Research on the Impact of Algorithm Control on the Continuing Intention of gig Workers: Based on Fair Heuristic Theory

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Abstract. The rise of the gig economy has prompted a large number of workers to flock to the delivery and ride hailing industries, and their work process is fully controlled by algorithms, which shape the overall perception of gig workers' work process. Based on the theory of fairness heuristic, this study found that algorithmic control can positively affect the fairness perception of gig workers, and fairness perception positively affects the continuing intention of gig workers. Fairness perception plays a positive predictive role between algorithmic control and continuing intention.

Keywords: Algorithmic control; Perception of fairness; Continuing intention

1 Introduction

The gig economy has gradually become an important growth point for the development of China's service industry. However, the high turnover rate of gig workers is also a concern. how to enhance the willingness of gig workers to continue working on the platform is a key issue that the platform needs to focus on.

The definition of the continuing intention of gig workers is the behavioral intention to continue providing services on the platform as part of it (Wiener et al., 2021) [13]. In existing research on the intention of gig workers to continue providing services on the platform, scholars mainly explore through qualitative analysis, believing that individuals' perception of fairness (Liu et al., 2019) [10], pursuit of intrinsic work significance (Lin et al., 2020) [9] affect their willingness to continue providing services on the platform, with individual perception being an important influencing factor. In the process of work, there is no interference from leaders or colleagues on gig workers, and algorithms control their work. Therefore, algorithm control is one of the most important factors affecting the work experience of gig workers. Fairness refers to employees' perception and internal judgment of whether their organization treats them fairly (Greenberg, 1990) [7]. This study suggests that the fairness perception of gig workers under algorithmic control is the subjective perception and judgment of gig workers on whether they are treated fairly under the control of platform algorithms

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The definition of algorithmic control is the real-time dynamic control of the process of providing online labor services for gig workers through normative guidance, tracking evaluation, and behavioral constraints (Pei et al., 2021) [11]. In the existing literature on the impact of algorithmic control on gig workers, scholars mainly explore autonomy (Griesbach et al., 2019) [6], stress (Gao et al., 2023) [4], and fairness (Lee, 2018) [8], but there are still the following shortcomings. Firstly, scholars often analyze from a qualitative perspective, lacking empirical research. Secondly, regarding the impact of algorithms on the sense of fairness, scholars believe that on the one hand, algorithms lead to lower levels of dignity and gig workers consider it unfair (Zhang et al., 2023) [14], while on the other hand, scholars believe that algorithm efficiency makes gig workers consider it fair (Lee, 2018) [8]. Therefore, it is necessary to analyze from an empirical perspective how algorithmic control affects the perception of fairness among gig workers, thereby affecting their intention to continue.

The definition of algorithmic transparency is the degree to which gig workers access and understand information related to platform algorithmic control (Deng et al., 2023)[2], which affects the information required for fair judgment. Therefore, algorithmic transparency regulates the impact of algorithmic control on the perception of fairness among gig workers. In summary, this study constructed a theoretical model as shown in Figure 1.

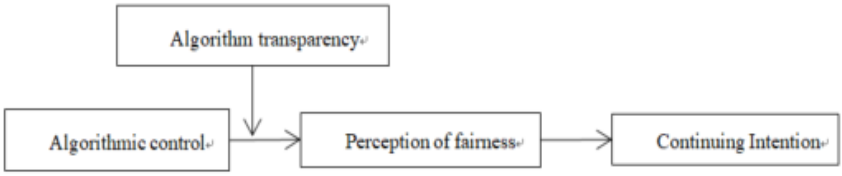

Fig. 1. Algorithm Control Impact Continuation Intention Model

2 Theory and Assumptions

2.1 Fairness Inspiration Theory

The fairness heuristic theory suggests that individuals will judge whether they have been treated fairly in order to determine whether they are safe in a group. When making judgments, they will use the information they have obtained from the situation related to fairness to explain their perception of fairness in the overall situation, as a guide for future actions and attitudes.

2.2 Theoretical Assumptions

This article believes that algorithmic control will positively affect the fairness perception of gig workers, for the following reasons: gig workers will first receive the following fairness information when they enter the platform to work. One is the objectivity of algorithm technology. Algorithms are technologies that make gig workers

believe they will treat everyone equally. The second is the algorithmic piece allocation mechanism. Pay per visit is considered a fair reward for hard work. The third is the supporting properties of the algorithm. Algorithms provide guidance for gig jobs, increasing their income and being considered fair. The above information about algorithm control fairness will form a perception of fairness. Proposing Hypothesis 1:

H1: Algorithm control has a positive predictive effect on fairness perception.

This article argues that the perception of fairness has a positive impact on the intention to continue. The reasons are as follows: firstly, the perception of fairness will affect the trust of gig workers in the platform, thereby affecting their intention to continue cooperating with the platform. Secondly, the perception of fairness among gig workers will increase their sense of respect and promote platform recognition. Thirdly, in existing research, perceived fairness often has a positive impact, such as reducing turnover intention. Proposing Hypothesis 2:

H2: The perceived fairness of gig workers has a positive predictive effect on their intention to continue.

Based on the above inference, this article believes that fairness perception plays a mediating role between algorithm control and intention to continue. Specifically, gig workers will make fair judgments on algorithm control to ensure that they receive orders and receive corresponding platform rewards; The first perception of algorithmic allocation mechanisms, piece rate salary, and other information will form an overall understanding of fairness, thereby increasing trust in the platform and willingness to continue working on it. Proposing Hypothesis 3:

H3: Fair perception plays a positive mediating role in the relationship between algorithmic control and intention to continue.

This article believes that algorithm transparency will positively regulate the relationship between algorithm control and fairness perception. The reasons are as follows: firstly, the level of algorithm transparency will affect the perception of fair information by gig workers, and transparent algorithms enable them to better understand the differences with others. Secondly, the increase in algorithm transparency makes it easier for gig workers to detect biases and errors, increasing their trust in the algorithm. Thirdly, algorithmic transparency makes gig workers believe that technicians are unlikely to develop and use dangerous and biased algorithms. So hypothesis 4 is proposed:

H4: The relationship between algorithm control and fairness perception is positively regulated by algorithm transparency

3 Research methods

3.1 Sample selection

This study selected delivery drivers and ride hailing drivers as the research subjects. The distribution of this survey questionnaire mainly adopts the method of online platform distribution, and the sample is mainly from a market research company platform Credamo. During the survey process, the occupation of the sample, as well as the number of responses and credit scores, can be set to ensure the accuracy of the sam-

ple. In the process of sample collection, based on the actual situation, this study adopts a one-stage sample collection method. In July 2023, relevant samples such as algorithm control, fairness perception, continuation intention, and algorithm transparency will be collected at once. Collect 356 questionnaires to answer, eliminate invalid questionnaires, and 255 valid questionnaires, with an effective rate of 71.6%. The sample situation is as follows: 77.3% of takeout riders and 22.7% of ride hailing drivers; 71.0% males; 65.1% full-time; 67.5% work for more than 1 year; 88.2% are under 40 years old; 52.2% are married. 88.6% of the population from high school to undergraduate stage.

3.2 Measurement scale

The measurement scales and reliability coefficients for all variables are as follows. The measurement controlled by the algorithm adopts the three-dimensional measurement table developed by Pei et al. (2021) [11], The Cronbach's α coefficient is 0.772. For the measurement of fairness perception, this study suggests that gig workers under algorithmic control belong to independent work and do not communicate with authoritative figures such as leaders and colleagues. Therefore, as "independent contractors", gig workers have not experienced the interactive fairness caused by interpersonal quality. However, the algorithmic control decision-making process itself has an impact on the distribution fairness and procedural fairness of gig workers, So this study used the dimensions of distributive fairness and procedural fairness in the fairness perception scale developed by Colquitt (2001) [1], The Cronbach's αcoefficient is 0.859.The measurement of continued intention was conducted using the continued intention measurement scale developed by Goldbach et al. (2018) [5], The Cronbach's α coefficient is 0.920. Drawing on the approach of Pei Jialiang et al. (2022) [12], the transparency scale proposed by Durcikova et al. (2009) has been adapted as an algorithm transparency scale [3], The Cronbach's α coefficient is 0.854. All scales use the Likert 5-point method, scoring items from "strongly disagree" to "strongly agree" on a scale of 1 to 5. Based on existing research, demographic variables such as job nature, working hours, gender, age, education, and marriage are used as control variables. The measurement method for the nature of work is: "1 represents full-time, 2 represents gig"; Working hours: "1 represents less than 6 months (including 6 months), 2 represents 6-1 year (including 1 year), 3 represents 1-2 years, and 4 represents more than 2 years"; Gender:"1 represents male, 2 represents female"; Age:"1 represents 0 to 20 years old, 2 represents 21 to 30 years old, 3 represents 31 to 40 years old, 4 represents 41 to 50 years old, and 5 represents 50 years old and above"; Educational background: "1 represents junior high school and below, 2 represents general high school/vocational school/technical school/vocational high school, 3 represents junior high school, 4 represents undergraduate, 5 represents master's, and 6 represents doctoral"; Marriage: "1 represents married, 2 represents unmarried"

4 Result analysis

4.1 Common method deviation test

To avoid homologous bias, Harman single factor detection was conducted in this study. There were 8 common factors with eigenvalues greater than 1, with a total explanatory variance of 63.081. When not rotated, the first common factor accounted for 30.807% of the total load, which is less than the critical criterion of 40%. This indicates that there is no serious issue of common method bias in this study.

4.2 Confirmatory factor analysis and discriminant validity

As shown in Table 1, the four factor model has the most advantage in fitting indicators, with good discriminant validity among various variables.

Table 1. Results of confirmatory factor analysis

model	χ2/df	CFI	TLI	SRMR	RMSEA
Four factor model	1.746	0.918	0.906	0.05	0.05
Three factor model	3.068	0.762	0.740	0.07	0.09
Two factor model	4.073	0.644	0.614	0.092	0.110
Single factor model	4.405	0.604	0.572	0.092	0.116

Note: N=255; The three factor model combines fairness perception and algorithm transparency; The two factor model combines fairness perception, algorithm transparency, and continuation intention; Single factor model merges all variables

4.3 Descriptive Statistics and Analysis

From Table 2, it can be seen that there is a significant positive correlation between algorithm control and fairness perception ($r=0.556$, $p<0.01$), and a significant positive correlation between fairness perception and intention to continue ($r=0.550$, $p<0.01$). Hypothesis H1 and hypothesis H2 have been preliminarily validated

Table 2. Descriptive and Correlation Analysis Results

	1	2	3	4	5	6	7	8	9	10	11
1 occupation	1										
2 nature of work	-0.074	1									
3 working hours	-0.208**	-0.414**	1								
4 gender	0.058	0.130*	-0.039	1							
5 age	-0.127*	-0.149*	0.410**	0.085	1						
6educational background	-0.189**	0.144*	0.017	0.267**	0.172**	1					
7 marriage	0.183**	0.221**	-0.445**	-0.024	-0.536**	-0.092	1				
8 Algorithmic control	-0.051	-0.193**	0.144*	-0.035	0.135*	-0.052	-0.196**	1			
9Algorithm transparency	-0.02	-0.222**	0.269**	0.102	0.276**	0.012	-0.229**	0.443**	1		
10Perception of fairness	-0.065	-0.185**	0.212**	0.06	0.218**	0.023	-0.230**	0.556**	0.635**	1	
11Continuing Intention	-0.234**	-0.213**	0.393**	0.121	0.262**	0.09	-0.266**	0.353**	0.441**	0.550**	1
mean value	1.770	1.350	2.970	1.290	2.530	3.160	1.480	4.270	3.642	3.868	3.656
standard deviation	0.420	0.478	1.106	0.455	0.926	1.073	0.501	0.426	1.006	0.646	1.175

Note: * * * represents $p<0.001$, * * represents $p<0.01$, and * represents $p<0.05$

4.4 Hypothesis analysis

As shown in Table 3, hierarchical regression shows that algorithmic control has a positive impact on fairness perception (M2, β= 0.791, p<0.001), assuming H1 holds, fairness perception has a positive impact on intention to continue, (M7, β= 0.852, p<0.001), assuming H2 holds. The Bootstrap method was used to test the mediating effect of perceived fairness. The results showed that the effect value of the indirect effect of the algorithm controlling the intention to continue through fair perception was 0.6259, and the confidence interval (CI) of the indirect effect was [0.4183, 0.8765], excluding 0 within the interval. Assuming H3 holds. As shown in Table 3, the interaction between algorithm control and algorithm transparency has no significant impact on fairness perception (M4, β= 0.021, p>0.05), so the regulatory effect is not significant, assuming that H4 is not valid.

Table 3. Hierarchical Regression Analysis Results

	Perception of fairness				Continuing Intention			
	M1	M2	M3	M4	M5	M6	M7	M8
occupation	-0.055	-0.019	-0.042	-0.043	-0.492**	-0.457**	-0.446**	-0.441**
nature of work	-0.175	-0.068	-0.015	-0.013	-0.289	-0.18	-0.139	-0.127
working hours	0.036	0.038	0.003	0.003	0.277***	0.28***	0.247***	0.25***
gender	0.105	0.108	0.029	0.031	0.377*	0.38**	0.288	0.295
age	0.075	0.058	0.007	0.008	0.096	0.079	0.033	0.033
educational background	-0.009	0.01	0.012	0.012	0.014	0.032	0.021	0.025
marriage	-0.141	-0.048	-0.05	-0.048	-0.108	-0.014	0.012	0.024
Algorithmic control		0.791***	0.513***	0.443		0.798***		0.172
Perception of fairness							0.852***	0.791***
Algorithm transparency			0.300***	0.21				
Algorithm Control * Algorithm Transparency				0.021				

Note: * * * represents p<0.001, * * represents p<0.01, and * represents p<0.05

5 Conclusion and Discussion

The results of this study show that firstly, algorithm control positively affects the perception of fairness among gigs. The work process of gig workers is monitored and controlled by algorithms throughout the entire process. In order to protect their position on the platform, gig workers will judge the fairness information related to algorithm control. During this process, algorithmic control displays relevant information about fairness, such as technical objectivity, fair piece allocation mechanisms, and algorithmic support for gig workers, which increases their perception of fairness and creates an overall fair experience; Secondly, the perception of fairness positively affects the intention of gig workers to continue. The improvement of fairness perception will increase trust and recognition of platform algorithms, making gig workers willing to continue cooperating with the platform and increasing their intention to continue. Thirdly, fairness perception plays a positive mediating role between algorithmic con-

trol and intention to continue. Fourthly, the results also show that algorithm transparency cannot regulate the effect of algorithm control on fairness. This may be due to the rapid development of the gig economy, which makes gigs not actually concerned about algorithm transparency. Secondly, the biases that may exist in algorithm control itself cannot be changed by algorithm transparency.

Theoretical Implications: This study advances the research on the mechanism of algorithmic control on gig workers, introduces fairness perception from the perspective of fairness heuristic theory, explores the mechanism of algorithmic control's influence on continuing intention through fairness perception, and advances empirical research on algorithmic control in the fields of organizational behavior and human resources.

Practical Implications: Algorithm control is an important factor affecting the perception of gig workers. In the future, platform enterprises need to pay attention to fair algorithm mechanisms when conducting algorithm control, highlight the fairness of algorithms, and convey this information to gig workers, so that they can form an overall sense of fairness and are willing to continue working on the platform.

Limitations and future research: There are the following shortcomings in this study. The first is that the sample size is relatively small, with 255 qualified samples recovered. Future research can increase the sample size. The second issue is research methodology. Failure to adopt a multi time point data collection approach for fairness perception and continued intention can to some extent lead to common method bias. In future research, scholars can adopt a multi-stage questionnaire collection approach to reduce the possibility of homologous bias.

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