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# The Double-Edged Sword Influence of Algorithm Management on Platform Commitment

Siyi HAN[a,1]
[a]*Business School of Beijing Wuzi University, China*

**Abstract.** The purpose of this study is to find out the mechanism of algorithm management on platform commitment under the background of gig economy. By using the methods of questionnaire survey and data analysis, it is found that the algorithm management of platform has an inverted U-shaped influence on platform commitment, and job control mediates the relationship between them. This research enriches the research variables and directions, and provides useful knowledge and practice for platform managers on how to reasonably use algorithm technology to supervise workers while ensuring their loyalty to the platform.

**Keywords.** Algorithm management, platform commitment, job control, gig workers

## 1.Introduction

With the rapid development of Internet and digitalization, the gig economy begins to rise and develop rapidly, and gives birth to a new employment form based on the platform. At present, the platform labor force is a scarce resource for the platform[1]. It is the key to the platform market competition that more labor force can occupy a larger market share. Many platforms use algorithms to gamification design work tasks, and strive to reduce the mobility of gig workers, increase the order receiving rate in this platform, and increase its platform stickiness[2]. Gig workers are different from traditional employment. They mostly adopt the mode of receiving orders from multiple platforms, and work on similar platforms at the same time[3], their mobility is very high. This paper holds that "platform commitment" is a new derivative and presentation form of organizational commitment in platform economy, and it is an important variable that reflects the relationship and stickiness between odd jobs and platforms in the digital economy. Therefore, in view of the high flexibility of gig economy, it is of great theoretical significance and practical value to study the relationship and mechanism between algorithm management and platform commitment in the situation of "organization disappearance".

Algorithm management is a management and control method adopted by the platform in order to minimize the transaction costs caused by the uncertain risks caused by the work autonomy of gig workers, which can further strengthen the control of gig workers[4]. It can achieve the management and supervision of gig workers through the

[1] Corresponding Author, Siyi HAN, Beijing Wuzi University, China; E-mail: h18630188638@ 163.com.

control of market, bureaucracy and users[5]. In practice, the platform realizes a series of management processes, such as platform entry and exit, order distribution, piece unit price and payment, working hours, rewards and punishments, etc. through algorithms, and creates the sense of urgency of "time competition" through "panoramic monitoring" of labor process and setting up the mechanism of grabbing orders. So, what is the relationship and mechanism between algorithm management and platform commitment?

Job control refers to the degree to which employees can control their own work tasks and behaviors, including the decision-making power, skills and discretion of employees[6]. Job control emphasizes employees' autonomy in working procedures and decision-making power in working content, which helps to produce positive results[7], and then can play an incentive role in the work behavior of gig workers. With the development of algorithm technology and refined supervision and control, the positive effect of platform management is decreasing, which will have a negative impact on job control. The "black-box" characteristics of algorithm management and the behaviors such as the compression of the delivery time of the delivery workers greatly reduce the job control of the people, and the panoramic electronic monitoring generated by the continuous optimization of the algorithm further increases the control of the delivery workers[8][9]. According to the resource preservation theory, if individuals feel "freedom", "instant feedback" and "fun" in algorithm management, they will have a sense of resource fullness, which is beneficial to increase their job control; On the contrary, if individuals feel real-time "being monitored", "emotional exploitation"[10]and "stigma" in algorithm management, they will feel that their resources are being exploited, and their sense of job control will decrease accordingly.

## 2.Theoretical basis and research hypothesis

### *2.1 Algorithm management and platform commitment*

Platform commitment is a new embodiment of organizational commitment in traditional enterprises in the context of gig economy. It mainly refers to gig workers' recognition of the goals and values of the platform they serve, and the positive emotional experience brought about by it. It reflects an important variable of the relationship between gig workers and the platform. The research on organizational commitment has a long history. Becker(1960) holds that organizational commitment is "a psychological phenomenon in which employees have to stay with the increase of unilateral investment in the organization, and it is the embodiment of the psychological contract between employees and organizations"[11]. "Commitment" is more of an emotional dependence of employees on the organization, and more emotional dependence on their organization[12]. Nowadays, the competition among enterprises is becoming increasingly fierce, and employees' innovative behavior has become the main source for enterprises to gain competitive advantage[13]. Organizational commitment can promote employees' innovative behavior, thus improving the competitiveness of enterprises. In addition, organizational commitment can also help organizations retain employees. For example, in the early career of employees, organizational commitment can negatively affect their turnover intention[14], thus enhancing employees' willingness to stay in the firm.

Algorithm is a technical term in the field of computer science, which refers to a limited, abstract, effective and regular compound control structure, which can achieve a specific purpose under certain rules[15]. Algorithm is a neutral mechanism that draws objective conclusions based on data facts, but it is alienated into a new tool of production relations that helps capital to achieve proliferation[16]. On the one hand, the algorithm can improve the working interest of gig workers, and make them work more actively, and the stickiness of the platform will rise accordingly. Norlander(2021) et al., through the research of Uber, taxi and limousine drivers, found that although drivers working on Uber and other platforms are controlled by algorithm management to a higher degree, their competence, autonomy and relevance are slightly higher than those of taxi drivers [5].

On the other hand, in the process of labor, the platform weakens workers' work autonomy through algorithm management from three stages: work preparation, execution and feedback, while long-term and high-intensity labor requirements have a negative impact on workers' psychology and behavior [4]. In the delivery platform, the algorithm replaces the traditional manager to supervise the work of the employees who sell out. The delivery workers seem to have autonomy in their work. In fact, the delivery workers are strictly monitored and controlled by the algorithm from the moment they receive the order[17].

According to the cognitive evaluation theory, proper challenging task design and instant feedback will make gig workers regard algorithm management as a challenge, which will bring more autonomy. At this time, gig workers will think that the control of the platform is to improve their work efficiency, so they will agree with the management of the platform and improve their commitment to the platform. On the contrary, when the platform application of algorithm management is “excessive”, the strict time control and the relatively opaque task allocation rules will make the gig workers make a threatening assessment, thinking that the current resources can't cope with it, and they need to use extra and more resources to cope with this control[18], so they choose to get rid of the platform management, reduce the platform commitment, and form a “double-edged sword effect” of the algorithm management on the platform commitment. Therefore, this paper puts forward the following assumptions:

H1: Algorithm management in the platform has an inverted U-shaped impact on platform commitment.

### *2.2 The intermediary role of work control*

Job control refers to the degree to which employees can control their own work tasks and behaviors, including the decision-making power, skills and discretion of employees[6]. In the job demand-control model, Karasek thinks that the concept of job control is consistent with that of discretion, which reflects the autonomy of employees at work and makes them feel that their work tasks are under their own control[19]. Job control emphasizes employees' autonomy in working procedures and decision-making power in working content, which helps to produce positive results[7], and then can play an incentive role in the work behavior of gig workers. On the one hand, the emergence and popularization of platform work has added more autonomy and flexibility to the work of gig workers. For example, the working hours of drivers working on the W platform seem to be very flexible, and they can freely choose online time, duration and use of vehicles. Drivers have a feeling of “working for themselves”, and their sense of job control is further enhanced, the fragmentation of working hours and tasks on the W

platform enables drivers to complete orders in their spare time, which makes drivers feel free to work and have more autonomy in working hours[20].

With the development and continuous improvement of algorithm technology, the platform's intervention on work procedures and progress has been further strengthened, which has a negative impact on the controllability of gig workers. In the take-out platform, riders should feed back the delivery progress to the platform in time during the whole delivery process, and the platform will monitor the delivery information of riders in real time through the GPS inheir mobile phones, so as to increase customers' control and predictability of orders. This panoramic electronic monitoring greatly limits riders' autonomous work behavior[17], and reduces their sense of work control.

The resource preservation theory holds that different resources are not independent, but are interrelated and influence each other like a constantly moving “motorcade”[21]. For example, the advance access mechanism designed by Instacart platform for delivery workers will reduce their working hours, choice opportunities, platform recognition, etc. with the passage of time[8]. Therefore, algorithm management is also a constantly changing resource for gig workers, which is dynamic and mobile. When the efficient matching rate between supply and demand and the relatively free working time and place brought by algorithm technology match their own needs and conditions, gig workers will pay more attention to the potential opportunities and developments in algorithm management, which can lead to positive emotional experience, and have a sense of resource filling in their hearts, which will have a positive impact on job control. With the continuous improvement of algorithm technology and the continuous expansion of work intervention, gig workers will feel that the convenience and flexibility brought by algorithm technology are further weakened, followed by more comprehensive monitoring and behavior constraints, which will face greater work pressure and require additional resources to meet challenges, resulting in their own resources being exploited and their sense of job control being reduced. Therefore, the following assumptions are put forward:

H2: The algorithm management of the platform has an inverted U-shaped influence on the work control.

According to the resource preservation theory, individuals will acquire and preserve their precious resources, and individuals are more inclined to protect existing resources than to acquire new resources. Job control can make the individual's psychological resources more full, and also help him obtain new resources to cope with future challenges and pressures. Studies have shown that when employees have a high sense of control over their work, they will actively innovate in their work, and are more likely to have internal entrepreneurial behavior, creating value for enterprises[22], thus enhancing organizational commitment. On the one hand, employees with a high sense of job control can freely decide the specific procedures and methods to complete their work, and can feel more fun and freedom from their work[23]. Their job satisfaction will also increase, and they will be more satisfied with their current working status, so they are willing to stay in the organization and continue to work, and their turnover rate will decrease[24]. Therefore, the following assumptions are put forward:

H3: Job control has a positive impact on platform commitment.

H4: Job control plays an intermediary role in the inverted U-shaped relationship between algorithm management and platform commitment.

The conceptual model of this study is shown in Figure 1.

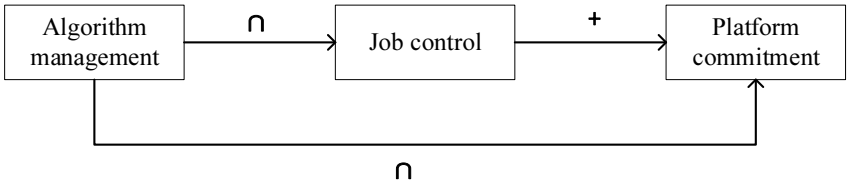


**Figure 1.** Theoretical model diagram.

## 3.Research methods

### *3.1 Variable measurement*

This study adopts the method of questionnaire survey. The scale used is self-compiled according to the research content by referring to the mature scales in previous studies. The scale used for reference has good reliability and validity in different research situations. The questionnaire is designed by Likert's five-point scoring method. The choices are divided into five levels, from totally disagreeing (1 point) to completely agreeing (5 points). The higher the score, the higher the degree of agreement.

- Algorithm management: The measurement of algorithm management comes from the 9-item scale developed by Peter(2021)[5].
- Job control: The measurement of job control comes from the 11-item scale developed by Nico and Marit (2003)[23].
- Platform commitment: The measurement of platform commitment is derived from the 18-item scale developed by Meyer(1993)[25].
- Control variables: referring to the characteristics of general variables.

### *3.2 Data collection*

Using the questionnaire survey method, taking salesmen and network car drivers as the research objects, using the network platform as the medium, online questionnaires are distributed for data collection, and at the end, red envelopes are attached as rewards for answering. A total of 500 questionnaires were distributed and 426 questionnaires were collected, with a recovery rate of 85.2%.

## 4. Hypothesis test and results

### *4.1 Confirmatory factor analysis*

In this study, confirmatory factor analysis (CFA) was adopted to test different models of the three variables studied, and the validity of discrimination among the variables was tested. The results show that the fitting effect of the three-factor model is the best ($\chi^2$/df= 3.699, CFI = 0.910, TLI = 0.912, IFI = 0.891, RMSEA = 0.082). Compared with other competitive models, the three-factor model has the best effect, which indicates that the three-factor variables have good discriminant validity, and can carry out the follow-up hypothesis test.

### *4.2 Correlation analysis and results*

In the process of reliability test, Cronbach's values of algorithm management, work control and platform commitment are 0.624, 0.765 and 0.806, respectively, which have good reliability.The correlation coefficient among variables shows that algorithm management is positively correlated with job control, algorithm management is positively correlated with platform commitment, job control is positively correlated with platform commitment, and the relationship among variables accords with the basic theoretical expectation.

**Table 1.** Correlation analysis results

| Variable | M | SD | Sex | Age | EI | TW | AM | JC |
|---|---|---|---|---|---|---|---|---|
| Sex | 1.376 | 0.485 | - | | | | | |
| Age | 3.509 | 1.010 | 0.039 | - | | | | |
| EI | 2.541 | 0.755 | -0.036 | -0.131** | - | | | |
| TW | 1.637 | 0.482 | 0.156** | 0.149** | 0.010 | - | | |
| AM | 4.055 | 0.509 | -0.061 | -0.069 | 0.013 | -0.038 | - | |
| JC | 3.749 | 0.755 | 0.008 | -0.067 | 0.018 | -0.018 | 0.048* | - |
| PC | 3.550 | 0.722 | 0.109* | 0.131** | -0.055 | 0.012 | 0.116* | 0.222* |

EI=Educational level,TW=Type of work, AM=Algorithm management,JC=Job control,PC=Platform commitment,* $p<0.05$，** $p<0.01$.

### *4.3 Hypothesis test*

Model 2 and Model 3 in Table 2 show that there is a significant positive correlation between algorithm management and platform commitment. After the square term of algorithm management is put into the model, the correlation coefficient between algorithm management and platform commitment decreases, while the square term of algorithm management has a significant negative correlation with platform commitment, and the fitting index increases significantly. Assuming H1 is verified.

It can be seen from model 7 and model 8 that there is a significant positive correlation between algorithm management and work control. After adding the square term of algorithm management to the model, the correlation coefficient between algorithm management and work control decreases, while the square term has a significant negative correlation with focusing promotion, and the hypothesis H2 of improved fitting index is verified.

From model 4, it can be seen that after putting work control into the model, the hypothesis H3 that there is a significant positive correlation between work control and platform commitment has been verified. At this time, it can be seen from model 5 that the correlation coefficient between algorithm management and platform commitment square term of algorithm management and platform commitment decreases, but it is still significant, which indicates that work control plays a partial intermediary role in the inverted U relationship between algorithm management and platform commitment, assuming H4 is verified.

**Table 2.** main effect and intermediary effect test

| Variable | PC | | | | JC | | | |
|---|---|---|---|---|---|---|---|---|
| | model1 | model2 | model3 | model4 | model5 | model6 | model7 | model8 |
| Sex | 0.112 | 0.134* | 0.133* | 0.084 | 0.105 | 0.095 | 0.104 | 0.101 |
| Age | 0.046 | 0.054 | 0.054 | 0.067* | 0.073* | -0.072 | -0.069 | -0.067 |
| EI | -0.079 | -0.067 | -0.067 | -0.067 | -0.057 | -0.041 | -0.036 | -0.037 |
| TW | -0.054 | -0.052 | -0.052 | -0.041 | -0.040 | -0.045 | -0.044 | -0.042 |
| AM | | 0.311** | 0.101** | | 0.210** | | 0.129* | 0.073** |
| $AM^2$ | | | -0.029** | | -0.009** | | | -0.369** |
| JC | | | | 0.295** | 0.275** | | | |
| F | 5.248 | 8.827 | 8.058 | 11.691 | 13.183 | 1.786 | 2.011 | 2.000 |
| $\Delta R^2$ | | 0.156 | 0.159 | 0.201 | 0.256 | | 0.023 | 0.025* |

* $p<0.05$，** $p<0.01$.

## 5. Conclusion and discussion

The conclusions of this paper are as follows: First, algorithm management may promote or inhibit the platform commitment of gig workers by triggering different cognitive evaluations, forming a “double-edged sword effect”; Secondly, job control mediates the inverted U-shaped relationship between algorithm management and platform commitment; Thirdly, it provides a theoretical basis and practical significance for promoting the rational use of algorithms on the platform and protecting the legitimate rights and interests of workers.

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