Research on the Survival Condition of Workers in Platform Digital Economy-Take the Delivery Rider and the Live-streaming Sales Practitioner as an Example

Lantiancheng Zhang, Ran Tao
Xinhang Experimental Foreign Language School, Jinan, Shandong, China

Abstract: The rise of platform-based digital economy has reshaped traditional employment patterns, with food delivery riders and live-streaming e-commerce practitioners emerging as typical representatives of platform labor groups[1]. Their living conditions reflect the challenges in labor governance within platform economy development. This study focuses on two groups in Jinan City, employing literature review, semi-structured interviews, questionnaire surveys, and content analysis to compare their living conditions across four dimensions: labor processes, control mechanisms, rights protection, and survival strategies[2]. Findings reveal that both groups face common issues such as ambiguous labor relations, inadequate rights protection, and income instability. However, due to differences in labor nature, food delivery riders are subject to rigid algorithmic control in logistics operations, exhibiting high-intensity and high-risk characteristics, while live-streaming e-commerce practitioners are influenced by flexible traffic algorithms, demonstrating significant emotional consumption and strong occupational uncertainty[3]. Based on these findings, the study proposes categorized governance approaches from four perspectives: government, platforms, industries, and workers, providing references for improving the rights protection system for platform laborers[4].

Keywords: Platform Economy; Food Delivery Riders; Live-Streaming Sales; Algorithmic Control; Emotional Labor

1. Introduction

1.1 Research Background

The deep integration of digital technologies has propelled the platform-based digital economy to become a new engine for China's economic development[13]. New employment models leveraging internet platforms continue to emerge, creating tens of millions of job opportunities. As core components of platform labor, food delivery riders and live-streaming e-commerce practitioners represent typical forms of labor in logistics services and content-based e-commerce platforms, respectively. However, the "de-employerization" and "flexibilization" characteristics of platform economies have blurred the boundaries of traditional labor relations, exposing workers to new challenges in labor protection, working conditions, and career development[5]. Food delivery riders navigate between urban streets and algorithmic rules, enduring intense time pressure and high safety risks. Meanwhile, live-streaming e-commerce practitioners chase traffic and profits in virtual spaces, facing dilemmas like emotional exhaustion from excessive work and drastic income fluctuations[10].

As the capital of Shandong Province, Jinan has demonstrated robust growth in its platform-based digital economy[14]. The food delivery and e-commerce livestreaming sectors have expanded significantly year after year, with both groups experiencing substantial growth. Their living conditions align closely with the characteristics of Jinan's platform economy development, presenting distinct local research value. Against this backdrop, studying these two groups in Jinan to thoroughly analyze workers' living conditions under the platform economy is not only essential for addressing practical issues in platform labor governance but also a necessary requirement for promoting high-quality development of the platform economy[6].

1.2 Research Significance

Theoretical Significance

Current research predominantly focuses on workers within single-platform systems, yet

lacks systematic comparative studies between food delivery riders governed by algorithmic control and live-streaming sales practitioners regulated by traffic algorithms[7]. This paper establishes a dual-dimensional analytical framework of "algorithmic control and emotional labor", conducting comparative analyses of the working processes and living conditions of these two groups[8]. The study reveals both commonalities and differences in capital control logic under platform economies across different labor forms, thereby filling the gap in comparative research on platform-based workers[17].

Practical Significance

This study, conducted in Jinan City, collects authentic survival data from two distinct groups through field research, providing a precise portrayal of the living challenges and practical demands faced by platform workers in localized environments[14]. The findings offer empirical evidence for improving labor rights protection policies for platform workers in Jinan and Shandong Province, while also providing practical guidance for relevant government departments in formulating labor governance policies for the platform economy[16].

1.3 Current Research Status at Home and Abroad

1.3.1 Current status of international research

Research on platform economy and workers abroad mainly focuses on three dimensions:

The first aspect involves a macro-level analysis of platform-based employment models. Sundararajan (2016) systematically examined the characteristics of the sharing economy, highlighting how platform economies have catalyzed the rise of the gig economy and transformed traditional labor relations and employment structures[1]. Subsequent research further revealed that while platforms utilize digital technologies to match labor supply and demand, this innovative employment model inherently lacks safeguards for workers' rights[4].

The second aspect involves the micro-level dissection of algorithmic control mechanisms. Rosenblat & Stark (2016), through their study of ride-hailing platforms, pioneered the concept of "algorithmic governance", demonstrating how platforms employ algorithms to exert precise control over workers, resulting in severe information asymmetry[2]. Wood et al. (2019) further revealed that algorithmic control operates with a "phantom-like" opacity, making it difficult for workers to identify the rule-makers or engage in meaningful negotiations[3].

The third aspect involves institutional frameworks for safeguarding workers' rights. De Stefano (2016) highlighted that platform economy workers face systemic challenges including inadequate social security and unfair compensation due to ambiguous labor relationship recognition[4]. Lehdonvirtas (2018) cross-border research further underscores that developing a labor protection system compatible with the platform economy has become a shared challenge for nations worldwide[5].

Overall, foreign research provides abundant theoretical resources for understanding platform labor, but most studies focus on foreign platforms such as Uber and TaskRabbit, with insufficient attention paid to food delivery platforms and live streaming platforms in the context of China[15].

1.3.2 Domestic research status

Domestic research has focused on the specific living conditions and governance approaches of workers in the platform economy, with the scope of study gradually expanding from food delivery riders to live-streaming e-commerce practitioners, ride-hailing drivers, and other groups[9].

In the field of labor control mechanisms, Chen Long (2020) introduced the concept of "digital control", which precisely describes how platforms use data and algorithms to systematically regulate food delivery riders, exposing the institutional roots of their "trapped in the system" phenomenon[6]. Sun Ping (2019) analyzed the digital labor processes of food delivery workers from the perspective of "algorithmic logic", demonstrating how algorithms reshape the temporal and spatial dimensions of labor[7]. Wu Qingjun and Li Zhen (2018) conducted a mixed-method study of ride-hailing drivers, revealing the complex interplay between labor control and work autonomy in the sharing economy[8].

In examining workers' living conditions, scholars have conducted in-depth field research on food delivery riders' work intensity, safety risks, and rights violations. With the rise of live-streaming commerce, researchers have begun to focus on the emotional labor characteristics and survival challenges faced by this emerging workforce[10]. Wang Tianyu

(2018) analyzed the legal recognition of labor relations in internet platform employment, providing an institutional framework to understand the rights protection dilemmas of platform workers[9].

In terms of labor governance approaches, researchers suggest improving the employment quality and rights protection system for platform gig workers at the policy level, and exploring labor protection system designs that adapt to the characteristics of the platform economy[12].

1.3.3 Review of the study

In conclusion, domestic and international research has established a solid theoretical foundation for this study[15]. Existing studies have systematically analyzed platform economies, labor control mechanisms, and workers' living conditions at macro, meso, and micro levels[3]. However, several research gaps remain: First, there is a lack of systematic comparative studies on different types of platform workers, failing to fully reveal the differences in capital control logic between logistics service and content e-commerce labor forms[7]. Second, localized empirical research needs further development, as field survey data on platform workers in specific regions are relatively scarce[16]. This study focuses on Jinan City as the research area, conducting a comparative analysis between food delivery riders and live-streaming e-commerce practitioners, aiming to fill these gaps[14].

1.4 Research Content and Methods

Research Focus

This study examines the living conditions of food delivery riders and live-streaming e-commerce practitioners in the platform-based digital economy[13]. Key components include: defining core concepts such as platform economy, algorithmic control, and emotional labor[17]; establishing a dual-dimensional analytical framework of "algorithmic control-emotional labor"[8]; conducting field research to characterize the demographic characteristics and living conditions of these two groups in Jinan City[14]; comparing their commonalities and differences across four dimensions: labor processes, control mechanisms, rights protection, and survival strategies[2]; analyzing the root causes of their survival challenges[5]; and proposing categorized governance approaches[4].

Research Methodology

This study employs a hybrid research strategy that integrates qualitative and quantitative approaches[3]. The literature review method systematically examines domestic and international research findings to establish a theoretical framework[1]. Semi-structured interviews with 12 food delivery riders and 12 live-streaming e-commerce practitioners in Jinan City reveal their underlying survival challenges[14]. A quantitative analysis is conducted through 200 questionnaires (182 valid responses) collected via questionnaire surveys[2]. Content analysis systematically examines secondary sources such as in-depth media reports and judicial documents to supplement primary data[9].

1.5 Technical Approach and Innovations

The technical route: This paper follows the logical line of "theoretical construction, empirical investigation, data analysis, comparative study and countermeasure derivation", and carries out the research in five stages[6].

Key innovations of the study: First, an innovative research perspective by establishing a dual-dimensional analytical framework of "algorithmic control-emotional labor", comparing two groups to reveal differences in capital control logic across various labor forms in platform economies[17]. Second, localized research subjects through fieldwork in Jinan City to obtain indigenous empirical data[14]. Third, integrated research methods combining qualitative interviews with quantitative questionnaires for mutual validation, ensuring the scientific validity of conclusions[3].

2. Core Concepts and Theoretical Foundations

2.1 Definition of Core Concepts

Platform-based digital economy

A new economic form that utilizes digital knowledge and information as key production factors, modern information networks as important carriers, and internet platforms for resource allocation and value creation[13]. Its core characteristics are data-driven, platform-supported, and network-coordinated[1].

Platform workers

A new employment category that provides labor services and earns compensation through internet platforms[5]. The study focuses on two

typical representatives: food delivery riders and live-streaming e-commerce practitioners. The former deliver meals via food delivery platforms, falling under the logistics service category, while the latter promote products through live-streaming platforms, categorized as content-based e-commerce[10].

Algorithmic Control

A novel labor management approach where platform companies utilize data collection, analysis, and algorithmic models to plan, monitor, evaluate, and incentivize or penalize workers' labor processes[2]. In this study, food delivery riders face algorithmic control in logistics, focusing on delivery efficiency, route planning, and order allocation; live-streaming e-commerce practitioners encounter algorithmic control in traffic management, emphasizing real-time recommendations, audience distribution, and fan profiling[7].

Emotional labor

A form of labor where workers manage, express, and perform their emotions according to specific rules during the work process to meet job requirements[10]. Live-streaming sales practitioners are a typical group of emotional laborers, who create value through emotional performances, empathetic interactions, and fan engagement, while simultaneously enduring significant emotional consumption[11].

2.2 Theoretical Basis

The Theory of Labor Alienation

Marx posited that under capitalist production relations, workers become alienated from their products, processes, and fellow workers. In the platform economy, algorithmic control has emerged as a new form of capital domination, further intensifying worker alienation: food delivery riders are algorithmically conditioned into mere delivery tools, while live-streaming professionals are manipulated by traffic metrics, performing emotional acts to conform to algorithmic demands, thereby alienating their authentic emotions[17].

Platform capitalism theory

Srnicek argues that platforms have become the new core of capitalist accumulation[15]. By constructing digital ecosystems, platform companies monopolize data, labor, and markets[1]. Through collecting massive data to build algorithmic models, they achieve precise control over labor processes and maximize value extraction, thereby revealing the fundamental nature of the interest relationship between platform companies and workers[3].

The Theory of Emotional Labor

Hochschild categorized emotional labor into surface performance and deep performance, highlighting that emotional management leads to psychological exhaustion and stress[10]. Subsequent studies applied this theory to live-streaming commerce research, revealing that the emotional labor of live-streaming practitioners exhibits commercialization, normalization, and high-intensity characteristics, with excessive emotional consumption becoming their primary survival challenge[11].

3. Empirical Research on the Living Conditions of Platform Workers in Jinan City

3.1 Overview of the Survey Subjects

This survey was conducted in core urban districts of Jinan City, including Lixia District, Shizhong District, Huaiyin District, and Licheng District, with a total of 182 valid samples collected[14].

Sample of food delivery riders (92 individuals): All were riders on Meituan and Ele.me platforms, including 42 dedicated delivery riders and 50 crowdsourced riders. The sample comprised 86 males and 6 females, with ages predominantly concentrated between 20–45 years (92.4%). Employment duration distribution was as follows: <3 months (21.7%), 3–1 year (38.0%), 1–3 years (26.1%), and ≥3 years (14.2%)[6].

Sample of live-streaming e-commerce practitioners (90 individuals): covering platforms such as TikTok, Kuaishou, and Taobao, with 38 full-time streamers and 52 part-time streamers; 35 males and 55 females; the age range is concentrated between 22 and 38 years old (88.9%); those with less than 6 months of experience account for 26.7%,6 months to 1 year for 35.6%, 1 to 3 years for 24.4%, and over 3 years for 13.3%; live-streaming categories include local specialty products, cosmetics, clothing, etc[11].

3.2 Analysis of the Living Conditions of Food Delivery Riders in Jinan City

3.2.1 High work intensity with significant algorithm time pressure

The workload of food delivery riders is strictly regulated by algorithms[7]. Research indicates that 45.7% of riders work 8-10 hours daily, 34.8% exceed 10 hours, and only 19.5% work

fewer than 8 hours. On average, 51.1% handle 30-50 orders per day, while 22.8% manage over 50. By precisely calculating delivery times, the algorithm imposes stringent deadlines, with delivery windows being continually shortened[6]. A three-year veteran rider remarked:

The delivery time provided by the platform is becoming increasingly shorter, while merchants take longer to prepare meals and face traffic congestion, ultimately resulting in riders bearing the responsibility for delays. A delayed order incurs a fine of 3-5 yuan, and negative reviews result in a 10-yuan penalty, with appeals being largely ineffective. To avoid delays, running red lights and riding against traffic have become commonplace. Which rider in this industry has never encountered minor accidents?

3.2.2 High safety risks with lack of labor protection measures

Jinan's complex road network with numerous mountainous routes and narrow streets in the old urban area poses significant safety risks for food delivery riders[14]. Statistics show 82.6% of riders have experienced minor traffic accidents, while 13.0% have been involved in more severe incidents[6]. However, critical gaps exist in rider protection: while professional delivery riders are legally employed by companies, their social insurance contributions remain irregular. Crowdsourced riders, on the other hand, lack formal contracts or social security benefits, leaving them to bear the consequences of accidents alone[4]. One crowdsourced rider candidly admitted:

"Crowdsourcing means the more you work, the more you earn. The platform claims we are in a partnership and not employees. In the event of an accident, the platform states it bears no responsibility, and even a work-related injury claim cannot be filed, leaving the employee to bear the consequences alone."

3.2.3 Income polarization and unreasonable compensation structure

Riders with monthly incomes of 4,000– 6,000 yuan account for 47.8%, those earning 6,000–8,000 yuan make up 26.1%, while those below 4,000 yuan represent 17.4% and those above 8,000 yuan constitute 8.7%[6]. The compensation structure is imbalanced, with low base rates and heavy reliance on order-boosting incentives and long-distance subsidies[12]. However, the high threshold for order-boosting rewards and uneven distribution of long-distance orders exacerbate the issue. Additionally, riders face penalties ranging from a few to dozens of yuan for overtime, negative reviews, or order rejections, further squeezing their income margins[3].

3.2.4 Ambiguous labor relations and inadequate protection of rights and interests

The platform adopts a "platform + delivery company + rider" employment model, transferring labor relations to delivery companies to avoid employer liability[5]. Dedicated delivery riders sign labor contracts with delivery companies, but the contracts are often non-standard, with issues like unpaid overtime and low social security contribution bases[9]. Crowdsourced riders, on the other hand, have only a partnership without any labor protections. Research shows that only 23.9% of riders are covered by work injury insurance, and just 8.7% are covered by pension insurance[4].

3.3 Analysis of the Living Conditions of Live Streaming E-commerce Practitioners in Jinan City

3.3.1 Irregular working hours and high emotional labor consumption

Industry professionals spend 42.2% of their time on 4-6 hour daily live streams, 31.1% on 6-8 hour sessions, and 17.8% on over 8-hour broadcasts[11]. Most practitioners must meticulously select products and rehearse before live streams, while also managing fan engagement and order processing afterward-resulting in actual working hours far exceeding their broadcast durations[10]. More critically, they endure significant emotional labor: maintaining enthusiasm and positive emotions during live streams, engaging in frequent audience interactions, and even putting on a front when feeling down[10]. As one full-time beauty streamer noted:

During live streaming, you must speak with a smile, no matter how annoyed or exhausted you feel. The moment the camera is turned on, you should radiate energy. After the broadcast, you may feel as if your entire being has been drained, with no desire to speak a word. Over time, you may perceive yourself as two entirely different individuals in front of the camera and in real life.

3.3.2 Revenue volatility, with traffic algorithms dominating earnings

The industry shows a striking income distribution: 37.8% earn 3,000-5,000 yuan monthly, 26.7% between 5,000-10,000 yuan, 22.2% below 3,000 yuan, and 13.3% above

10,000 yuan[11]. New and mid-tier streamers face severe traffic challenges as platforms favor top performers through algorithmic bias, leaving newcomers with low exposure and meager earnings[7]. Meanwhile, top streamers achieve rapid growth by leveraging traffic advantages, exacerbating the industry's severe income polarization[12]. A new streamer with six months of experience lamented:

When I first started live streaming, the studio only had a dozen or so viewers at most. My monthly income barely covered the rent. Traffic was all about luck-when the platform promoted me, the audience grew; without promotion, I'd go hours without viewers. They say live streaming makes money, but that's for top-tier streamers. We small and medium-sized streamers are just the ones who keep running the show.

3.3.3 Uncertainty in career development and intense industry competition

Jinan's live-streaming commerce sector remains in its developmental phase, with local MCN agencies underdeveloped and most practitioners operating as self-employed individuals without professional support[14]. A staggering 68.9% of practitioners report career uncertainty, while only 31.1% have clear career plans[11]. The industry's cutthroat competition and low entry barriers have attracted a flood of newcomers, forcing practitioners to constantly refresh content and hone skills to stay competitive[10]. One practitioner lamented: "The live-streaming industry evolves at lightning speed. What's trendy today could be outdated next week. You're constantly learning new tricks, and even a moment's inattention means being left behind. The pressure is overwhelming."

3.3.4 Lack of rights protection, prominent intellectual property risks

Most practitioners and platforms maintain collaborative relationships, with ambiguous labor law recognition and severe lack of rights protection[9]. Only 15.6% of practitioners have signed labor contracts with MCN agencies or platforms, while most individual practitioners face no social security, enduring issues like unpaid overtime and delayed income[11]. They also confront prominent intellectual property risks: frequent occurrences of content plagiarism, unauthorized product link usage, and trademark infringement, compounded by a lack of legal expertise and complaint channels[4]. One practitioner lamented, "My painstakingly created live-stream content gets copied and used by others. When I file complaints with the platform, they claim they can't intervene. It's so difficult to protect my rights that I end up accepting the loss."

4. Comparative Analysis of Living Conditions Between Food Delivery Riders and Live-Streaming E-commerce Practitioners

4.1 Common Characteristics: The Shared Dilemma of Workers in the Platform Economy

As a new type of labor group under the platform digital economy, the two groups face many common survival difficulties despite their different labor forms[5].

The first issue stems from ambiguous labor relationship recognition and a lack of rights protection mechanisms. Food delivery riders are legally separated from platforms through the "platform + delivery company" model, while live-streaming professionals primarily maintain partnerships with platforms[9]. This ambiguous legal status leaves both groups without traditional labor law protections, with social insurance participation rates below 25%-a concerning situation for their rights safeguards[4].

Secondly, they are significantly controlled by algorithms, which weakens their labor autonomy[2]. The delivery time, route, and order volume of food delivery riders are determined by logistics algorithms, while the traffic distribution and recommendation positions of live-streaming professionals are decided by traffic algorithms[7]. Both groups are "bound" by algorithms, losing their autonomy in the labor process and becoming "subordinates" to algorithms[3].

Thirdly, the income is unstable and the polarization of the industry is serious[12]. The income of the two groups is directly linked to the algorithm rules of the platform, which is highly unstable. At the same time, the two industries show the "head effect": a few top workers occupy most of the resources and benefits, and the vast majority of ordinary workers have a meager income[1].

Fourth, there is a lack of career development pathways with poor sustainability[6]. The work of food delivery riders is highly repetitive and lacks skill accumulation; live streaming professionals' career development is heavily

dependent on traffic and followers, lacking core professional skills[10]. The industry undergoes rapid turnover, leaving most practitioners facing career confusion[11].

4.2 Differences in Characteristics: Survival Variations Under Different Labor Forms

The two groups represent labor patterns in logistics service platforms and content e-commerce platforms respectively[13]. Due to differences in labor nature and control mechanisms, their living conditions show significant disparities (see Table 1)[8].

Table 1. Comparison of Living Conditions Between Food Delivery Riders and Live-Streaming E-Commerce Professionals

dimension	Food delivery rider	Live-streaming sales professionals
labor leading type	dominated by manual labor	Emotional labor dominance
carrier of labor	Offline physical space	Online virtual space
control mechanism	Rigid Control of Logistics Algorithm	Flexible Control of Traffic Flow Algorithm
control method	Time calculation, path	Traffic allocation,
	planning, and clear rewards and punishments	Recommendation mechanism, implicit rules
main risk	Physical security risks (82.6% oftraffic accidents)	Psychological risk (72.2% of respondents experience psychological stress)+market risk
Work intensity performance	Physical fatigue, exhaustion	Emotional depletion,psychological fatigue
typical dilemma	"Trapped in the system"	"Living in the flow oftraffic"

4.2.1 Labor process: dominance of physical labor vs dominance of emotional labor

The labor process of food delivery riders is characterized primarily by physical exertion, where workers complete delivery tasks through physical movement[6]. The outcomes of this labor can be directly quantified as delivery duration and order volume. The work of riders exhibits standardized, repetitive, and offline features, with the intensity of labor mainly manifested in physical fatigue and consumption[3].

The labor process of live-streaming sales professionals is fundamentally characterized by emotional performance[10]. Through interactive demonstrations of emotional engagement, they accomplish sales objectives. The outcomes of their work are difficult to quantify directly, as they are closely tied to the depth of emotional investment and the level of audience empathy[11]. Their work is marked by personalization, interactivity, and online presence, with the primary intensity lying in emotional expenditure and psychological pressure[2].

4.2.2 Control mechanism: rigid control of logistics algorithms vs flexible control of flow algorithms

Food delivery riders face rigid and coercive algorithmic control in logistics operations[7]. Through precise time calculations and route planning, the algorithm strictly governs their work process, with every step constrained by clear reward-punishment rules (e.g., fines for time overruns or negative reviews)[6]. Riders can only passively comply with algorithmic regulations, or face direct financial penalties. This control mechanism can be summarized as "systemic discipline"[3].

Live-streaming e-commerce practitioners face algorithmic traffic control with flexible and implicit characteristics[2]. The algorithmic rules are ambiguous and volatile, making it impossible for practitioners to precisely grasp algorithmic preferences[7]. They can only adapt by continuously adjusting content and style to align with algorithmic expectations. Algorithmic control primarily operates through traffic allocation, lacking clear reward-punishment mechanisms, and adopting more covert approaches. This control method can be summarized as "traffic traction."[10]

4.2.3 Risk types: dominance of physical security risks vs. psychological and market risks

The primary risk for food delivery riders is physical safety, with 82.6% of riders having experienced traffic accidents[6]. Due to the working environment, riders face a higher risk of traffic accidents during deliveries, and the lack of labor protection measures means they must bear the losses themselves in the event of an accident[4].

The primary risks for live-streaming e-commerce practitioners are psychological and market risks[11]. 72.2% of practitioners reported varying degrees of psychological stress, with prolonged emotional labor leading to anxiety and depression[10]. Additionally, 68.9%

indicated facing industry elimination risks, where market risks such as traffic fluctuations, product stagnation, and industry updates pose significant survival threats[7].

5. Analysis of the Formation Reasons of the Survival Dilemma of Platform Workers

5.1 Institutional Level: Labor Laws and Regulations Lag Behind the Development of Platform Economy

China's current labor laws and regulations, rooted in traditional employer-employee relationships, struggle to adapt to the platform economy's de-employer employment model[9]. The legal status of platform workers remains ambiguous-neither classified as traditional labor relations nor pure civil partnerships-leaving them in a regulatory gray area[4]. Moreover, the social security system has yet to fully cover platform workers, with enrollment methods, contribution bases, and benefit standards remaining unadjusted to their unique circumstances[12]. This systemic gap constitutes the institutional root of their survival challenges[16].

5.2 Platform Level: Algorithmic Control and Responsibility Avoidance Driven by Profit-Seeking Capital

Driven by profit maximization and capital incentives, platform enterprises exploit workers' value through algorithmic control while circumventing employer responsibilities[17]. On one hand, they employ sophisticated algorithms to reduce labor costs and intensify workloads -food delivery platforms shorten delivery times, while live-streaming platforms leverage traffic algorithms to intensify industry competition[3]. On the other hand, through employment models like "platform + third-party companies" and "collaborative partnerships," these platforms sever direct labor ties, shifting labor protection obligations to third parties or workers themselves to evade statutory employer liabilities[5].

5.3 Industry Level: Lack of Industry Standards, Intensified Unregulated Competition

Both the food delivery and live-streaming e-commerce sectors are experiencing rapid growth, yet their regulatory frameworks remain underdeveloped, resulting in rampant disorderly competition[13]. In the food delivery sector, platforms relentlessly cut delivery rates and raise order-fulfillment thresholds to capture market share, squeezing riders' earnings and intensifying their workload[6]. The live-streaming industry, with its low entry barriers, has seen a surge of newcomers, fueling fiercer competition[11]. Meanwhile, the absence of unified standards has led to rampant issues like content plagiarism, false advertising, and intellectual property violations, leaving practitioners' legitimate rights unprotected[10].

5.4 Laborers Level: Group Dispersal, Weak Bargaining Power and Rights Protection Ability

Both groups exhibit dispersed characteristics, lacking effective organizational structures and demonstrating weak bargaining and rights protection capabilities[4]. Delivery riders, working in scattered locations with flexible schedules, struggle to establish effective organizations or engage in equal negotiations with platforms[6]. Live-streaming practitioners, mostly self-employed individuals, are in competitive relationships with each other, making it difficult to form collective efforts[11]. Additionally, both groups generally lack sufficient cultural literacy and legal knowledge, resulting in unclear understanding of their legitimate rights[9]. When facing labor disputes, they often choose to endure silently due to the absence of effective channels for rights protection, which further encourages platform companies to engage in infringement behaviors[5].

6. Collaborative Governance Path for Labor Rights Protection in the Digital Economy Platform

6.1 Government Level: Improve Laws and Regulations, Strengthen the Social Security System

The government should expedite the refinement of labor laws and social security systems tailored to the platform economy[16]. First, it should establish clear criteria for defining labor relations, aligning with the employment patterns of platform economies[9]. This includes clarifying the legal relationship between platform enterprises and workers, ensuring eligible platform workers are protected under labor laws, and defining the employer

responsibilities of platform enterprises[4]. Second, the social security system should be enhanced by introducing flexible enrollment policies for social insurance that accommodate the unique needs of platform workers[12]. This would allow individual participation in pension and medical insurance, while requiring platform enterprises to contribute to workers' work injury and unemployment insurance[5]. Third, market supervision must be strengthened by imposing stricter penalties for infringement by platform enterprises, along with standardizing their algorithmic rules, compensation structures, and penalty systems[3].

6.2 Platform Level: Enhancing Corporate Social Responsibility, Categorizing and Optimizing Algorithms and Employment Models

Platform enterprises should strengthen corporate social responsibility and abandon the profit-driven business philosophy[17]. To address the algorithmic control disparities between two groups, they should implement categorized optimization measures[7].

For food delivery riders, priority should be given to optimizing logistics algorithms-appropriately relaxing delivery hours during off-peak periods, establishing a protection mechanism for adverse weather conditions, and fully considering the riders' traffic safety and physical and mental health in algorithm design[6]; standardizing employment models by ensuring proper social insurance contributions for dedicated delivery riders, and exploring the establishment of more stable protection relationships with crowdsourced riders[4].

For live streaming practitioners, platforms should be encouraged to appropriately disclose the underlying logic of traffic algorithms, establish a "anti-monopoly" mechanism for traffic allocation, provide traffic support to new streamers and small-to-medium streamers, and alleviate industry polarization[11]. Meanwhile, a rapid response mechanism for content infringement should be established to protect the intellectual property rights of practitioners[10].

Common measures: Establish a communication mechanism for workers, build a communication bridge between the platform and workers, and adjust the platform's policies in a timely manner to achieve win-win development for both the platform and workers[2].

6.3 Industry Level: Establishing Industry Standards and Strengthening Self-discipline

Industry organizations should serve as a bridge and link[13]. Firstly, they should establish trade associations to develop unified industry standards, specifying entry requirements, worker rights protection, and competition rules[16]. Secondly, they should enhance self-regulation by urging platform companies to fulfill corporate social responsibilities and issuing industry-wide warnings or penalties for non-compliant enterprises[17]. Thirdly, they should provide professional services to workers, including skills training and legal education to boost their career competitiveness and rights protection capabilities[9]. Additionally, they should establish a labor dispute mediation mechanism to promptly resolve conflicts between workers and platform companies[4].

6.4 Workers Level: Improving Personal Quality and Strengthening Group Organization

Platform workers should enhance their professional competence and strengthen organizational development[12]. Firstly, they should improve their skills by acquiring vocational training and legal knowledge to boost career competitiveness, clarify their legitimate rights, and strengthen rights protection awareness[9]. Secondly, they should strengthen collective organization by establishing a platform workers union through trade unions and industry associations, uniting scattered workers to form a cohesive force for equal negotiation with platform enterprises[5]. Thirdly, they should exercise rational rights protection by seeking legal remedies such as labor arbitration or litigation when their rights are violated, fostering a culture of rational rights protection[4].

7. Conclusion and Outlook

7.1 Research Conclusions

This study takes food delivery riders and live-streaming e-commerce practitioners in Jinan City as the research object, and uses a mixed research method to carry out an in-depth study on the living conditions of platform workers under the background of digital economy[14]. Through the construction of a dual-dimensional analytical framework and empirical investigation and comparison, the study has completed the

core research objectives and obtained targeted research conclusions.

This study confirms that platform laborers represented by the two groups are facing a common survival predicament in the development of the platform economy, and this predicament is a comprehensive result of multiple factors such as institutional lag, platform profit-seeking, industry disorder and laborer weakness[16]. At the same time, the study further clarifies that the labor nature and algorithm control mode are the core factors leading to the differentiation of the living conditions of the two groups, and the two typical survival states of "trapped in the system" and "living in the traffic" are formed accordingly[17].

Based on the above research, the study holds that the protection of platform workers' labor rights and interests cannot adopt a one-size-fits-all governance model[4]. It is necessary to build a multi-subject collaborative governance system with the participation of government, platform, industry and workers, and implement differentiated governance strategies according to the characteristics of different platform labor groups[16]. Only in this way can we effectively solve the survival dilemma of platform workers, improve the rights and interests protection system of platform labor, and realize the healthy and sustainable development of the platform economy[13].

7.2 Research Limitations and Prospects

The study has the following limitations: Firstly, the survey sample size is limited, failing to cover all regional and type of platform workers in Jinan City, which may affect the generalizability of the research conclusions[14]. Secondly, the technical analysis of platform algorithms is insufficient, lacking in-depth exploration of the construction and operation processes of algorithm models[3].

Future research could be advanced through three key approaches: First, expanding survey sample sizes to compare labor conditions across different regions and city sizes, and carrying out cross-regional comparative research to enrich the empirical data of platform labor research[16]. Second, conducting technical analyses of platform algorithms by leveraging big data and AI to decode their underlying control mechanisms, and providing a more scientific basis for the optimization of algorithmic control and the formulation of relevant regulatory policies[17]. Third, tracking the implementation effects of labor governance policies in the platform economy to provide dynamic empirical evidence for policy refinement, and forming a dynamic governance mechanism that adapts to the development of the platform economy[4].

The development of platform economy is an era trend, and safeguarding the legitimate rights and interests of platform workers is an important prerequisite for promoting its healthy and sustainable development[13]. Only by achieving the coordinated advancement of platform economy development and workers' rights protection can the platform economy better serve economic and social development, enabling the majority of platform workers to share the fruits of development[12].

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Due to my limited academic level, there are some omissions and deficiencies in the paper. I sincerely request the teachers and readers to criticize and correct them.

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