The Inherent Logic and Optimization Path of Embedding Adaptive Response Algorithms in Labor Dispute Governance

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Abstract. This paper analyzes the inherent logic of embedding adaptive response algorithms into labor dispute governance, pointing out that it promotes a paradigm shift from rigid efficiency to intrinsic compliance, from lagging regulation to agile collaboration, and from workers to co-builders. The study finds that current governance practices still face real dilemmas such as data barriers and algorithmic biases under platform dominance, ambiguity in responsibility caused by algorithmic black boxes, and hidden exploitation concealed by efficiency miraculous effects. This paper proposes constructing a visualized and explainable algorithmic system, improving a multi-party collaborative digital governance framework, and adhering to the core principles of "people-centeredness" and "human-in-the-loop," thereby resolving digital injustice through technological architecture reshaping and power structure checks and balances.

Keywords: Adaptive response algorithm; labor dispute governance; algorithmic bias; multi-party co-governance

1 Introduction

Traditional governance algorithms are mainly automated adjudication algorithms with preliminary governance attributes, used to handle highly standardized violation judgments. With the increasing frequency of labor disputes arising under the platform economy, their fragmented forms and the decentralized nature of the field, traditional automated adjudication logic is insufficient when facing hundreds of millions of instant order disputes. This complexity often leads to the awkward situation of "difficulty in filing cases, difficulty in obtaining evidence, and long cycles" in traditional judicial procedures (Wang Yan, 2021). The pressure of governance paradigm transformation has prompted the embedding of an "adaptive response algorithm" derived from the concepts of responsive regulation and agile governance into labor dispute governance. As a logical extension of automated adjudication algorithms, this algorithm not only represents the paradigm shift of digital governance from "mechanical control" to "organic governance," but also achieves a leap from "post-event remedies" to "instant

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governance." Therefore, it is essential to explore the inherent logic and optimization path of embedding adaptive response algorithms into labor disputes.[1]

2 The Intrinsic Logic of Embedding Adaptive Response Algorithms in Labor Dispute Governance

The embedding of the adaptive response algorithm aims to build an intelligent auxiliary system capable of sensitively sensing workers' demands and dynamically adjusting labor-management conflicts, thereby achieving a leap in governance logic from the one-way suppression of an "algorithmic Leviathan" to the two-way interaction of "agile governance." The internalization of compliance, digital collaboration, and the reshaping of the subject's status described below are essentially manifestations of this algorithm's self-calibration and dynamic balancing capabilities in the governance field.

2.1 The Evolution from “Rigid Efficiency Control” to “Compliance-Based Intrinsic Governance”

In traditional governance models, "rigid efficiency control" is the core characteristic of platform algorithms. This singular efficiency orientation leads to severe rigid conflicts and negative impacts when facing complex environments such as extreme weather, trapping workers in an inescapable "algorithmic dilemma." The approach involves adaptive algorithms constructing a "sub-rule system," transforming external laws, regulations, and industry standards into executable "underlying logic code." It performs "self-calibration" after capturing the information, using big data technology within the program to call upon external environmental parameters to offset the original "punishment." Responsive governance requires entities to self-calibrate based on feedback from regulated individuals (Yang Binglin, 2017). For platforms, the "adaptive response" algorithm is no longer simply a metrics harvester; it's also a compliance engine that can automatically detect "abnormal labor intensity"—based on an early warning and handling mechanism, it achieves pre-emptive self-correction before disputes arise. For workers, this internalized governance mechanism transforms "external rights protection" into "self-established internal rights and responsibilities," achieving dynamic compliance for both employers and employees during algorithm operation.[2]

2.2 Evolution from "Lagging Administrative Supervision" to "Agile Digital Collaboration"

For regulatory authorities, the value of adaptive response algorithms lies in providing a "digital regulatory sandbox," enabling them to transition from a "firefighting" to a "preventative" governance model. Under traditional governance systems, administrative regulation often exhibits significant "lag." This lag manifests in several ways : regulation lags behind potential risks, lacking the ability to anticipate and promptly address emerging issues, leading to difficulties in adapting to the massive fragmented disputes on online platforms and the resulting imbalance between available administrative

resources. On one hand, they connect government regulatory departments to a data pool based on existing standardized data interfaces and open standards, enabling real-time access to operational data from various systems on the platform. On the other hand, by addressing information asymmetry between government and businesses, algorithmic nesting embeds regulatory instructions into the algorithm's allocation logic, allowing the system to calculate appropriate measures for agile handling and rapid response to high-frequency, fragmented disputes.

2.3 Evolution from “Passive Controller” to “ Participant in Co-construction ”

In traditional governance structures, platform companies, government regulatory agencies, and workers are the three main stakeholders, and their power boundaries often exhibit a one-way tilt towards platform companies. The underlying logic of adaptive response algorithms lies in the return of worker agency—from being a "passive recipient" under previous algorithms to becoming a "feedback right holder" and "co-builder and sharer." The return to technological ethics must reflect respect for human agency. This development not only helps enhance workers' sense of professional identity but also forms the foundation for building a harmonious and trusting digital employment environment between people and the environment. First, by integrating "precise calculation" and "efficient results," it significantly reduces the cost of workers' rights protection. Addressing the issue of too many factors in rights protection, the 24/7 support model ensures that disputes are resolved "as soon as they arise," completely changing the situation where workers' rights are damaged and they cannot obtain timely relief due to traditional post-event litigation. Second, addressing the previous "one-size-fits-all" approach to platform rules, it identifies more problems through specific analysis of specific issues and provides better solutions at appropriate times. Finally, the algorithm technology returns to the "human-in-context" form of realizing social governance concepts and values, that is, configuring the technology's functions and effects according to human needs.

3 The Real-World Dilemmas of Embedding Adaptive Response Algorithms in Labor Dispute Governance

3.1 Data Barriers and Algorithmic Bias under Platform Dominance

In the current labor dispute governance system, platform companies are not only parties to the dispute but also effectively assume the adjudicative function of initial dispute resolution. This "platform self-management" model is the root cause of the governance dilemma. Data silos undermine the foundation of impartiality in dispute governance, leading to severe "information islands." Data is the "lifeline" for uncovering the truth of labor disputes, but in reality, core labor process data are tightly sealed on the platform's private servers. This data monopoly prevents external regulatory bodies and workers from obtaining crucial evidence to support their defenses, creating "data black boxes" lacking public auditing. Algorithmic bias systematically and explicitly solidifies

the inherent structural injustices in labor disputes from their logical source, manifesting itself clearly in dimensions such as time, space, and efficiency: In the time dimension, algorithms presuppose an idealized "shortest delivery time," ignoring physiological limits and force majeure, thus causing algorithmic judgments to be disconnected from physical reality; in the spatial dimension, route planning logic ignores terrain obstacles and dynamic traffic flow, similarly creating a disconnect between algorithmic results and physical reality; in the efficiency dimension, algorithms continuously increase labor intensity through ranking and elimination mechanisms, inevitably leading to a systematic bias towards capital efficiency in governance outcomes. Algorithms are by no means neutral technological tools; their decision-making logic is naturally influenced by training data.

3.2 The Dilemma of "Attribution of Responsibility" Under the Algorithm Black Box

The lack of transparency in algorithmic decision-making logic has led to serious "black box" problems, which, in a governance context, manifest as ambiguity in attributing responsibility when algorithmic decisions erroneous. when disputes arise regarding algorithmic judgments, platforms tend to shift blame to technical limitations or uncontrollable factors in system operation , attempting to sever the connection between technological output and the platform's will. This strategy essentially constructs a legal wall of immunity from liability through complex technological barriers, allowing platforms to cleverly absolve themselves of traditional employer responsibility by blurring the correspondence between rights and responsibilities. "attribution of responsibility " problem lies in the profound substitution of traditional manual management by digital algorithms. Algorithms transform complex governance decisions into high-dimensional vectors, ultimately collapsing into a series of binary codes for black-box operations. This transformation process completely severs the traditional legal causal logic chain of "intention-behavior-consequence." This unexplainability deprives workers of their right to know and right to defend themselves at the institutional level , leading to a deep crisis of trust in algorithms (Xu Feng, 2019), rendering any defense against the judgment ineffective due to a lack of evidentiary support. If the principle of "algorithmic behavior is subject behavior" cannot be established at the institutional level, the closed loop of legal remedies will never be truly closed (Zhang Shuang, 2022).[3][4]

3.3 The Risk of "Hidden Exploitation" Under the Myth of Efficiency

The long-standing "efficiency-first" logic in algorithm design is fundamentally at odds with the mainstream social values of "fairness and justice." Under this logic, the pursuit of governance effectiveness by algorithms often deviates from its original purpose, and its core methods and means of improving efficiency are increasingly reliant on it. The first manifestation is the construction of a rigorous "digital Taylorism" through algorithms, achieving a digital shift from the traditional principle of efficiency first. When this efficiency-first logic lurks in governance algorithms, so-called "mediation solutions" may simply be persuading workers to accept higher-intensity labor in exchange

for the pacification of disputes. The second manifestation is more insidious: algorithmic management possesses a hypocritical "gamification" quality. Under the guise of "providing convenience for workers," it actually conducts "24/7 monitoring" (Sun Ping, 2019). If the logic of governance algorithms is captured by the logic of capital, it may evolve into a form of invisible exploitation disguised as "mediation" but actually "discipline." Any unequal power relations are hidden within seemingly objective or irresistible institutional rules. Algorithms first use gamification methods such as "credit scores" to induce workers to accept excessively high-intensity labor in order to maintain their account weight (Rosenblat, 2018).[5]

4 Optimization Path of Embedding Adaptive Response Algorithms in Labor Dispute Governance

4.1 Constructing a Visual, Interpretable, and Evaluable Algorithm System

Constructing a closed-loop algorithmic system centered on visualization, explainability, and evaluability is a technological prerequisite for penetrating the algorithmic black box and achieving digital justice. Therefore, it is necessary to reform, reshape, and upgrade the traditional governance system and its technological architecture, making algorithmic rules more aligned with public rational constraints. Algorithm transparency is not merely about publishing the code; it's about revealing the most crucial variables and weighting logic that determine the algorithm's operation. Algorithms must be able to explain their decision-making basis to non-technical stakeholders. They cannot merely show the "cause and effect" of the execution result; they must also clearly explain the entire cause and effect of the event. When handling disputes involving delivery drivers, the algorithm should clearly demonstrate why a specific order is judged as "reasonably late," and clearly explain the reasons for the platform's "deduction" or other corresponding actions. The governance system needs to move from simple corporate self-assessment to establishing a third-party evaluation mechanism based on the effectiveness of algorithm operation.

4.2 Improve the Digital Governance Framework for Multi-party Collaboration

A sound multi-party collaborative governance framework is the institutional guarantee for breaking down unilateral platform management and achieving modern governance. Regarding algorithm-assisted governance, clarification is needed through legislation or judicial interpretation. The essence of this multi-party co-governance lies in constructing a governance loop that balances efficiency, fairness, and humanistic care through checks and balances of power and the sharing of responsibilities, truly transforming the process of technology embedding into an empowerment process. The key to achieving adaptive governance lies in building a cross-stakeholder, multi-party collaborative digital platform and transforming "multi-party co-governance" from a concept into an operational institutional channel. This collaborative platform should be based on a

government cloud platform, enabling data interoperability among multiple stakeholders. To ensure governance effectiveness, the responsibilities and authorities of each stakeholder must be clearly defined: the government has the right to set "regulatory red lines" and audit algorithms; platform companies bear the responsibility for ensuring compliance with underlying algorithms and data openness.

4.3 Adhere to the Core Principles of "People-oriented" and "Human-centered"

The ultimate goal of algorithmic governance should not be the pursuit of extreme efficiency indicators, but rather the realization of decent work for workers and harmonious and stable social relations. In the process of embedding adaptive response algorithms, adhering to the principles of "human-centeredness" and "human-in-the-loop" should not merely remain a value declaration, but must be translated into specific operational procedures during algorithm execution. Firstly, in the embedding process, the focus of " human-centeredness " must be prioritized in the algorithm parameter setting stage. Specifically, the algorithm should establish dedicated "context-aware parameters" to incorporate uncontrollable factors (such as heavy rain, road closures, traffic accidents, etc.) as core adjustment weights. Secondly, adhering to the "human-in-the-loop" principle requires establishing substantial human intervention and ethical review anchors within the automated decision-making process of algorithms. Operationally, this means establishing a "final human review authority for major decisions," especially when it comes to critical rights such as the determination of significant labor compensation. Furthermore, this "loop" is also reflected in a dynamic feedback and correction mechanism: the platform should provide workers with a real-time access to a human appeal channel, ensuring that rational human judgment can correct logical flaws in the algorithm at any time.

5 Summary

The study finds that current algorithmic governance faces core problems such as the lack of fairness due to data silos, the drift of responsibility caused by the black box effect, and hidden exploitation concealed by the myth of efficiency. To address these shortcomings, this paper proposes a systematic solution that couples a transparent notification mechanism, an interpretable framework, and multi-stakeholder collaborative evaluation. This solution aims to resolve the fairness deficit under the algorithmic black box and promote the return of algorithms from mere "efficiency tools" to "governance carriers." Looking to the future, digital labor governance should follow the principles of moving from auxiliary to central, from coercive to resilient, and from single-leadership to multi-party co-governance. Algorithms need to gradually evolve into a governance center that senses social conditions and dynamically adjusts conflicts, achieving immediate perception and precise relief. Governance logic should incorporate adaptive parameters and external relief channels to build a resilient system that is self-healing and imbued with humanistic warmth.

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