

A Study on the Problem of Employee Punch Card Substitution in Enterprise Management: The Case of Jingdong Enterprise

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Abstract: With economic progress and the continuous advancement of science and technology, the issue of employees substituting punch cards has gradually become a significant challenge in enterprise management. The purpose of this paper is to discuss the causes, effects, and countermeasures of the employee punch card phenomenon, with the aim of providing effective management recommendations for Chinese enterprises. In practice, enterprises should flexibly apply the countermeasures proposed in this paper according to their specific circumstances to prevent substitute punch card incidents and improve overall management efficiency.

Keywords: Employee punch card issue; Enterprise management; Economic impact; Technical solutions; Cost-benefit analysis

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1. Introduction

In modern enterprise management practices, the phenomenon of employee substitute punch cards has become a problem that cannot be ignored. Taking Jingdong Enterprise as an example, according to a report by the Red Star Capital Bureau on May 25, 2024, an internal survey of Jingdong revealed that employees substitute punch cards around 14,000 times per month. Each instance of substitute punching costs 15 yuan, and a single person can substitute for as many as 20 employees, forming an industrial chain. This phenomenon not only exposes flaws in the company's management system but also has a far-reaching negative impact on the overall workplace atmosphere, work efficiency, and even revenue. It is an urgent issue that requires immediate rectification.

2. The origin, definition, and manifestation of the employee punching card problem

China's attendance system has early origins, initially aimed at state officials. In modern society, the earliest form of attendance tracking was paper punch cards, but the practice of "substitute punching" became common. To stop this malpractice at its source, fingerprint punch machines were introduced^[1]. However, the sensitivity of fingerprint recognition created accuracy issues, negatively affecting efficiency and user experience. To improve accuracy and convenience, innovative methods such as facial recognition, genetic technology, and mobile attendance systems were introduced.

Employee substitute punching refers to the practice where employees falsify attendance records by having someone else punch in on their behalf or by using technical means to avoid being physically present. This phenomenon is often seen when employees ask others to punch in for them to avoid fines for being late or leaving early, or when they are absent from work but still manage to have their attendance recorded. In Jingdong Enterprises, employees are required to punch in through the internal JingME software, which can be accessed via mobile phones or computers within designated office areas. According to an interview with the Red Star Capital Bureau, a Jingdong employee speculated that substitute punching could be done by someone logging into the employee's account using in-office equipment or by going directly to the employee's workstation and using their own device to punch in on their behalf.

3. Reasons for the problem of employees punching cards on behalf of others

In modern enterprise management, traditional management models and outdated economic management concepts have increasingly revealed problems that hinder the progress and development of businesses^[2]. While the attendance system may be effective for self-disciplined employees, it fails to substantially improve the efficiency of less motivated workers. Under traditional systems, employees tend to procrastinate, slack off, punch in, and then leave their posts. Mandatory attendance does not enhance the focus or effort of unmotivated employees and may instead negatively impact the work quality and efficiency of more diligent employees.

A lack of strict enforcement or poor implementation of attendance policies gives employees opportunities to exploit the system, which also reflects a deficiency in fostering a positive and honest organizational culture^[3]. With advancements in technology, employees now use mobile apps, virtual positioning, and other methods to make substitute punching more covert. Over-reliance on technological attendance systems can also damage interpersonal relationships, exacerbate social indifference, and trigger employee resistance, further hampering organizational culture development.

The practice of employees punching cards on behalf of others stems from various personal reasons, such as traffic delays, family emergencies, or the desire to avoid punishment. Some employees may seek to exploit the system to secure full attendance bonuses or avoid penalties. Other personal factors, including laziness, job dissatisfaction, and the influence of substitute punching among colleagues, contribute to this behavior. These factors interact, leading to the imitation and eventual proliferation of substitute punching.

4. The impact of employee punching card problems

The impact of substitute punching on enterprises is multifaceted. This behavior not only disrupts attendance records and distorts data, preventing the company from accurately reflecting employee attendance and compromising the fairness of the system. It also violates enterprise management policies, challenges the

authority of the system, and may lead to management chaos, affecting normal business operations ^[4]. This ultimately reduces the overall work efficiency and service quality of the company, weakens its competitiveness, and severely damages its social reputation and corporate image.

Furthermore, employees who engage in substitute punching damage their personal reputations and career prospects by creating a dishonest impression, which can harm their professional image. It also triggers a sense of unfairness among colleagues, reducing their motivation and job satisfaction. In the long run, it undermines the integrity culture within the enterprise, eroding trust between the company and its employees, negatively affecting teamwork, and diminishing the overall competitiveness of the organization.

5. Cost-benefit analysis of the problem of employee substitute punching cards

5.1. Constructing the cost-benefit analysis model

To quantify the economic impact of employee substitute punch card behavior, a cost-benefit analysis model can be constructed by analyzing changes in punch card data before and after policy implementation. This approach enables the calculation of costs and benefits before and after the policy, ultimately deriving the economic gains from the relevant measures (Table 1).

Table 1. Data required for the model and its description

Serial no.	Data name	Data description
1	Number of employees	The total number of employees in the company, the default is 517,000 unchanged.
2	Number of substitute punch cards	The total number of times an employee punches a card on behalf of an employee each month.
3	Average wage	Employee's average daily wage = average monthly wage of Chinese yuan (CNY) 24,106 / 21.75 days of payroll per month = CNY 1,108.32.
4	Working hours	Standard working hours per employee per day, default card punching means 1 day's work time lost.
5	Loss of revenue	Reduction in average daily revenue generation per person due to substitute punch card = annual revenue generation of CNY 2.1 million for a single employee / 250 working days per year = CNY 8,400.
6	Other costs	Hardware costs, software costs, and operating costs due to upgrade.

The direct economic loss to the company from employee substitute punch card behavior is primarily reflected in ineffective labor cost expenditures, i.e., the loss of average daily wages per person per incident of substitute punching. Indirect costs, which are more far-reaching, include the weakening of the company's profitability and the loss of potential business income. Although these losses are difficult to quantify, their long-term effects are significant ^[5]. Ultimately, the company's revenue loss due to substitute punching is defined as the daily revenue loss per person per substitute punch card. Additionally, companies must invest in upgrades to prevent substitute punching, incurring further costs in hardware, software, and operations.

(1) Direct cost = number of substitute punch cards × hours worked × average salary

(2) Indirect cost = number of substitute punch cards × working hours × revenue loss

(3) Other costs = hardware costs + software costs + operating costs

For this analysis, outsourced personnel who work in the same office location and follow the same attendance policy as BOE enterprises were selected as the sample. The sample size was determined by setting

the allowed error (E) at 3%, with a confidence level of 95%, yielding a corresponding Z-score of 1.96. Using a conservative estimate, the expected overall proportion (p) was set at 0.5, and the minimum sample size was calculated as follows:

$$n = \left(\frac{Z^2 \cdot p \cdot (1 - p)}{E^2} \right)$$

$$n = \left(\frac{1.96^2 \cdot 0.5 \cdot (1 - 0.5)}{0.03^2} \right)$$

$$n = 1067.11 \approx 1068$$

Since the sample size must be an integer, it is rounded up to the nearest whole number. Therefore, at least 1,068 samples are required to estimate the overall situation. In the end, a sample size of 1,100 was chosen.

Given that substitute punch card behavior typically occurs when employees are late, leave early, or are absent from work but wish to create the illusion of punching in on time to receive their daily wages, it is assumed that there will be no room for such behavior after the new policy is implemented. The abnormal punch card data from the sample can therefore be used to estimate the total number of substitute punch card incidents.

By establishing a correlation between the 8,067 abnormal punch cards from the sample of 1,100 employees in April and the 14,000 substitute punch card incidents from a total population of 517,000 employees, a coefficient of 0.0037 was derived. Based on this coefficient, and assuming the total population remains unchanged, the total number of substitute punch cards for June was calculated to be 428.

5.2. Economic benefits after policy implementation

The calculations allow for the determination of direct and indirect costs for the two months before and after the policy implementation in May, as shown in **Table 2**. In June, a direct benefit of Chinese yuan (CNY) 15,042,100 and an indirect benefit of CNY 11,400,480,000 were realized compared to April, resulting in a total benefit of CNY 12,904,690,000.

Table 2. Data related to substitute punch cards from April to June

Month	Number of substitute punch cards (times)	Direct cost (CNY)	Indirect cost (CNY)
April	14,000	1,551.65 million	11,760 million
May	8,309	920.90 million	6,979.56 million
June	428	47.44 million	359.52 million

5.3. Economic costs of upgrading

5.3.1. Hardware upgrade costs

Hardware upgrades primarily involve replacing existing swipe card access control machines with face recognition access control machines. This process also requires the replacement of hardware components such as gigabit switches, electrical wiring, power cables, and power piping to adapt to the new machines. Including the cost of point-of-sale installation services, the total cost of upgrading the hardware for the 94 point-of-sale access control machines was CNY 261,030 (approximately CNY 261,000), as shown in **Table 3**.

Table 3. Quoted hardware costs for upgrades

Serial no.	Product name	Brand and model	Unit	Unit price (CNY)	Remarks
1	Face swipe card access control machine	ZKTeco XFACE600	Units	1,699	
2	Gigabit switch	Xindanwei XDRS-G105WT	Units	45	Average 5 access control machines require 3 Gigabit switches
3	Face device power supply	Little Ear 12V5A	Number	80	Average 1 access control unit requires 1 power supply for the equipment
4	Electrical wiring	Hikvision DS-1LN5E/E	Box	380	Average 1 box of electrical wiring to install 5 access control units
5	Power cord	Tiancheng DC12V	Meters	3.86	10 meters of power cable for an average of 1 access control unit
6	Electrical piping	Multi-Practice 20MM	Meters	1.5	30 meters of electrical conduit for an average of 1 access control unit
7	Point installation	Wiring, piping, installation, commissioning	Several	393.12	20% of the total unit cost of 1-6 items for 1 access control unit

5.3.2. Software upgrade costs

Software upgrades focus on improving the rules and upgrading the system. An efficient and secure access control management system was constructed ^[6]. By adding a face recognition feature to the hardware access control machines and relying on the Jingdong Super Brain, the clock-in management system was upgraded, with relevant rules improved. For example, if clocking occurs before 9:00 a.m. without a corresponding record of entry through the park gate, the clocking is deemed invalid. Similarly, if the difference between the off-duty clocking time and the last exit from the park gate exceeds one hour, the clocking is also considered invalid.

As one of Jingdong Enterprises' achievements in the field of computer vision, Jingdong Super Brain's core technologies include face recognition, iris recognition, deep learning, image processing, knowledge graphs, and natural language processing. Its face recognition accuracy can reach 99.9% ^[7]. This technology has already been applied to the internal office area of Jingdong Enterprises for attendance management. Since the Jingdong Super Brain software is self-developed, the software upgrade cost is CNY 0.

5.3.3. Employee operation costs

In addition to the hardware and software upgrades, 24-hour system stability has been ensured by employing one operations and maintenance staff member and four central controllers for daily management. This has significantly improved attendance management fairness, enhanced employee operational efficiency, and optimized human resource costs. The introduction of technological tools, process reengineering, improvements in the working environment, and the establishment of regular training and feedback mechanisms have stimulated employee potential, improving work execution and teamwork efficiency ^[8].

The monthly operating cost after the system upgrade, which includes the salaries of one operations and maintenance staff member and four central controllers, total CNY 36,000 (**Table 4**).

Table 4. Quotation of operation cost of upgrading staff

Serial no.	Post name	Unit	Average monthly wage (CNY)	Remarks
1	Operation and maintenance	People	12,000	
2	Central control	People	6,000	2 people per shift, 12 hours of work, 24-hour monitoring in the control room

5.3.4. Total cost

In total, the upgrade costs, including hardware, software, and operational expenses, amounted to CNY 297,030 (approximately CNY 297,000).

5.4. Cost-benefit analysis

Following the implementation of the new attendance policy by Jingdong Enterprises in May, this study applied a relevant economic model to quantify the changes in costs related to substitute punch card behavior, accurately analyzing the data to demonstrate the economic benefits brought about by the policy and the system upgrades.

The study results show that, in June, one month after the policy's implementation, direct benefits of 15,042,100 yuan and indirect benefits of CNY 11,400,480 were achieved, resulting in total benefits of CNY 12,904,690. In contrast, the total cost of upgrading the access control system, including hardware, software, and operational expenses, was only CNY 297,030 (approximately CNY 297,000). The net benefit was CNY 12,874,999, and the cost-benefit ratio for June was 434.5, over a hundred times greater than 1. These findings further validate the effectiveness of the new attendance policy in preventing substitute punching behavior and highlight the critical role of system upgrades in reducing company costs and improving management efficiency.

6. Further research: application of technical means in solving the problem of employee substitute punching

Integrating with the cloud monitoring system allows for the in-depth application of facial recognition technology and efficient linkage with the surveillance system. In addition to applying facial recognition for access control, the system relies on more than 300 cameras and cloud monitoring software inside and outside the building. Facial recognition is used to generate paths of employee movements, and cross-verification helps confirm instances of substitute punching.

This paper proposes a comprehensive technical architecture designed to facilitate efficient and intelligent data management and analysis, aimed at improving the detection of substitute punching. The architecture consists of multiple layers, each with specific functions and responsibilities, forming a coherent and highly automated system. Below is a detailed description of each layer (**Figure 1**):

- (1) User Layer: The User Layer serves as the front-end interface of the architecture, providing an intuitive user interface. This layer allows users to perform operations such as configuration maintenance, configuration management, alert management, and monitoring management. Through these functions, users can customize system behaviors based on actual needs, set alert rules, and monitor system status in real time.
- (2) Functional Layer: The Functional Layer forms the core of the system, integrating various advanced

functionalities, including but not limited to:

- (a) Facial recognition: Utilizes biometrics for authentication and security monitoring.
- (b) Attendance record export: Automates attendance management, supporting the export of attendance data.
- (c) Data analytics and forecasting: Employs statistical and machine learning algorithms for in-depth data analysis and forecasting future trends.
- (d) Data monitoring on the cloud: Monitors the status of cloud-stored data to ensure data security and availability.
- (e) Activity trajectory mapping: Tracks and records the activity paths of users or objects to support behavioral analysis.
- (f) Correlation analysis: Identifies correlations between data to uncover potential patterns or anomalies.

These functionalities are supported by computational, storage, alarm, and algorithm components.

(3) Collection Layer: The Collection Layer serves as the entry point for data into the system and includes the following components:

- (a) Collection agent: Acts as a mediator for data collection, gathering data from various sources.
- (b) Probe point: Defines the specific locations or interfaces for data collection.
- (c) API push: Enables real-time data transmission through an API interface.
- (d) Log: Records detailed logs of system operations, providing a foundation for troubleshooting and performance optimization.

(4) Abstraction Layer: The Abstraction Layer provides a high-level abstraction of system resources such as machines, networks, domains, and applications, simplifying the complexity of resource management and operations.

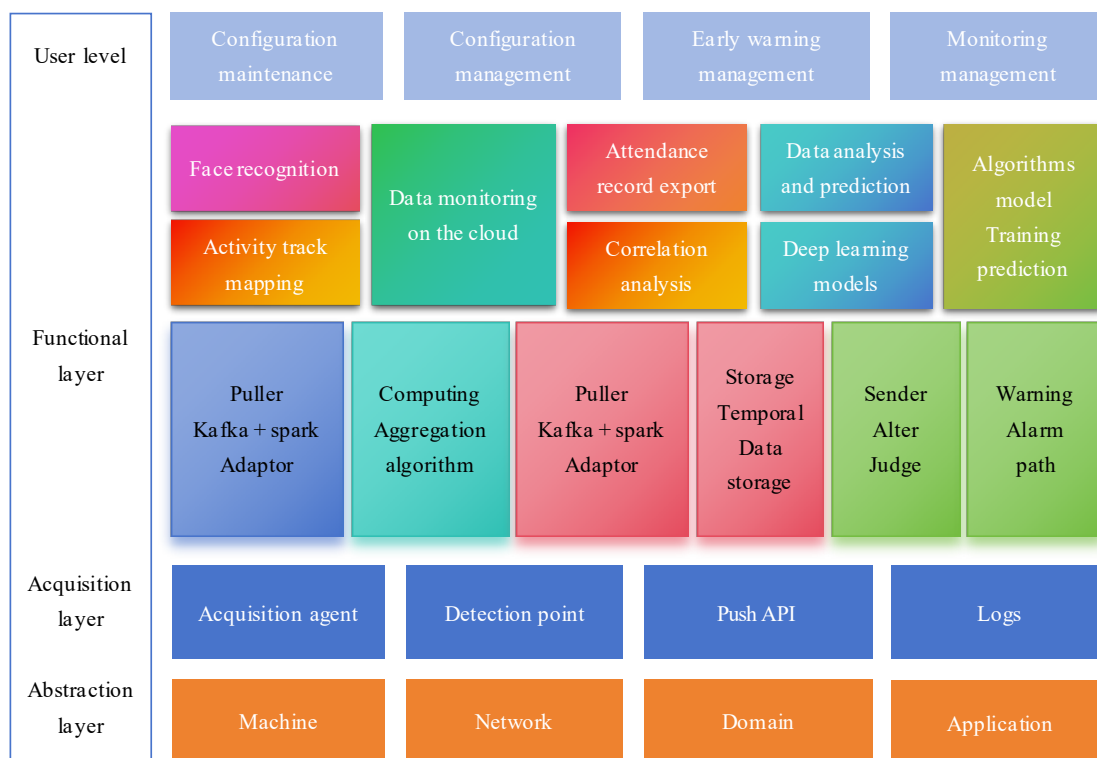


Figure 1. Cloud monitoring system architecture diagram

7. Measures to address the problem of employees punching cards on behalf of others

7.1. Accelerate the construction of the internal management system

To effectively solve the problem of employees punching cards on behalf of others, enterprises need to strengthen their internal management systems. This can be achieved through the development of a comprehensive attendance management system, the establishment of strict record-keeping and audit mechanisms, the assignment of specific management positions, regular statistical analysis of attendance data, and periodic evaluation of the system's effectiveness. Timely adjustments should be made to align with changes in the enterprise and employee needs, ensuring an efficient attendance management system that upholds operational order and employee discipline ^[9].

7.2. Establish a monitoring, reward, and punishment mechanism for employee punching issues

To address the problem of employee punch card misuse, enterprises must build a strict monitoring system alongside a reward and punishment mechanism. An independent and authoritative supervisory department should be established to oversee attendance data, ensuring accuracy and integrity. Clear penalties should be instituted for substitute punching behaviors, while a reward system should incentivize employees to adhere to attendance rules. Furthermore, enterprises should regularly assess attendance management, address anomalies promptly, and continually refine the mechanism to maintain fairness and efficiency in attendance management.

7.3. Foster a positive corporate culture

To effectively address the issue of substitute punching, it is essential to cultivate a strong corporate culture. Core corporate values, centered on integrity, should be established, with employees' awareness of attendance discipline enhanced through comprehensive education and communication. By combining team-building initiatives with employee care, companies can strengthen employees' sense of belonging and responsibility ^[10]. This collaborative effort can help create a positive environment where rules and regulations are respected, and workplace order is maintained.

7.4. Improve employee quality and capabilities

The effectiveness of addressing the substitute punching issue depends largely on improving the quality and capabilities of employees. Enterprise managers should adopt advanced management concepts, demonstrate excellent communication and collaboration skills, maintain high moral standards, and exhibit professional ethics. With rich management experience and specialized knowledge, managers can guide employees toward rule compliance. Under a sound management strategy with effective supervision and incentive mechanisms, employees can enhance their sense of belonging and loyalty, reducing the occurrence of substitute punching and promoting the healthy development of the enterprise.

8. Conclusion

The problem of employees punching cards on behalf of others is a common challenge in enterprise management, and its impact on businesses cannot be overlooked. This study found that substitute punching not only disrupts enterprise management order but also negatively affects the company's economy and organizational culture. Specifically, this issue may lead to increased labor costs, reduced operating income, and the breakdown of a

positive corporate atmosphere. To address this, enterprises can adopt a series of measures, such as strengthening attendance management, upgrading software and hardware with technological tools, establishing monitoring and punishment mechanisms, fostering a favorable corporate atmosphere, and enhancing employees' awareness of compliance with regulations.

Ultimately, enterprises should tailor their solutions to their specific circumstances, implementing appropriate measures to reduce instances of substitute punching. By doing so, they can improve productivity, reduce labor costs, and promote sustainable economic development for the business.

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Disclosure statement

The authors declare no conflict of interest.

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