From Algorithmic Control to Psychological Motivation: Reflection and Reconstruction of Incentive Mechanisms for Platform Riders

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Abstract. This study examines the incentive dilemmas faced by food-delivery riders in the digital economy, focusing on how algorithmic management shapes workers' psychology and behavior. Drawing on Self-Determination Theory and the crowding-out effect, it explores, via a literature review of journals, industry reports, how platform algorithms as forms of extrinsic motivation interact with riders' intrinsic motivation. Through a labor-quota mechanism and the dispatch logic, platforms systematically suppress riders' autonomy, alienate their sense of competence, and erode their relatedness, leading to a crowding-out effect in which extrinsic motivation undermine intrinsic motivation and manifest as professional burnout and identity loss. The study proposes a three-fold improvement path: reconstructing algorithmic transparency mechanisms, establishing career-development systems, and building multi-stakeholder collaborative networks. Platform employment models must move beyond a purely extrinsic framework and, through institutional design, better coordinate intrinsic and extrinsic motivation to achieve both decent work and sustainable development for riders. These findings offer a theoretical foundation and practical insights for breaking the "incentive trap" of algorithmic management and address a key gap in understanding how intrinsic and extrinsic motivations interact in digital labor.

Keywords: Food Delivery Riders, Algorithmic Management, Self-Determination Theory, Crowding-out Effect

1. Introduction

In recent years, China's digital labor platforms have achieved rapid growth by leveraging algorithmic technologies, attracting a large number of platform workers. Unlike traditional labor management models, platforms construct real-time data-driven systems to supervise and optimize workers' labor processes. Currently, algorithms exert powerful control over order allocation, delivery-time estimation, route planning, dispatching, and real-time monitoring [1]. While this technology-centered approach reshapes labor forms, it also exerts profound impacts on workers' psychology and behavior. Platform workers, especially food-delivery riders, face a striking contradiction: advertised flexibility and high compensation continuously attract new entrants, yet

riders struggle with ambiguous labor relations, the absence of social security, strict algorithmic control, and marginalized status.

Academia holds two opposing views on algorithmic management: some studies highlight positive effects: enhanced autonomy, emotional experience, and service performance, while others document negative outcomes, such as overwork and emotional exhaustion. However, existing research predominantly concentrates on labor-relation definitions and control mechanisms, and systematic analyses of rider motivation—particularly the interaction between algorithmic incentives and intrinsic motivation—remain scarce.

Therefore, this paper takes "rider motivation" as its core focus. The study employs a literature-analysis approach across peer-reviewed journals, industry reports, and platform white papers, integrating Self-Determination Theory with the crowding-out effect perspective. It addresses two questions: How do algorithmic technologies, as extrinsic motivation, influence riders' work behaviors and psychological states? How do intrinsic motivational factors operate within algorithmic management frameworks? The study aims to overcome the limitations of treating intrinsic and extrinsic motivation in isolation, filling empirical and theoretical gaps in their interaction mechanisms. It will also offer evidence-based recommendations for optimizing platform employment models, by guiding algorithm design, informing policy, and promoting high-quality, decent work for riders.

2. Background and current situation analysis

2.1. Industry size and rider employment models

According to the 2025 China Online Food Delivery Market Status Report, in 2024 China's online food delivery market reached RMB 1,635.7 billion. The user base grew to 553 million, accounting for approximately 50.3% of the total internet population, fully demonstrating its market capacity and demand. The market structure is characterized by a highly concentrated duopoly, with Meituan and Ele.me together holding about 92% of the share. Supporting the operation of this enormous market is an army of over 10 million food delivery riders. These riders fall into two main employment models: full-time riders, who work fixed hours, undergo attendance checks, and are managed and paid a monthly salary by their service station; and part-time riders, who act as a flexible supplement and arrange their own schedules to accept orders [2]. Riders generally endure extremely high labor intensity, working 10 to 12 hours per day, and are typically required to complete each delivery within a prescribed time frame. In terms of income, Meituan Research Institute disclosed that among Meituan's high-frequency riders (those who accepted orders on 22 days or more in a given month, with an average of at least 6 hours of order-taking per day) nationwide, the average monthly earnings ranged from RMB 6,650 to RMB 9,344. However, overall, platforms commonly obscure the direct labor relationship with riders by outsourcing to third-party companies—a mechanism that conceals issues related to defining the employment relationship and safeguarding riders' rights and interests.

2.2. Algorithmic management interventions

Algorithmic management, as adopted by digital-labor platforms, refers to the practice in which algorithms, in a highly automated and data-driven manner, replace human managers to execute management functions over workers' labor processes [3]. Such algorithms take over tasks

traditionally performed by human managers, which is particularly common in the gig economy [4]. In the context of food delivery platforms, algorithmic management manifests in three forms:

Normative guidance: setting service standards, assisting human decision-making, and providing information support;

Tracking and evaluation: monitoring geographic locations, task progress, service attitudes, and riders' behavioral patterns;

Behavioral constraints: implementing bonuses, deductions, and service-level rankings;

These platforms replace human managers with automated, data-driven systems that control order allocation, delivery-time calculation, route planning, and performance monitoring. Dispatch rules follow a "more capable, more orders" principle: the system evaluates riders' capabilities based on historical metrics and allocates more orders to top performers, producing a pronounced Matthew effect. Newly hired riders must first accumulate sufficient delivery data to qualify for larger dispatch volumes, while top riders must continuously maintain high performance—failure to do so can result in sudden order drops or temporary suspension.

2.3. Incentive and punishment mechanisms

Platforms employ a multi stage labor quota mechanism in which piece rate prices increase progressively with each higher tier of completed orders while overall unit prices have declined year on year. To maintain or grow their income riders must continuously increase their order volume. Orders approaching these tier thresholds are particularly significant for income growth and reflect an "accelerated accumulation logic" of "the bold get more." Additionally platforms offer extra incentives during inclement weather conditions to further motivate riders to accept more orders.

The punishment mechanism links performance indicators such as on time rate, customer satisfaction and attendance to riders' income. If riders fail to meet standards such as an on time rate below a specified threshold, exceeding the allowable number of negative reviews or insufficient attendance they face an across the board reduction in unit prices for all orders that month. The more orders a rider completes the greater the financial loss under these penalties. This punitive structure pressures riders to take risks such as speeding to meet metrics and avoid overall income loss [4].

3. Psychological repression effects of algorithmic management

Food delivery platforms have constructed a "high-efficiency, high-control" labor system through non-standardized employment and algorithmic management. While this ensures service quality and operational efficiency, it severely restricts riders' autonomy, diminishes their sense of competence, and weakens interpersonal relatedness—reducing them to "data-driven executors." The specific content will be explained in the following sections.

3.1. Systematic suppression of psychological needs by algorithmic control

Platform economies commonly employ strong extrinsic motivation strategies in labor management, relying on highly automated, algorithm-driven reward and punishment systems that use quantitative metrics such as task completion volume, speed, and customer ratings as performance benchmarks. This incentive mechanism is a form of extrinsic motivation, in which worker behavior is driven by external material rewards or penalties. However, reliance on extrinsic motivation often overlooks the critical role of intrinsic motivation in enhancing initiative, responsibility and well-being.

Self-Determination Theory (SDT) is a classic framework for understanding intrinsic motivation. It posits that intrinsic motivation depends on the satisfaction of three basic psychological needs: autonomy, competence and relatedness [5]. Meeting these needs correlates with higher engagement, performance and creativity [6]. Specifically, autonomy refers to the desire to govern one's actions with a sense of choice; competence involves feeling effective within social and material contexts; and relatedness denotes forming meaningful connections with tasks, others and the organization [7]. Fulfillment or frustration of these needs significantly impacts an individual's initiative, motivation and socio-cognitive well-being. Analysis of algorithmic management on food-delivery platforms reveals tensions between riders' work conditions and these core needs. The following sections examine how algorithmic control suppresses each psychological need and thereby undermines intrinsic motivation.

3.1.1. Erosion of autonomy

Food-delivery riders' work is characterized by flexible deadlines, elastic working hours, blurred workplaces, and mobile job roles, which on the surface appear to grant greater freedom. However, platform algorithms have established a "strong control–weak contract" management approach, leaving riders with little genuine autonomy [8]. Under this model, riders ostensibly set their daily hours and workload via a piece-rate wage system, but in reality those choices are heavily constrained.

Riders' high investment in individual orders stems not from attractive unit prices but from each order's impact on monthly income fluctuations. A single mistake does not merely forfeit revenue from that order; it also depresses the pricing of future orders. The resulting swings in compensation amplify the value of each delivery by tens or even hundreds of times. Furthermore, the "more capable, more orders" dispatch system forces riders to accumulate performance data to secure higher order volumes, while top riders must continuously uphold high metrics to avoid sudden dispatch reductions or suspensions.

Thus, riders' apparent autonomy is, in fact, tightly controlled by algorithmic systems. They are compelled to complete every assigned order—often extending their work hours—and, once all aspects of their work are dictated by system scheduling, route optimization, and time constraints, it becomes difficult to sustain a genuinely proactive psychological state.

3.1.2. Alienation of competence

Riders rely entirely on platform systems, mechanically executing services prescribed by the platform. While algorithmic deskilling reduces the complexity of individual tasks, over-reliance on opaque, dehumanizing algorithms treats gig workers as data nodes rather than human beings [8]. This approach depends on excessive external incentives that erode intrinsic motivation.

The iceberg model of competence suggests that current algorithms focus on surface-level behaviors and skills—such as improving delivery speed—while neglecting deeper competency needs like emotional intelligence and problem-solving abilities. Under algorithmic overcontrol that deprives riders of contextual judgment, skills are reduced to rule-following, stagnating their sense of competence. According to Self-Determination Theory, individuals seek a sense of control and efficacy in their tasks; intrinsic motivation arises when work offers appropriate challenges and feedback [9]. However, intensive algorithmic intervention prevents riders from experiencing competence growth, rendering them dependent on system ratings. This externally driven incentive mechanism undermines the development of skill-related accomplishment and intrinsic efficacy.

3.1.3. Disruption of relatedness

The platform economy has restructured the connection between workers and employers. In traditional labor relations, subordination to employer control is a core criterion for dependency; this criterion no longer applies to gig workers. Instead, riders form a dyadic relationship with algorithms that redefines the manager–employee dynamic [10]. Under the platform model, the rider-platform relationship is reduced to an order-reception-settlement partnership, while interactions with merchants and customers are entirely governed by algorithmic evaluation systems.

In traditional economies, labor unions play a critical role in safeguarding workers' rights and providing support, but they struggle to play a meaningful role in the platform economy. This absence of union representation further undermines riders' ability to experience connection and purpose at work. Relatedness is the intrinsic tendency to seek emotional bonds, belonging, and meaning in social interactions. However, platform evaluation systems drastically weaken riders' interactions with organizations, peers, and users. The impersonal design of these systems destroys fundamental pathways for social connection, leaving riders increasingly isolated as labor "islands."

3.2. Crowding-out effect

These findings can be further explained by the Crowding-Out Hypothesis. This theory posits that when an individual's behavior is initially driven by intrinsic motivation, overly frequent or intense external incentives may undermine that intrinsic motivation, systematically crowding out their interest in and sense of meaning from the work [11].

On food-delivery platforms, algorithms tie behavioral performance to ongoing monetary rewards and penalties. Consequently, riders become increasingly reliant on external gains rather than on recognition of self-worth or aspirations for career development. This dynamic helps explain why, even among riders with relatively high incomes, burnout and loss of professional identity remain widespread.

4. Discussion on improvement approaches

4.1. Reconstructing autonomy

The conflict between people's psychological need to understand the specific operations, methods, and logical relationships of algorithms and the opacity of algorithmic information leads to profound distrust or even aversion toward algorithms [12]. Riders' intense feelings of frustration and uncertainty from being forced to accept algorithmic decisions stem largely from their limited understanding of algorithmic information. To address this, employers should provide riders with appropriate explanations of the design, development, and application principles of algorithms before implementing electronic monitoring systems. This can enhance riders' cognitive understanding of algorithmic systems and lay the foundation for reconstructing their autonomy.

Considering the stage-specific characteristics of work values among new-form employees, targeted measures can be adopted during riders' initial employment period. From the perspective of workers' livelihood-oriented work values, establishing a minimum income guarantee mechanism and requiring platforms to optimize algorithms for better online duration management are essential. Specifically: Adjust the size of regional rider groups based on workload to ensure riders achieve a minimum number of orders per unit time; Minimize unnecessary waiting time for orders to alleviate riders' resistance to meaningless overtime [13].

These measures can better satisfy riders' needs during the livelihood-seeking stage, gradually promoting the reconstruction of their autonomy.

4.2. Multidimensional definition of competence

To enhance riders' competence, platforms must provide resources and support so that riders genuinely recognize their own capabilities. Digital-labor platforms should strengthen humanistic management, establish clear career-development pathways, and offer career-coaching services to help riders define professional goals and trajectories. Platforms should also cultivate riders' underlying competencies and encourage active self-leadership. Specialized training modules tailored to gig workers could include behavioral-focus strategies for problem-solving, natural-reward strategies to build intrinsic incentives, and constructive-thinking strategies for cognitive restructuring and stress management [14].

Moreover, training for low-skilled workers in the platform economy should be incorporated into vocational education. Such programs could cover digital technologies, internet skills, delivery best practices, and service techniques. For example, vocational courses might teach intelligent-tool operations—like autonomous delivery vehicles—and explain algorithmic logic in platform economies, thereby supporting riders' progression to station-manager roles or higher positions. Vocational education should align with industry needs by developing cross-occupational skills—such as market analysis, identification of emerging job opportunities, and specialized technical abilities—alongside key competencies like communication, innovation, and leadership to facilitate flexible career transitions [15]. For instance, because many riders may eventually operate restaurants, catering-focused vocational guidance could be incorporated into existing career-advancement pathways.

4.3. Multistakeholder enhancement of relatedness

Building a dedicated connection system for food-delivery riders requires collaboration among government agencies, industry associations, unions, platform enterprises, and riders. Establish rider hubs to enhance welfare, integrate rights-protection and psychological-counseling modules, and form professional support networks to better safeguard labor rights. Encouraging the development of rider unions and industry associations is equally crucial. These bodies can improve rider welfare, promote legal literacy, participate in algorithm-rule making, and oversee labor-rights compliance [16].

Unions can also support platforms by providing skills training aligned with the national occupational catalog issued by the Ministry of Human Resources and Social Security, offering entrepreneurship-support policies and resource information, and thereby enhancing workers' sense of belonging to both platforms and unions. Strengthening riders' intrinsic motivation further involves cultivating a stakeholder mindset, reconstructing the meaning of work, and increasing proactive engagement—ultimately helping transform food delivery into a sustainable career.

5. Conclusion

As a quintessential example of deep integration between digital technology and the real economy, the food-delivery industry has thrived through advanced digital tools and innovative platform models. It has not only disrupted traditional economic structures but also emerged as a critical engine for fostering new occupations, absorbing vast labor forces, and driving socio-economic

development. From an employment perspective, the industry serves as a "reservoir" for surplus labor. Effectively tapping and cultivating this opportunity may help address multiple societal challenges.

However, a paradox arises: many riders join the industry primarily for quick income without long-term commitment, yet their actual tenure often surpasses initial expectations. In this context, how to leverage riders' tenure to foster their personal development and support sustained corporate growth has become a pressing issue. While institutional compliance in labor relations provides a necessary foundation, the core challenge lies in enhancing riders' occupational well-being.

Currently, many enterprises rely heavily on external algorithmic incentives to manage riders, yet this singular approach struggles to comprehensively address the motivational complexities of such a large workforce. Intrinsic motivation, notably, is not passively generated but requires deliberate catalysis. Thus, in employee motivation strategies, enterprises should avoid over-reliance on either external or internal incentives, adopting a balanced approach instead. On one hand, continuously optimize external incentives to ensure their rationality and effectiveness; on the other hand, actively activate internal motivators to spark riders' intrinsic drive and enthusiasm. This dual strategy can promote riders' holistic well-being, achieving an organic unity of objectively decent work and subjectively fulfilling labor.

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