Game Theory Analysis on Behavior Strategy Selections of Employees Under "996" Working System

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Abstract. On March 27, 2019, a project called 996ICU spread on GitHub. What is 996.ICU? It's work 996, sick ICU. The project received a wide response as soon as it was released. There have been a lot of favorable and critical comments on the "996" work system, which has triggered a wave of hot public opinions. Based on the game theory, this paper tries to analyze the employee's behavior strategy selection under "996" working system, and reveal the internal reasons for the long-term existence of "996" working system.

Introduction

On March 27, 2019, a project called 996ICU spread on GitHub. What is 996.ICU? It's work 996, sick ICU. This is actually a self-deprecating saying among programmers, meaning that if you work in mode 996, you are likely to be admitted to ICU in the future. The project's sponsor compared the minimum 72 working hours under the 996 working system with provisions such as the labor contract law, and called for "programmers' lives to be valued". The sponsor of "996ICU" called on the programmers to disclose, and write the companies with the super-long working system in the "list of 996 companies", which immediately received warm responses from a large number of users. Huawei, alibaba, ant financial, jingdong, 58.com, suning, pinduoduo, dajiang......A number of Internet head companies have been listed. Therefore, "996" quickly became a hot word on the Internet. The "996" work system has been widely discussed in the society, with many voices in favor and criticism, which has become a hot topic in the society for a time. Based on the game theory, this paper tries to analyze the employee's behavior strategy selection under "996" working system, and reveal the internal reasons for the long-term existence of "996" working system.

Game Analysis between Employees in 996 Working System Based on Prisoner's Dilemma

"996" working system has existed for a long time, but until the "996.ICU" program, none of employees in this kind of enterprise chose to publicly expose the system. This involves the game of behavior strategy selections between employees under the "996" working system.

Let's assume that an enterprise has two employees, who are both victims of the 996 working system. They have two strategies on whether to expose the "996" working system to the public, one is to choose exposure, and the other is to choose silence. If "exposure" is selected, and the enterprise has enough resources to formulate corresponding countermeasures according to whether the employees expose "996" working system to the public. If one employee chooses "exposure" and the other chooses "silence", the employee who chooses "silence" will be rewarded with 3 units and the employee who chooses "exposure" will be punished with 1 unit. If both choose "silence", neither reward nor punishment will be given.

Based on the above assumptions, we get the game payoff matrix between employee and employee about the choice of "exposure" and "silence" as shown as table 1.
Table 1. The game's payoff matrix between employee and employee about the choice of "exposure" and "silence".

|            | Employee B |
|------------|------------|
|            | exposure   | silence    |
| Employee A | 1, 1       | -1, 3      |
|            | 3, -1      | 0, 0       |

Based on the above game payment matrix, we analyze the strategy choice of employee A and employee B on whether to expose "996" working system.

First, we examine the strategic choice of employee A. If employee B chooses the "exposure" strategy, then the benefit of employee A choosing the "exposure" strategy is 1, and the profit of choosing the "silence" strategy is 3. Obviously, when employee B chooses the "exposure" strategy, choosing the "silence" strategy is the optimal response of employee A. If employee B chooses the "silence" strategy, then the profit of employee A choosing the "exposure" strategy is -1, and the profit of choosing the "silence" strategy is 0. Obviously, when employee B chooses the "silence" strategy, choosing the "silence" strategy is the optimal response of employee A. In this way, whether employee B chooses the "exposure" strategy or the "silence" strategy, the optimal response of employee A is to choose the "silence" strategy. Therefore, "silence" is the dominant strategy of employee A.

Second, we examine the strategic choice of employee B. If employee A chooses the "exposure" strategy, then the benefit of employee B choosing the "exposure" strategy is 1, and the profit of choosing the "silence" strategy is 3. Obviously, when employee B chooses the "exposure" strategy, choosing the "silence" strategy is the optimal response of employee B. If employee A chooses the "silence" strategy, then the profit of employee B choosing the "exposure" strategy is -1, and the profit of choosing the "silence" strategy is 0. Obviously, when employee A chooses the "silence" strategy, choosing the "silence" strategy is the optimal response of employee B. In this way, whether employee A chooses the "exposure" strategy or the "silence" strategy, the optimal response of employee B is to choose the "silence" strategy. Therefore, "silence" is the dominant strategy of employee B.

Apparently, in the game of whether or not to expose "996" working system, the dominant strategy of both employees is to choose the "silent" strategy. The structure of the game is the classic "prisoner's dilemma" model, the Nash equilibrium is ("silent ","silent"), that is to say two employees will choose "silent" strategy, although compared with both sides choose "exposure", choosing "silent" strategy will not only lead to the overall income of both sides is less than the overall income of both sides to choose "exposure" strategy, will also lead to the income of each individual is less than the income of he choose "exposure" strategy. The two employees were caught in the famous "prisoner's dilemma" in the game of deciding whether to expose "996" working system. Based on individual rationality, both employees make their own strategic choices to pursue the maximization of individual interests, but the final result is not only to the detriment of their individual interests, but also to the detriment of their collective interests, neither selfish nor beneficial to others.

According to the above analysis, it can be seen that when faced with the choice of whether or not to expose the "996" working system, compared with the enterprise as an organization, the strength of employees is too weak. For the sake of personal interest, employees will choose "silence" by coincidence. This is the reason why no one has come out to expose the 996 system for a long time.

Faced with the "996" working system implemented by the enterprise, although employees have to choose "silent" strategy due to their weakness, can employees choose to resist it? For this purpose, we assume that an enterprise has two employees A and B. Faced with the "996" working system, they have two choices: "accept" and "resist". Choosing "accept" means extra overtime and extra effort; choosing "resist" means no overtime and no extra effort. From the perspective of improving work efficiency and improving enterprise benefit, it is of course to encourage employees to work
overtime, that is, to support employees to choose "accept" strategy and to suppress employees to choose "resist" strategy.

If both employees choose to resist the "996" working system, on the one hand, the benefits of both parties will be maximized, everyone will have more rest time, and on the other hand, they will still have the same opportunities for promotion and salary increase, and they will still be in an equal competitive position.

However, employees are rational and will pursue the maximization of personal interests. Everyone wants to obtain more opportunities for promotion and salary increase. No one will rashly choose to resist the "996" working system, but will actively or passively choose to accept the "996" working system.

Game Analysis between Employees in 996 Working System Based on Boxed Pigs Game

According to the analysis conclusion in the previous section, when faced with the "996" working system, employees will neither choose "exposure" and "resist", but choose "silence" and "accept". In this case, when all the employees accept the "996" working system, employees have not only the difference of ability, but also the difference of working attitude. Different abilities and attitudes will bring different results. In order to analyze the internal law, we assume that an enterprise have employee A and employee B, employee A has strong ability, and employee B has weak ability. In the "996" working system, there are two strategies to choose: positive and negative. The enterprise assigns work tasks to teams, and employee A and employee B work overtime together to accomplish A task. The cost paid by employees to accomplish the work task is 4, and the reward after the task is accomplished is 10, in which employee A gets 7 and employee B gets 3.

Based on the above assumptions, the two employees have 2 choices respectively, and there are 4 situations as follows.

1. Both employees choose to work overtime positively. The total cost of completing the task is 4, and each employee bears the cost of 2 units respectively. Due to the stronger ability of employee A, employee A gets 7 units reward, and employee B gets 3 units reward.

2. Employees A chooses to work overtime positively, and employee B chooses to work overtime negatively, the total cost 4 of completing the task will be borne by the employee A alone, employees get A 7 units reward, but the cost due to the need to pay 4 units, its actual net income is 3, employees B did not pay cost, its net income for the 3 units reward.

3. Employees A chooses to work overtime negatively, and employee B chooses to work overtime positively, the total cost 4 of completing the task will be borne by the employee B alone, employees get B 3 units reward, but the cost due to the need to pay 4 units, its actual net income is -1, employees B did not pay cost, its net income for the 7 units reward.

4. Both employees choose to work overtime negatively. The task cannot be completed and they cannot get any paid. The benefit of both employees is 0.

Based on the above assumptions, we get the game payoff matrix between strong employee and weak employee about the choice of "positive" and "negative" as shown as table 2.

| Employee A | Employee B |
|------------|------------|
| positive   | 5, 1       | 3, 3       |
| negative   | 7, -1      | 0, 0       |

According to the above game payment matrix, we analyze the strategic choices of strong and weak employees when faced with the demands of working overtime in teamwork under the "996" working system.
First, we examine the strategic choice of strong employee. If the weak employee chooses the "positive" strategy, then the benefit of strong employee choosing the "positive" strategy is 5, and the profit of choosing the "negative" strategy is 7. Obviously, when the weak employee chooses the "positive" strategy, choosing the "negative" strategy is the optimal response of the strong employee. If the weak employee chooses the "negative" strategy, then the benefit of strong employee choosing the "positive" strategy is 3, and the profit of choosing the "negative" strategy is 0. Obviously, when the weak employee chooses the "negative" strategy, choosing the "positive" strategy is the optimal response of the strong employee. In this way, strong employee has no choice of the dominant strategy in this game, and his optimal response depends on the strategy choice of weak employee. If the weak employee chooses the "positive" strategy, the strong employee chooses the "negative" strategy; if weak employees chooses "negative" strategy, strong employee chooses "positive" strategy.

Second, we examine the strategic choice of weak employee. If the strong employee chooses the "positive" strategy, then the benefit of weak employee choosing the "positive" strategy is 1, and the profit of choosing the "negative" strategy is 3. Obviously, when the strong employee chooses the "positive" strategy, choosing the "negative" strategy is the optimal response of the weak employee. If the strong employee chooses the "negative" strategy, then the benefit of weak employee choosing the "positive" strategy is -1, and the profit of choosing the "negative" strategy is 0. Obviously, when the strong employee chooses the "negative" strategy, choosing the "negative" strategy is the optimal response of the weak employee. In this way, whether strong employee chooses the "positive" strategy or the "negative" strategy, the optimal response of employee A is to choose the "negative" strategy. Therefore, "negative" is the dominant strategy of weak employee.

Since the dominant strategy of weak employee in the team cooperation game is "negative", weak employee always chooses the "negative" strategy in the team cooperation game. Therefore, strong employee will have to choose "positive" strategies based on the above analysis. Therefore, the Nash equilibrium of the team cooperation game is ("positive", "negative"). Strong employee chooses the "positive" strategy, while weak employee chooses the "negative" strategy.

As a result, strong employees will have to choose "positive" strategy based on the analysis. Therefore, the Nash equilibrium of the team cooperation game is ("positive", "negative"), strong employee chooses the "positive" strategy, and weak employee chooses the "negative" strategy.

Obviously, this game is a classic "boxed pigs game" model, in which strong employee has to play an active role of "big pig" in team cooperation and undertake the responsibility of completing team tasks, while weak employee chooses the smart "small pig" role and picks up the big pig's free ride, and share the achievement of strong employee's hard work for free.

In the teamwork game under the "996" working system team, weak employees choose work overtime "negative" strategy is a wise choice, because weak employee, as a rational person, knows that choosing a "positive" strategy is a bad strategy because of more harm than good, choosing a "negative" strategy is a good strategy for him. Therefore, he lacks the motivation to actively complete the team task, because he can share the achievements of team work without any effort.

Meanwhile, it is a wise choice for the strong employee to choose "active" strategy to work overtime, because strong employee, as a rational man, knows that weak employee will certainly choose to "negative" strategy, this is because if they also choose "negative" strategy, the team task will not be completed, he himself will have no benefit, and so, he had better to work hard, select "active" strategy, undertake the responsibility of the team mission and contribute to the team. He can also make a profit himself. This means that some employees will take a free rid under the "996" working system. Because overtime work takes up more free time and is intensive, the life and energy of the employee who work hard is more consumed, but the results are the same or similar to those of passive overtime employees. Such a result will cause discontent among employees who actively work overtime. In the long run, their working enthusiasm will gradually decline until they become a passive overtime worker, which is unfavorable to the long-term development of the enterprise.
Summary

"996" working system is a common working mode in the society. The system infringes on the legitimate rights and interests of workers and harms their physical and mental health and family harmony. According to the existing laws in China, overtime work shall not exceed one hour per day, three hours in special circumstances, and no more than 36 hours per month. Therefore, the "996" working system is not only denounced in moral, but also is prohibited in law. That is to say, "996" work system is both immoral and illegal, should not exist, especially not for a long time.

However, under the current working environment, employees have to accept the "996" working system silently and even show a positive attitude, no matter the analysis is based on the prisoner's dilemma model or based on the boxed pigs game model. In order to change the "996" work system, it is necessary to have a strong third party intervention, such as public opinion and government regulation.

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