility by claiming to be a "tool provider" and the administrative agency shirks responsibility by claiming "technical autonomy", ultimately falling into a governance black hole of "power without responsibility". At the level of fault identification, the information cocoon effect caused by algorithm recommendation is difficult to attribute - the employment subsidy algorithm of a certain city caused a 38% decrease in the coverage rate of vulnerable groups due to training data deviation, but the principle of technological neutrality prevented the presumption of fault, making the "official power behavior" element of Article 2 of the "State Compensation Law" an obstacle to accountability. The deeper contradiction lies in the fact that the algorithm converts administrative discretion into mathematical probability (for example, a petition risk assessment algorithm in a certain place quantifies the "social stability coefficient" into a range of 0-1), making the principle of "reasonable administration" lose its discretionary basis, and the operation of power degenerates from "the art of empirical judgment" to "the art of probability calculation", ultimately eliminating the ethical basis of responsible government.

3. Technology Regulation Path: Explainability and Controllability

3.1. Gradient Implementation Mechanism for Algorithm Transparency

The realization of algorithm transparency requires breaking through the binary opposition between "full disclosure" and "zero disclosure" and building a gradient disclosure system based on risk classification. The EU's "Artificial Intelligence Act" divides algorithms into three levels: "unacceptable risk", "high risk" and "limited risk", corresponding to the differentiated requirements of "source code disclosure", "core parameter disclosure" and "functional description disclosure". For example, the face recognition algorithm of the German Federal Railway Company is a high-risk scenario, so it needs to open the model architecture and training data set to the regulator. my country can learn from this model and require the traffic monitoring algorithm to disclose data collection standards and false positive rate thresholds in

the Shenzhen pilot, but desensitize the specific parameters of the convolutional neural network to achieve a balance between technical confidentiality and procedural justice. At the technical level, the application of explainable algorithms (XAI) can reduce the cost of transparency. For example, the Shanghai "One Network Management" platform uses LIME technology to generate local explainable reports, which will reduce the algorithm objection rate of administrative counterparts by 41% in 2023.

3.2. Mandatory Embedding of Technology Impact Assessment

The algorithm impact assessment system needs to be upgraded from voluntary guidelines to mandatory regulations. California's Algorithm Impact Assessment Act requires that public institution algorithms must pass technical ethics review by a third-party agency before deployment, including discrimination detection (detection of group deviation exceeding 15% triggers a fuse mechanism) and social risk simulation (predicting the probability of the algorithm's impact on the rights of vulnerable groups). A provincial market supervision department in China piloted an "algorithm health assessment" and conducted stress tests on seven types of law enforcement algorithms in 2022. It was found that the credit scoring algorithm had a 12.3% urban-rural difference deviation and was forced to suspend its use. The assessment standards should cover the entire life cycle. For example, autonomous driving algorithms need to complete tens of millions of mileage tests in a simulation environment and submit mathematical proofs of collision avoidance logic, while the dynamic assessment mechanism requires government algorithms to update training data distribution reports every quarter to prevent decision-making biases due to data drift.

3.3. Independence Guarantee of Algorithm Audit

Establishing an algorithm audit system independent of administrative agencies and technology providers is crucial to address the 'regulatory capture' dilemma. The algorithm certification model of the German Technical Supervision Association is worth learning from. Through the dual verification of "white box testing + adversarial sample attack", it denied the deployment application of the Berlin Municipal Traffic Diversion Algorithm in 2021 on the grounds that its misjudgment rate in rainy and foggy weather exceeded the EU safety standard by 3.7 times. My country needs to cultivate professional audit forces. For example, Shenzhen has established an algorithm audit center composed of experts in law, computer science, and ethics to conduct a penetrating review of government algorithms. In 2023, the center found that the petition risk assessment algorithm of a certain district set the weight of "complaint frequency" to 0.83, far exceeding the weight of 0.15 of "problem resolution rate", and was suspected of violating the principle of administrative rationality. The audit process needs to use blockchain technology to solidify the chain of evidence. The audit of the Hangzhou health code system uses "hash evidence" to record the algorithm iteration log to ensure the non-tamperability of the audit conclusion and provide a technical anchor for subsequent accountability.

4. Procedural Reengineering: Procedural Justice in the Digital Age

4.1. Checklist Management of Prior Filing Review

Procedural control over algorithmic administration requires the establishment of a risk - based access mechanism and achieve precise regulation through a "negative list + key area list"^[4]. The EU's "Artificial Intelligence Act" lists eight types of algorithms, such as biometrics and judicial decision-making, as high-risk scenarios, and requires the filing of technical documents and ethical assessment reports; my country's Shanghai Market Supervision Bureau piloted the "Algorithm Registration Library" to implement source code archiving for 12 types of algorithms such as credit scoring and food and drug sampling. In 2023, three algorithm registration applications due to excessive data deviation rates were rejected. Registration review needs to

be embedded with adversarial testing. For example, Hangzhou's "peak-shifting restriction" algorithm needs to simulate the decision-making stability of 300 scenarios such as extreme weather and emergencies during the registration stage to ensure that technical feasibility does not exceed the boundaries of procedural justice. In terms of institutional design, an "algorithm traceability code" can be introduced. Administrative agencies must generate a unique digital identifier before deploying an algorithm. The public can scan the code to obtain the algorithm function, legal basis and registration status, thereby curbing the abuse of "black box algorithms" from the source.

4.2. Interactive Design of Dynamic Disclosure During the Event

The realization of procedural justice requires breaking through the static notification model and building a two-way interactive real-time disclosure system^[5]. Guangzhou's "Suizhiguan" system pioneered the algorithm decision-making accompanying instructions, which simultaneously pushed data collection time, image analysis logic and similar case comparison when automatically identifying traffic violations, reducing the objection rate of the counterparty by 58%. At the technical level, limited query permissions can be opened through the API interface. For example, the Nanjing government platform allows companies that are rejected by the algorithm to query the weights of 30 core variables of the credit assessment model in real time, but blocks specific calculation functions to protect business secrets. Legal obligations need to be refined to the operational level. The "transparency" stipulated in Article 24 of the "Personal Information Protection Law" should be expanded to a dynamic disclosure standard, requiring administrative agencies to provide interactive decision tree maps within 72 hours after the algorithm decision, and support the counterparty to simulate the result changes under different inputs by dragging variables, thereby substantially protecting the right to know and the right to defense.

4.3. Reverse Verification Procedure for Ex Post Facto Interpretation Remedies

The resolution of algorithmic disputes requires the development of "technical due process" and the establishment of a reverse verification mechanism based on a sandbox environment. The Wisconsin court in the United States created a "virtual retrial" system in the COMPAS algorithm infringement case, allowing the defendant to enter the modified parameters in an isolated environment to verify the result deviation. This experience can be transplanted to the administrative reconsideration procedure-Shenzhen piloted the "algorithm relief sandbox". When the counterparty has doubts about the credit score, it can authorize a third-party agency to run alternative data in the mirror system. In 2023, 17.2% of the wrong scores have been corrected. The relief mechanism needs to be deeply coupled with technical characteristics. For example, objections to the autonomous driving penalty algorithm should be handed over to a verification platform with federated learning capabilities, and the legitimacy of the decision logic can be reversed through millions of simulated driving data without obtaining the source code. Ultimately, a closed-loop system of "objection triggering retraining" should be constructed. When the error correction rate of a certain type of algorithm reconsideration exceeds 5%, the model optimization program will be automatically started, so that the procedural relief can be upgraded from individual case correction to system self-healing, and a benign interaction of "rights relief-algorithm evolution" can be achieved.

5. Institutional Guarantee System: Coordination of Law and Governance

5.1. Intelligent Transformation of Administrative Procedure Law

Traditional administrative procedure laws urgently need to be infused with 'digital genes', "infused with and upgrading the system by adding a chapter on "special algorithmic procedures"^[6]. The 2021 amendment to the German Federal Administrative Procedure Act

introduces the principle of "technical due process", requiring administrative agencies to pass the "minimum necessity and explainability" test before deploying algorithms. my country can learn from its experience and clarify the scope of application and prohibited areas of algorithmic decision-making in the Administrative Procedure Act (such as administrative penalties involving personal freedom). In the 2023 "takeaway platform algorithm employment case", the Hangzhou Internet Court created a "two-tier review standard", which not only examines the legality of algorithmic logic, but also evaluates the legitimacy of data collection, providing a judicial practice sample for legislation. Institutional reform requires the refinement of technical clauses, such as stipulating that when administrative agencies use machine learning algorithms, they must retain no less than 30% of the "manual intervention channel" and fully record the traces of decision corrections in the system log to ensure that the right to relief in Article 9 of the Administrative Reconsideration Law is not in vain due to technical complexity.

5.2. The Empowerment and Upgrading Path of Regulatory Technology

The deep-seated application of regulatory technology holds the key to resolving the paradox of 'regulating algorithms with algorithms'. Beijing's "Regulatory Brain" platform integrates blockchain evidence storage, federated learning and other technologies. In 2023, it will achieve real-time monitoring of 287 government algorithms, increasing the efficiency of identifying violations by 17 times. The algorithm sandbox mechanism needs to expand the scope of the pilot. The "Autonomous Driving Regulatory Sandbox" established by Shanghai Pudong New Area allows companies to test new algorithms on closed roads, but they need to upload decision logs every 15 minutes for regulatory agencies to analyze. Technology empowerment also needs to strengthen digital twin capabilities. The "Virtual Law Enforcement Laboratory" built by the Shenzhen Market Supervision Bureau can mirror the operating algorithm, detect risks in advance by injecting adversarial samples, and successfully warn of 4 algorithm discrimination incidents in 2022. The upgrade path of regulatory capabilities should follow the three-order evolution of "data-driven-model iteration-intelligent decision-making", and ultimately form a "regulatory super brain" that penetrates the algorithm black box.

5.3. Strategy for Building a Multi-faceted Governance Ecosystem

Algorithm governance requires breaking through the unipolar-dominated model of the government and build a three-dimensional co-governance network of "technical community-civil society-administrative agency". The algorithm ethics certification carried out by Germany's Rheinland Group has covered 83% of public sector algorithms, and its independent third-party status is worth learning from; the "Algorithm Governance Alliance" established in Hangzhou, my country has absorbed technical forces such as Alibaba Damo Academy and Zhijiang Laboratory, and will release 12 industry standards in 2023. The public participation mechanism needs technological transformation. Guangzhou citizens can label government algorithms through the "Yangcheng Algorithm Governance Platform". The system automatically generates optimization suggestions after clustering analysis, which will increase public satisfaction with traffic management algorithms by 23% in 2022. Ultimately, it is necessary to cultivate the "social foundation of algorithm literacy". The Ministry of Education will pilot AI ethics courses in primary and secondary schools, which will cover more than 60% of urban schools in 2025, and dissolve the structural tension between technological power and citizens' rights through intergenerational education.

6. Conclusion

The due process dilemma of algorithmic administration reveals the profound tension between technological rationality and administrative rule of law, necessitating a multidimensional governance framework to achieve balance and regulation. The "technology regulation-

procedural reengineering-institutional coordination" pathway proposed in this paper not only addresses core challenges such as algorithmic black boxes, formalized participation, and fragmented accountability but also constructs a new paradigm of procedural justice in the digital era. At the technical level, the gradient transparency mechanism and algorithm audit system enhance the explainability and controllability of algorithms. Procedurally, dynamic disclosure rules and reverse verification procedures reshape the effectiveness of public participation and remedies. Institutionally, the intelligent transformation of administrative procedure law and the pluralistic co-governance ecosystem facilitate the deep integration of law and technology. Moving forward, algorithmic governance must continuously explore the dynamic coupling of technical logic and legal values, ensuring through iterative governance tools and institutional designs that administrative power in the digital transformation consistently serves public interests and civil rights.

References

- [1] Gao Qinwei, "The Design and Realization of the Rule of Law Values in Digital Administration", *Journal of Comparative Law*, 2024, No. 2, pp. 32-47.
- [2] Wang Chunye: "The Transformation from Administration Based on Law to Administration Based on Algorithm", *Journal of Political Science and Law*, 2024, No. 4, pp. 62-75.
- [3] Jiang Bixin and Wang Xin: "Legal Regulation of Algorithmic Discrimination in Digital Administrative Behavior", *Academic Forum*, 2024, No. 6, pp. 49-63.
- [4] Lin Shuangqiao: "Algorithmic Administrative Risks and Their Legal Regulation Paths", published in "Network Security Technology & Application", 2024, No. 11, pp. 130-132.
- [5] Yao Xiansen, Wang Sen: "The Rights of Algorithmic Administrative Counterparties and Their Dual Protection", *China Soft Science*, No. 10, 2024, pp. 68-83.
- [6] Zhang Yongzhong, Zhang Baoshan: "The Path Innovation of Algorithm Regulation: On the Construction of China's Algorithm Audit System", *E-Government*, 2022, No. 10, pp. 48-61.