Social Security and Administration Management (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/socsam.2025.060109
ISSN 2523-5796 Vol. 6 Num. 1

Empirical Study on the Protection of Rest Rights for Dedicated Food Delivery Riders under Algorithmic Control

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Keywords: Workers in New Employment Forms; Right to Rest; Empirical Research; Platform Economy; Algorithms

Abstract: With the continuous development of the digital economy, the scale of dedicated food delivery riders has expanded rapidly, but the issue of protecting their right to rest has become increasingly prominent. Based on empirical data from factor analysis of 136 judicial cases, in-depth interviews with 21 riders, and 6 station managers, this study identifies a platform algorithm management model comprising an algorithmic order-dispatching mechanism, an algorithmic incentive mechanism, and an algorithmic indirect management mechanism for dedicated stations. It analyzes how this model contributes to the difficulties in protecting riders' rest rights. Aiming at the two major dilemmas—"self-exploitation" caused by algorithmic management and the burden of proof in disputes due to the "algorithmic black box"—this paper proposes solutions: constructing a "counter-algorithm" protection mechanism and requiring platforms to disclose algorithmic decision dimensions and weights. These measures aim to better safeguard the rest rights of dedicated food delivery riders as new-form employees in the digital economy.

1. Introduction

In the digital economy era, the factor of data has transformed traditional labor and employment forms, giving rise to a large number of new-form workers, particularly food delivery riders who have become widely visible in public life. According to research by China's New Employment Form Research Center, driven by social security policies, the number of dedicated riders is expected to grow to 5-6 million by 2025, making this group extremely large.

Food delivery, as a key sector in the platform economy, relies on platform data capital and algorithmic tools. Platforms use algorithms to design labor management models for food delivery to match data resources with labor resources efficiently, ensuring high-performance completion of delivery tasks. However, the labor management models designed by algorithms—aimed at maximizing profits through resource matching—often trap dedicated riders in a state of "transitional labor" [1] with strong dependence, leaving their rest rights unprotected.

From a practical perspective, this study focuses on dedicated food delivery riders, using empirical research methods based on 136 judicial cases involving rest right disputes, in-depth

interviews with 21 riders, and 6 station managers. It summarizes the link between the legal protection of riders' rest rights and platform algorithm management, and proposes solutions to effectively safeguard their rights, thereby promoting the development of new-quality productivity through the growth of this new workforce.

2. Empirical Analysis of Dilemmas in Protecting Dedicated Riders' Rest Rights

2.1 Analysis of the Current Status of Dedicated Riders' Rest Rights

2.1.1 Analysis of Dedicated Riders' Working Hours

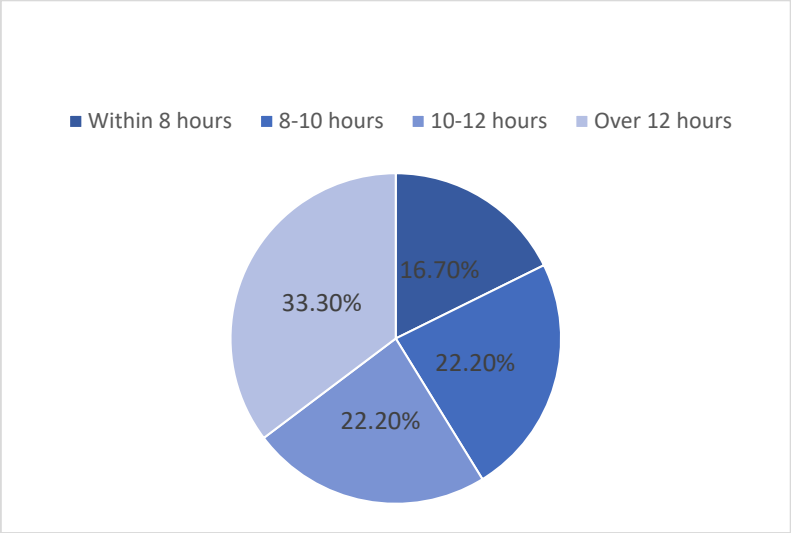

Figure 1 Proportion of Working Hours of Dedicated Delivery Riders

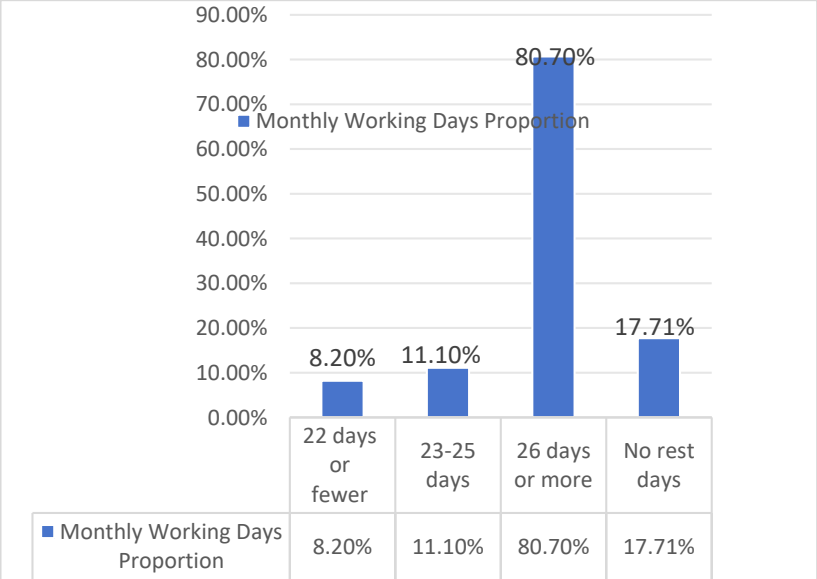

Figure 2 Proportion of Monthly Working Days of Dedicated Delivery Riders

First, we should analyze the average daily working hours of dedicated delivery riders. Among the 136 judicial cases involving disputes over the right to rest of dedicated delivery riders investigated by the author, 21 case samples had facts found by the court that included the average daily working hours of dedicated delivery riders; 21 dedicated delivery riders and 6 stations of

dedicated delivery riders interviewed in depth all had questions about the average daily working hours of dedicated delivery riders in the interviews, with 27 valid response samples; the total number of valid samples was 48. According to statistics, as shown in the left panel of Figure 1, the proportion of dedicated delivery riders with an average daily working hour of more than 8 hours is as high as 83.3%, and the proportion with more than 12 hours is as high as 33.3%.

Second, we should analyze the monthly working days of dedicated delivery riders. Among the 136 judicial cases involving disputes over the right to rest of dedicated delivery riders investigated by the author, 4 case samples had facts found by the court that included the monthly working days of dedicated delivery riders; 21 dedicated delivery riders and 6 stations of dedicated delivery riders interviewed in depth all had questions about the monthly working days of dedicated delivery riders in the interviews, with 27 valid response samples; the total number of valid samples was 31. According to statistics, as shown in Figure 2, the proportion of dedicated delivery riders with an average monthly working days of 26 days and above is as high as 80.7%. In addition, 17.71% of dedicated delivery riders said they had no rest days throughout the month.

From the perspective of empirical research data, the actual working hours of dedicated delivery riders are generally too long, and there are many cases of excessively long working hours (average daily working hours exceeding 12 hours). At the practical level, the working hours of dedicated delivery riders as laborers contradict the working hour system stipulated in Article 36 of the Labor Law of the People's Republic of China (hereinafter referred to as the Labor Law), which states that the state implements a working hour system in which laborers work no more than 8 hours a day and an average of no more than 44 hours a week. The right to rest of dedicated delivery riders has not been effectively protected.

2.1.2 Court Denials of Overtime Pay Claims in Rest Right Disputes

In the 136 judicial cases of dedicated delivery riders' rest - right disputes investigated by the author, the sample size involving overtime - pay claims is 129 cases. Among them, the sample size of overtime - pay claims not supported by the court is 118 cases. The reasons for non - support include the application of non - fixed working - hour system with the employer (so overtime pay is not applicable), commission and bonus being recognized as overtime pay, no evidence to prove the fact of overtime, etc. For brevity, it is shown in Table 1.

Among the reasons why the court did not support the overtime pay of dedicated delivery riders, the average proportion of cases where riders have no evidence to prove the overtime fact is 33.95%, which has exceeded 1/3. Difficulty in providing evidence is an important obstacle for dedicated delivery riders to safeguard their own rest rights and interests.

2.2 Platform Algorithmic Management Models and Resulting Dilemmas

As described in the previous data analysis, excessive working hours and difficulty in providing evidence during disputes are significant obstacles to the protection of the rest rights of dedicated delivery riders. Among them, excessive working hours directly lead to the loss of due labor rest time for dedicated delivery riders.

Through research, the author has found that the platform’s algorithmic management model is an important cause of the excessive working hours and difficulty in providing evidence during disputes for dedicated delivery riders. The specific algorithmic management model of the food - delivery platform and the mechanism by which it causes dilemmas in the protection of rest rights for dedicated delivery riders, such as excessive working hours and difficulty in providing evidence

during disputes, are elaborated in detail as follows:

2.2.1 Platform Algorithmic Management Models

Through in-depth interviews with dedicated delivery riders and their stations, the author has summarized and analyzed the following algorithmic management models employed by platforms for dedicated delivery riders.

The so - called algorithmic management model of food - delivery platforms refers to a series of operations through which food - delivery platforms manage the labor process of delivery staff by means of algorithmic tools. It is a new mode of digital labor management, a kind of “generative management”. The distribution management rules of food - delivery platforms are generated through the continuous interaction and negotiation between background algorithms and the front - line meal - delivery labor.[1] Notably, the author has found in the investigation that in the algorithmic management model of food - delivery platforms, apart from food - delivery platforms and food - delivery riders, a third - party organization, namely the food - delivery station, also plays an important role.

1) Algorithmic Order-Dispatching Mechanism

The algorithm-based order dispatch mechanism is inseparable from the connections among platforms, food-delivery stations, and dedicated delivery riders. Formally, the relationship between platforms and stations is a franchise model, while dedicated delivery riders are generally hired and managed by stations. The investigation reveals that the delivery operations of stations are managed through direct regional division by the platform: the platform assigns the order delivery tasks of different commercial districts and regions to different stations, thereby achieving full coverage of delivery operations in an entire administrative region or area to ensure the completion of platform delivery services. Since consumers place orders through platform software and matching delivery riders requires timeliness, the order-receiving platform for dedicated delivery riders across different stations is unified. During an in-depth interview with the manager of a Meituan delivery station in Chengdu, when asked about the relationship between the station and the platform, the manager explicitly stated: "The station and the platform have a cooperative partnership, a franchise model. Orders are dispatched by the platform's system, not directly by the station. There is a dedicated app for receiving and delivering orders. Our station is responsible for delivering orders in these nearby commercial districts."

The algorithm-based dispatch mechanism monitors and evaluates dedicated delivery riders' order delivery performance, thereby determining the riders' subsequent order priority. Higher order priority translates to higher income. The entire process of riders delivering orders is monitored by platform algorithms, including their delivery routes, time spent, customer evaluations, and the number of orders delivered per unit time. After analyzing and evaluating this data, the platform algorithm assigns different star ratings to riders: higher ratings lead to higher order priority and corresponding subsidies, while lower ratings result in the opposite—no subsidies and reduced order priority. During in-depth interviews with multiple dedicated delivery riders, when asked about changes in the order-receiving software during delivery, responses included: "The phone shows how long I've been delivering and how far I am from the destination," and "Customers can see my location, and whenever they check on their phones, I get a prompt saying they care about the delivery progress." When asked about the role of star ratings, responses included: "The higher the star rating, the more lucrative orders are assigned to me first," and "When I run more and faster, I get more orders."

Therefore, the platform's algorithm-based order dispatch mechanism can be summarized as

follows: First, the algorithm determines the region to which an order belongs by analyzing order information, thereby identifying the station responsible for the order. Second, since riders' platform profiles include their affiliated station, the platform directly assigns orders to the dedicated riders managed by the responsible station for delivery. The dispatch mechanism involves both station information and direct rider assignment by the platform. Third, through monitoring, the algorithm summarizes and analyzes feedback on riders' delivery performance (e.g., delivery time, service evaluations) to determine the quantity and quality of orders the rider will receive subsequently.

2）Algorithmic Incentive Mechanism

The investigation reveals that food-delivery platforms have algorithm-based reward mechanisms. Specifically, by accumulating the monthly number of orders delivered by dedicated riders, the total order volume is divided into different tiers. As the order quantity tier increases from low to high, the delivery fee per order gradually rises. Under the influence of the platform's algorithmic reward mechanism, each station implements specific operational mechanisms with varying details based on this framework. As it is shown in Figure 3. During an in-depth interview at an Eleme offline station in Xuzhou, Jiangsu Province, the manager explicitly stated: "For riders delivering within 500 orders monthly, the unit price is RMB 4.7 per order. When the volume increases to 800 orders, the unit price for orders between 500 and 800 rises to RMB 4.9 per order, and so on—the higher the order volume, the higher the unit price for subsequent tiers."

Additionally, other reward mechanisms exist, such as night delivery bonuses, long-distance delivery bonuses, and severe weather delivery bonuses. These are additional incentives, added to the unit prices of the aforementioned tiers to form part of the riders' income.

Figure 3 A certain Eleme station's tiered - pricing rules

3）Algorithmic Indirect Management of Stations

The algorithm-based indirect management mechanism of dedicated delivery stations refers to the mechanism through which platforms achieve indirect management of dedicated delivery riders by managing dedicated delivery stations via algorithms, specifically through algorithmic performance evaluation and resource allocation mechanisms. Since the profits of dedicated delivery stations cooperating with the platform originate from the platform, and the platform can use algorithms to directly record data on the labor process of dedicated riders and evaluate it, thereby obtaining overall evaluations of different third-party units, the platform can establish performance evaluation and resource allocation mechanisms through algorithms.

Specifically, this mechanism means that the platform sets performance evaluation criteria through algorithms, evaluates the work of dedicated delivery stations, and decides whether to

continue providing relevant stations with sufficient data resources based on these evaluations. To obtain sufficient data resources for profitability, dedicated delivery stations will manage dedicated riders. During an in-depth interview with the manager of a station in Chengdu, when asked about the impact of riders' delivery performance on the station, the station manager explicitly stated: "We have a 'delivery red line.' If we reach this red line, the number of orders decreases, and profits decline. Therefore, we must manage the riders." To avoid such situations, stations adopt different measures. According to riders' feedback, specific measures include "deductions for receiving negative reviews" and "dismissal for long-term failure to correct mistakes."

2.2.2 "Self-Exploitation" Caused by Algorithmic Management

Under the platform's algorithmic control, algorithmic incentive mechanisms and data-driven order dispatch mechanisms create a scenario where dedicated delivery riders can only gain algorithmic recognition and obtain orders with higher priority to increase income by continuously completing dispatched orders with high quality and achieving high algorithmic evaluations. As a result, dedicated riders often engage in "self-exploitation" by sacrificing labor rights, with the typical exploitative tactic being the trade-off of rest rights for more order-receiving opportunities and order commissions. The Guidelines on Implementing the Responsibilities of Online Catering Platforms and Effectively Protecting the Rights and Interests of Food Delivery Workers issued by the State Administration for Market Regulation and six other departments proposes the concept of the "strictest algorithm." [2] The current platform incentive and order dispatch mechanisms have indeed constituted "strictest algorithm" control over dedicated riders, maintaining their continuous exposure to long working hours through the instability of invisible competition and "excessive labor."

2.2.3 "Algorithmic Black Box" Leading to Proof Burdens

In the platform economy, the "algorithmic black box" manifests as platforms firmly holding pricing power and discursive authority, often withholding details such as specific algorithmic rules, operational principles, and decision-making processes under the pretext of trade secrets. Laborers find it extremely difficult to obtain clear information about the scoring rules of algorithmic systems and the weighting of various indicators.[3]

For dedicated delivery riders, the "algorithmic black box" is a key factor leading to their difficulty in providing evidence during rest-right disputes and accessing judicial redress for their rest rights. Characterized by significant opacity, closure, and complexity, the algorithmic black box makes it nearly impossible for riders to understand how algorithms operate, creating severe information asymmetry in labor disputes. Riders cannot comprehend why they are assigned excessive orders or penalized, and platforms can selectively preserve data through technical means—for example, recording only riders' "online order-receiving time" while ignoring actual waiting or movement time, resulting in incomplete calculation of working hours. In litigation, under the principle of "the burden of proof lies with the claimant," riders are required to provide evidence of excessive working hours. Even under China's relevant judicial interpretations[4], which stipulate that if laborers can provide prima facie evidence, employers bear the burden of rebuttal, and if employers refuse to provide relevant evidence, the court may presume the laborers' claims to be valid, dedicated riders still struggle to provide even preliminary evidence due to the algorithmic black box.

3. Solutions to Dilemmas in Realizing Rest Rights

3.1 Constructing a "Counter-Algorithm" Protection Mechanism

The fundamental reason why the platform's algorithm-based reward and order dispatch mechanisms lead to riders' "self-exploitation" lies in their nature as negative incentives—that is, the very motivation for riders' work is achieved at the expense of rest rights. Food delivery labor in the platform economy is a form of "transitional labor" characterized by a "surplus of labor subjects," meaning that for platforms, it does not matter who completes the delivery tasks, only that they are completed. In the pursuit of delivery efficiency and high profits, platforms use algorithms to tie the volume of delivery orders to income, thereby tying dedicated riders' earnings to the sacrifice of their rest rights.

Precisely because this mechanism in the platform economy ignores laborers' rest rights, it is necessary to control such negative incentive mechanisms. Building on the platform's existing incentive and optimal dispatch systems, we should design a counter-algorithm rights protection mechanism by adjusting evaluation criteria to break the tie between incentives and the sacrifice of rest rights, and effectively safeguard laborers' right to rest. The specific design of the "counter-algorithm" protection mechanism is shown in the Figure 4.

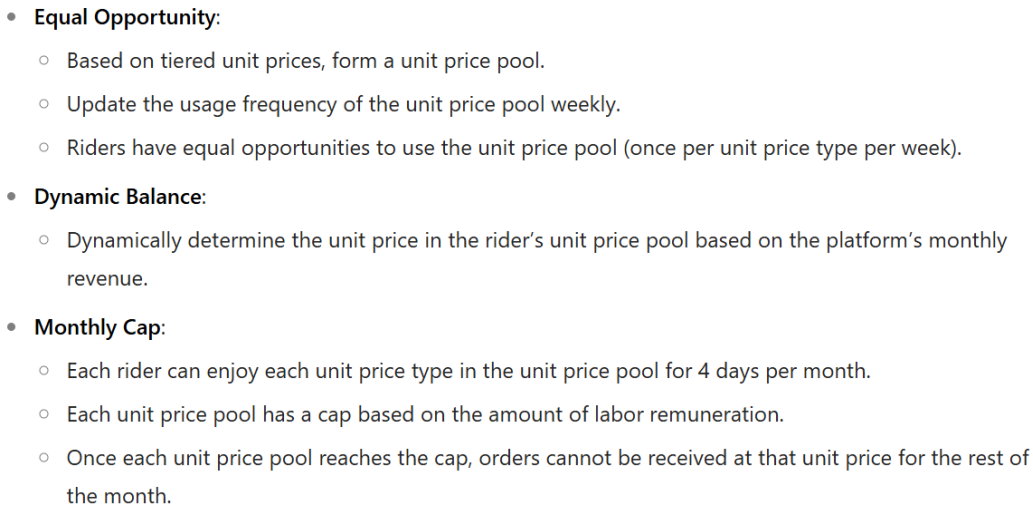

Figure 4 Model Diagram of the “Counter - Algorithm” Protection Mechanism

We should transform the past negative incentive mechanism—where "more labor leads to better resources and higher commissions," with order volume as the evaluation criterion—into a new mechanism based on "equal opportunity, dynamic balance, and monthly caps," using total labor remuneration as the evaluation standard. Specifically, while dynamically adjusting platform order dispatch, this mechanism would:

Take the full set of tiered unit prices as a group;

Grant each laborer equal order-receiving opportunities with different daily commission rates on a weekly basis;

Set remuneration caps for all tiered unit prices except the minimum (which remains uncapped).

This would achieve positive adjustment of the incentive mechanism, truly returning labor autonomy to each worker and shifting from "algorithmic control" to "control over algorithms."

Under the counter-algorithm rights protection mechanism, laborers can freely choose working days with different unit prices and independently determine daily working hours within the adjusted remuneration caps. This fully unleashes laborers' positive initiative, safeguarding their right to rest while achieving substantial fairness in platform data capital dispatch and ensuring dynamic balance of remuneration for all workers.

3.2 Requiring Platforms to Disclose Algorithmic Decision Dimensions and Weights

To address the dilemma of dedicated delivery riders' difficulty in safeguarding their rest rights due to the platform's "algorithmic black box," the immediate cause lies in the information asymmetry arising from the black box, which makes it difficult for riders to obtain preliminary evidence proving relevant facts. The fundamental cause, however, stems from the derivative challenges posed by platform "algorithmic power" [5] to laborers' rights. Digital platforms can leverage advanced algorithmic technologies to achieve innovation and optimization, recording riders' labor data while selectively disclosing information to them. This technological advantage not only serves as a critical foundation for platform decision-making but also gradually evolves into an intangible "power" that, while shaping information flow, resource allocation, and opportunity access, demonstrates strong control over riders. As a result, riders' inherent right to know and record their labor processes is challenged.

Therefore, the most straightforward and effective approach to addressing the "algorithmic black box" is to require platforms to disclose algorithmic decision-making dimensions and weightings, dismantling the "power" formed through algorithmic technologies and enabling laborers to obtain the right to a comprehensive understanding of their labor processes.

Specifically, building on the Personal Information Protection Law and the Regulations on the Administration of Algorithm Recommendations for Internet Information Services, requirements should be further refined to mandate that food-delivery platforms publicly disclose—or disclose to delivery riders—algorithmic dimensions directly related to laborers' rights, such as working hours, order dispatch logic, and reward-penalty rules. Meanwhile, the weightings of different algorithmic dimensions that lead to algorithmic outcomes should be made public, allowing laborers to clarify the calculation methods for their various labor conditions, identify information gaps, and negotiate with platforms/stations or seek judicial redress based on clear evidence.

4. Conclusion

In the era of the digital economy, the protection of rest rights for dedicated food delivery riders, as a typical representative of workers in new employment forms, has become a focal issue in the field of labor rights. Through empirical research, this paper reveals the intrinsic link between the platform's algorithmic management model and the dilemmas in safeguarding riders' rest rights: algorithmic order dispatch and incentive mechanisms force riders into a cycle of "self-exploitation," while the "algorithmic black box" exacerbates laborers' evidentiary difficulties in rights protection.

To address the above issues, this paper proposes a dual-track approach of constructing a "counter-algorithm" protection mechanism and promoting algorithmic transparency. The aim is to break the one-way control of platform algorithms through institutional restructuring and technological empowerment, returning labor autonomy to riders. This approach not only responds to the oppression of laborers by "strictest algorithms" but also provides a feasible solution for balancing platform efficiency and humanistic care. In the future, with the improvement of algorithm governance frameworks and the strengthening of social supervision, translating theory into practice

and ensuring policy implementation will require collaborative exploration among academia, governments, and platforms.

Protecting the rest rights of food delivery riders is not only an inevitable requirement for upholding laborers' dignity but also a cornerstone for promoting the healthy development of new employment forms. Only by adhering to a human-centered stance amid technological progress can we truly achieve symbiotic win-win outcomes between the digital economy and labor rights.

Acknowledgement

Fund Project: Southwest Minzu University College Students' Innovation and Entrepreneurship Training Program (202510656005)

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Table 1 The proportion of data on the reasons why courts did not support workers' overtime pay claims in the sample cases.

Classification Standard Data Type		Daily Work Time Extension		Weekend Rest		Legal Holidays		Paid Annual Leave		Average Proportion
		Quantity	Percentage	Quantity	Percentage	Quantity	Percentage	Quantity	Percentage	
Non - fixed Working Hour System	Not Applicable for Overtime Pay	26	22.03%	23	32.39%	27	34.18%	6	20.00%	27.15%
	Approval Flaws but Still Applicable for Non - fixed Working Hour System	1	0.85%	1	1.41%	1	1.27%			0.88%
Employer Has Fulfilled Obligations	Has Informed No Overtime Pay	8	6.78%	2	2.82%	2	2.53%			3.03%
	Has Paid Fixed Overtime Pay	1	0.85%					3	10.00%	2.71%
	Commission Recognized as Overtime Pay	15	12.71%	10	14.08%	12	15.19%			10.49%
	Bonus Recognized as Overtime Pay	9	7.63%							1.90%
	Has Fully Paid Overtime Pay	5	4.24%							1.06%
No Labor Relationship, Not Applicable for Overtime Pay		18	15.25%	14	19.72%	16	20.25%	1	3.33%	14.63%
No Evidence to Prove Overtime Fact		35	29.66%	21	29.58%	21	26.58%	15	50.00%	33.95%
Not Accepted Without Arbitration								1	3.33%	
Employee Does Not Enjoy Paid Annual Leave								4	13.33%	