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GROUPING EMPLOYEES BY SOCIAL PREFERENCE AND CAPACITY

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ABSTRACT

Based on principal-agent theory, the optimal choice of grouping employees considering both social preference and staff capacity is studied in this paper. The model presents the equilibrium outcomes. The analysis shows that the optimal efforts of the employees are related to their social preferences and capacity coefficient. Regardless of the level of the capacity, when the employees with different social preference are grouped, the total revenue of the enterprise is the largest.

KEY WORDS: Grouping employee; social preference; capacity

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INTRODUCTION

In recent years, the incentive mechanism from different views has been focused, including manager's incentive mechanism, individual incentive mechanism and team incentive mechanism. There are more research results in the study of team incentives. Since Alchian put forward team production theory, the team's research around how to analyze and solve the team in the objective existence of free-rider problem started. One of the very effective to promote teamwork, alleviate the important way of free rider is horizontal supervision, which is by the initial transverse conditions discussed to horizontal supervision incentive effects of inspection, now has been developed to study on the problem of employee combination. The focus of the research on employee combination is around how to choose the right employees had been regarded as a key factor that affected the mix of employees by researchers. So far, Mas have proved that employees of high productivity not only increase their own output but also indirectly promote their colleagues' output. Therefore, it's the best choice of grouping employees for the firm to take advantage of social pressure to

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relieve the external negative of free rider. Similarly, Bandiera also has demonstrated that when the employees with different abilities are grouped, the firm performance is much higher than that when the employees of similar capacity are grouped. In addition, Falk and Ichino have conducted a field experiment which verified the effect of colleagues ,the experiment indicate that it's a best decision for the firm to group employees with different productivity rather than similar productivity, low productivity are more sensitive to colleagues' pressure than ones of high productivity. After 2012, the difference in the social preference of employees was regarded as a key factor that affected the mix of employees by researchers. The study on employee combination within horizontal monitoring based on social preference matching by WANG Yan-mei and ZHAO Xi-nan, a model built based on the principal- agent theory is analyzed to reach the conclusions as follows. First, when horizontal monitoring exists, the efforts of employee and corporation's income are always higher than those without horizontal monitoring. But different combinations have the same effects on the efforts of employee. Second, heterogeneous combination can increase corporation total benefits through caving salaries for employee indirectly, but the double high combination can increase corporation total benefits directly through obtaining more efforts from employees, and heterogeneous combination and double high combination are always better than homogeneous mix. Finally, the social preference of employee and the riskcosts are key factors of selecting combination way. Next, the study on horizontal monitoring and employee grouping with the social preference information by WANG Yan-mei, there are two kinds of mixes of employees: grouping employees with different social preference and grouping employees with similar social preference. Based on principal-agent theory, the optimal choice of grouping employees considering social preference is studied. The research shows that, the effort of employee and firm's income are higher than those without peer monitoring ; when there is peer monitoring , mix of employees does not affect the employee's effort, while the employee's effort with higher social preference is always higher than those with lower social preference; when the employees with different social preference are grouped, the social utility cost saving is more than that when the employees of similar social preference are grouped, and the firm can get more revenue.

We have not gained many research achievements of the mix of employees, because it drew researchers' attention not long ago. Although the theoretical research and empirical test on the issue gets some conclusions, but the study of the problems are mostly only consider the employee's capacity factor, ignoring the employee social preferences, or only consider the employee's social preferences factor, ignore the employee's capacity. In brief, a further study considering both the employees' capacity and social preference based on WANG's study considering employees' social preference and foreign studies considering employees' capacity is shown in this article.

There are two attributes in this paper, one is employees' capacity and the other is their social preference. The assumption is one of the attributes must be, by changing another attribute, we can observe any change in the output of enterprise and find the optimal combination of employees. There are a total of 8 kinds of mixes of employees displayed in the tables below when the 2 attributes are based on high and low possibility.

When employees' capacity is high	
Heterogeneous grouping	high social preference and low social preference
Homogeneous grouping	double high and double low

When employees' capacity is low	
Homogeneous grouping	double high and double low social preference
Heterogeneous grouping	high social preference and low social preference

When employees' social preference is high	
Heterogeneous grouping	High capacity and low capacity
Homogeneous grouping	double high and double low

When employees' social preference is low	
Homogeneous grouping	double high and double low
Heterogeneous grouping	high capacity and low capacity

2 Model assumptions

Assumption 1: There are 4 employees in the team, divided into 2 little risk- neutral teams which share the common effort cost function and economists who expect maximum utilities.

Assumption 2: The principal can only observe the employees' output because of the asymmetry of information. When the employees are homogeneously grouped, the team output function is below:

$$x_1 = \theta_{11}a_{11} + \theta_{12}a_{12} + \varepsilon$$
, $x_2 = \theta_{21}a_{21} + \theta_{22}a_{22} + \varepsilon$

When the employees are heterogeneously grouped, the team output function is below:

$$x_1 = \theta_{11}a_{11} + \theta_{21}a_{21} + \varepsilon \quad x_2 = \theta_{12}a_{12} + \theta_{22}a_{22} + \varepsilon$$

In the equations above, a_{11} , a_{12} , a_{21} , a_{22} represents each employee' effort input the work, x_1 means the total output of a group and x_2 means the other team's total output. In addition, \mathcal{E} signifies an independent quantity which varies randomly ($\mathcal{E} \sim N(0, \sigma^2)$) and θ_{ij} (i, j = 1, 2, i indicates the team code, j indicates the employee code) is the capacity factor of employee, say, when capacity is low, $\theta_{ij} = 1$; when capacity is high, $\theta_{ij} > 1$.

Assumption 3: According to the common method to simplify the effort cost function involved in the issues of principal – agent, Set

$$C(a_{ij}) = \frac{1}{2}ka_{ij}^2$$

Where C is effort cost and k (k > 0) is assigned as marginal cost coefficient.

Assumption 4: if the incentive contract of the risk- neural principal is linear and the employee's wages is made up of basic wages and variable wages, the employee wages function is expressed below:

$$w_{ij}(x_i) = \alpha_{ij} + \beta_{ij}x_i \quad i, j = 1,2$$

Assumption 5: Social utility the employee gets from other colleagues will come out when one employee compares one's efforts with others, we can express it in this way:

$$p(a_{ij}:\gamma_i) = \gamma_i(a_{ij} - a_{tp}) \quad (0 < \gamma_i < 1, i, j, t, p = 1, 2)$$

When p = 1, 2, i = t, $j \neq p$ and when $i \neq t$, j = p, where γ_i represents social preference of an agent and $\gamma_i > \gamma_i$.

 $\gamma_1 > \gamma_2$. Furthermore, a_{ip} and a_{ij} are in the same team, t represents the team's code, p represents the employee code in the team.

3 MODELING AND SOLVING

3.1 High staff capacity

(1) Heterogeneous combination

Two team of output function:

$$x_1 = \theta_{11}a_{11} + \theta_{21}a_{21} + \varepsilon$$
 $x_2 = \theta_{12}a_{12} + \theta_{22}a_{22} + \varepsilon$

Two team of compensation function:

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The expected utility of the principal is equal to the expected income:

$$Ev[x_1 + x_2 - w_{ij}(x_1) - w_{ij}(x_2)]$$

$$= (1 - \beta_{11} - \beta_{21})(\theta_{11}a_{11} + \theta_{21}a_{21}) + (1 - \beta_{12} - \beta_{22})(\theta_{12}a_{12} + \theta_{22}a_{22}) - \alpha_{11} - \alpha_{12} - \alpha_{21} - \alpha_{22}$$
The agent' certainty equivalent income:

$$CE_{ij} = w_{ij}(x_i) - c_{ij} + \gamma_i(a_{ij} - a_{ij}) \quad i, j, t = 1, 2, t \neq i$$

The problem of the principal is to choose the optimal solution $^{(lpha_{ij},eta_{ij})}$:

 $w_{i}(x_{i}) = \alpha_{i} + \beta_{i} x_{i} \quad i = 1.2$

$$\max(1 - \beta_{11} - \beta_{21})(\theta_{11}a_{11} + \theta_{21}a_{21}) + (1 - \beta_{12} - \beta_{22})(\theta_{12}a_{12} + \theta_{22}a_{22}) - \alpha_{11} - \alpha_{12} - \alpha_{21} - \alpha_{22}$$

$$\alpha_{ij} + \beta_{ij}x_i - \frac{1}{2}k(a_{ij})^2 + \gamma_i(a_{ij} - a_{ij}) \ge u$$
S.t. (IR)
$$i, j, t = 1, 2, t \neq i$$
(1)
$$\max \alpha_{ij} + \beta_{ij}(\theta_{1j}a_{1j}' + \theta_{2j}a_{2j}') - \frac{1}{2}k(a_{ij}')^2 + \gamma_i(a_{ij}' - a_{ij})$$
(IC)
$$i, j, t = 1, 2, t \neq i$$
(2)

Where the equation 1 indicates participation constraint and equation 2 indicates incentive compatibility constraint. In the case where equation 1 is true, equation 2 is replaced with first-order condition, thus, the problem can be formulated:

$$\max_{a_{ij},\beta_{ij}} \sum_{j=1,2i=1,2} (\theta_{1j}a_{1j} + \theta_{2j}a_{2j} - \frac{k}{2}a^{2}{}_{ij} + \gamma_{i}(a_{ij} - a_{ij}) - u)$$

 $i, j, t = 1, 2, t \neq i$
S.t. $\beta_{ij}(\theta_{1j} + \theta_{2j}) + \gamma_{i} = ka_{ij}$
 $i, j = 1, 2$
(4)

Plug (4) into (3), solve the first order derivative:

$$a_{ij} = \frac{\theta_{1j} + \theta_{2j} + \gamma_i}{k} \quad j = 1,2$$
(5)

Plug (5) into (3), the total revenue of a team can be formulated below:

$$w = \frac{(\theta_{11} + \theta_{21})^2 - \gamma_1^2 + (\theta_{12} + \theta_{22})^2 - \gamma_2^2 + 2(\gamma_1 - \gamma_2)^2}{k} - 4u$$

(2) Homogeneous grouping

The output functions of 2 teams are as follows:

$$x_1 = \theta_{11}a_{11} + \theta_{12}a_{12} + \varepsilon \quad x_2 = \theta_{21}a_{21} + \theta_{22}a_{22} + \varepsilon$$

The certainly equivalently income of an agent is signified as:

$$CE_{ij} = w_{ij}(x_i) - C_{ij} + \gamma_i(a_{ij} - a_{ip})$$

$$i, j, p = 1, 2, j \neq p$$

The expected utility of a neutral principal is signified as:

$$Ev[x_1 + x_2 - w_{ij}(x_1) - w_{ij}(x_2)] =$$

$$= (1 - \beta_{11} - \beta_{12})(\theta_{11}a_{11} + \theta_{12}a_{12}) + (1 - \beta_{21} - \beta_{22})(\theta_{21}a_{21} + \theta_{22}a_{22}) - \alpha_{11} - \alpha_{12} - \alpha_{21} - \alpha_{22}$$

How to find the best combination of $(\alpha_{ij}, \beta_{ij})$ by a principal can be formulated as:

 $\max(1-\beta_{11}-\beta_{12})(\theta_{11}a_{11}+\theta_{12}a_{12})+(1-\beta_{21}-\beta_{22})(\theta_{21}a_{21}+\theta_{22}a_{22})-\alpha_{11}-\alpha_{12}-\alpha_{21}-\alpha_{22}$

S.t.(IR)

$$\alpha_{ij} + \beta_{ij}(a_{i1} + a_{i2}) - \frac{1}{2}k(a_{ij})^{2} + \gamma_{i}(a_{ij} - a_{ip}) \ge u$$

$$i, j, p = 1, 2, j \neq p \qquad (6)$$

$$\max \alpha_{ij} + \beta_{ij}(\theta_{i1}a_{i1}^{'} + \theta_{i2}a_{i2}^{'}) - \frac{1}{2}k(a_{ij}^{'})^{2} + \gamma_{i}(a_{ij}^{'} - a_{ip})$$

$$i, j, p = 1, 2, j \neq p \qquad (7)$$

Where the equation 6 indicates participation constraint and equation 7 indicates incentive compatibility constraint of a principal. In the case where equation 6 is true, equation 7 is replaced with first-order condition, thus, the problem can be expressed equally:

$$\max_{a_{ij}, \beta_{ij}} \sum_{i=1,2} \sum_{j=1,2} (\theta_{i1}a_{i1} + \theta_{i2}a_{i2} - \frac{k}{2}a^{2}{}_{ij} + \gamma_{i}(a_{ij} - a_{ip}) - u)$$

$$i, j, p = 1, 2, j \neq p \qquad (8)$$
S.t $\beta_{ij}(\theta_{i1} + \theta_{i2}) + \gamma_{i} = ka_{ij}$ $i, j = 1, 2$

$$(9)$$
Plug (9) into (8) solve the first order derivative:

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$$a_{ij} = \frac{\theta_{i1} + \theta_{i2} + \gamma_i}{k} \qquad i = 1,2 \tag{10}$$

Plug (10) into (8), the total revenue of a team can be formulated below:

$$w' = \frac{(\theta_{11} + \theta_{12})^2 - \gamma_1^2 + (\theta_{21} + \theta_{22})^2 - \gamma_2^2}{k} - 4u$$

3.2 Low staff capacity

(1)Heterogeneous combination

Two team of output function:

$$x_1 = a_{11} + a_{21} + \varepsilon$$
 $x_2 = a_{12} + a_{22} + \varepsilon_2$

The expected utility of the principal is equal to the expected income:

$$Ev(x_1 + x_2 - w_{ij}(x_1) - w_{ij}(x_2)) = = (1 - \beta_{11} - \beta_{21})(a_{11} + a_{21}) + (1 - \beta_{12} - \beta_{22})(a_{12} + a_{22}) - \alpha_{11} - \alpha_{12} - \alpha_{21} - \alpha_{22}$$

The agent' certainty equivalent income:

$$CE_{ij} = w_{ij}(x_i) - c_{ij} + \gamma_i(a_{ij} - a_{ij})$$
 $i, j, t = 1, 2, t \neq i$

The problem of the principal is to choose the optimal solution $(lpha_{_{ij}},eta_{_{ij}})$:

$$\max(1 - \beta_{11} - \beta_{21})(a_{11} + a_{21}) + (1 - \beta_{12} - \beta_{22})(a_{12} + a_{22}) - \alpha_{11} - \alpha_{12} - \alpha_{21} - \alpha_{22}$$

$$\alpha_{ij} + \beta_{ij}(a_{1j} + a_{2j}) - \frac{1}{2}ka_{ij}^{2} + \gamma_{i}(a_{ij} - a_{ij}) \ge u$$
S.t. (IR)
 $i, j, t = 1, 2, t \neq i$ (11)

$$\max \alpha_{ij} + \beta_{ij}(a_{1j}' + a_{2j}') - \frac{1}{2}ka_{ij}'^{2} + \gamma_{i}(a_{ij}' - a_{ij})$$
 $i, j, t = 1, 2, t \neq i$ (12)

Where the equation 11 indicates participation constraint and equation 12 indicates incentive compatibility constraint of a principal. In the case where equation 11 is true, equation 12 is replaced with first-order condition, thus, the problem can be expressed equally:

$$\max_{\alpha_{ij},\beta_{ij}} \sum_{j=1,2i=1,2} \sum_{i=1,2} (a_{1j} + a_{2j} - \frac{k}{2} a^{2}{}_{ij} + \gamma_{i}(a_{ij} - a_{ij}) - u)$$

$$i, j, t = 1, 2, t \neq i$$
(13)

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(14)

$$\beta_{ij} + \gamma_i = \kappa a_{ij} \qquad i, j = 1, 2$$

Plug (14) into (13), solve the first order derivative:

$$a_{ij} = \frac{1 + \gamma_i}{k} \qquad i, j = 1,2 \tag{15}$$

Plug (15) into (13), the total revenue of a team can be formulated below:

S.t.

$$w_1 = \frac{6 + (\gamma_1^2 + \gamma_2^2) + 2(\gamma_1 + \gamma_2) - 4\gamma_1\gamma_2}{k} - 4u$$

(2) Homogeneous composite

Two team of output function:

$$x_1 = a_{11} + a_{12} + \mathcal{E}$$
 $x_2 = a_{21} + a_{22} + \mathcal{E}$

The expected utility of the principal is equal to the expected income:

 $Ev(x_1 + x_2 - w_{1j}(x_1) - w_{2j}(x_2)) = (1 - \beta_{11} - \beta_{12})(a_{11} + a_{12}) + (1 - \beta_{21} - \beta_{22})(a_{21} + a_{22}) - \alpha_{11} - \alpha_{12} - \alpha_{21} - \alpha_{22}$ The agent' certainty equivalent income:

$$CE_{ij} = \alpha_{ij} + \beta_{ij}(a_{i1} + a_{i2}) - \frac{k}{2}a^{2}{}_{ij} + \gamma_{i}(a_{ij} - a_{ip})$$

$$i, j, p = 1, 2, j \neq p$$

The problem of the principal is to choose the optimal solution $(lpha_{_{ij}},eta_{_{ij}})$:

$$\begin{aligned} \max(1 - \beta_{11} - \beta_{12})(a_{11} + a_{12}) + (1 - \beta_{21} - \beta_{22})(a_{21} + a_{22}) - \alpha_{11} - \alpha_{12} - \alpha_{21} - \alpha_{22} \\ \alpha_{ij} + \beta_{ij}(a_{i1} + a_{i2}) - \frac{1}{2}ka_{ij}^{2} + \gamma_{i}(a_{ij} - a_{ip}) \ge u \\ \text{S.t. (IR)} \\ i, j, p = 1, 2, j \neq p \\ \text{(IC)} \\ \max \alpha_{ij} + \beta_{ij}(a_{1i}' + a_{2j}') - \frac{1}{2}ka_{ij}'^{2} + \gamma_{i}(a_{ij}' - a_{ip}) \\ i, j, p = 1, 2, j \neq p \\ \text{(IC)} \end{aligned}$$

Where the equation 16 indicates participation constraint and equation 17 indicates incentive compatibility constraint of a principal. In the case where equation 16 is true, equation 17 is replaced with first-order condition, thus, the problem can be expressed equally:

$$\max_{a_{ij},\beta_{ij}} \sum_{i=1,2} \sum_{j=1,2} (a_{i1} + a_{i2} - \frac{k}{2} a^{2}_{ij} + \gamma_{i} (a_{ij} - a_{ip}) - u)$$

$$i, j, p = 1, 2, j \neq p$$
(18)

S.t.
$$\beta_{ij} + \gamma_i = ka_{ij} \quad i, j = 1,2$$
(19)

Plug (19) into (18), solve the first order derivative:

$$a_{ij} = \frac{1 + \gamma_i}{k} \tag{20}$$

Plug (20) into (18), the total revenue of a team can be formulated below:

$$w_1' = \frac{6 + 2(\gamma_1 + \gamma_2) - (\gamma_1^2 + \gamma_2^2)}{k} - 4u$$

3.3 Social preferences is low

(1)Heterogeneous combination

Assuming that two capacity coefficient of the employees are θ_{11} and θ_{12} , capacity coefficient of the other employees are 1, $\theta_{22} = 1$, $\theta_{21} = 1$.

Two team of output function:

$$x_1 = \theta_{11}a_{11} + a_{21} + \varepsilon$$
, $x_2 = \theta_{12}a_{12} + a_{22} + \varepsilon$

The whole calculation process in the case of the heterogeneous grouping high-capacity employees can be applied here except that γ_i should be replaced with γ_2 and the final solution is $\theta_{22} = 1, \theta_{21} = 1$. The optimal solution:

$$a_{ij} = \frac{\theta_{1j} + \theta_{2j} + \gamma_2}{k} \quad j = 1,2$$

Total earnings:
$$v_2 = \frac{(\theta_{11} + 1)^2 + (\theta_{12} + 1)^2 - 2\gamma_2^2}{k} - 4u$$

(2) Homogeneous composite

Two team of output function:

 $x_1 = \theta_{11}a_{11} + \theta_{12}a_{12} + \varepsilon$ $x_2 = a_{21} + a_{22} + \varepsilon$ when employees capacity are high in the heterogeneous combination are same, only employee's capacity is low in the team x_2 , their capacity coefficient are $\theta_{22} = 1$, $\theta_{21} = 1$. At this time, worker's social preferences are low, their social preference coefficient are γ_2 . The optimal solution:

$$a_{ij} = \frac{\theta_{i1} + \theta_{i2} + \gamma_2}{k} \qquad i = 1,2$$

At this time, enterprise total revenue is equal to the part γ_1 of w' instead γ_2 , $\theta_{22} = 1, \theta_{21} = 1$. The result is

$$w_{2}' = \frac{(\theta_{11} + \theta_{12})^{2} + 4 - 2\gamma_{2}^{2}}{k} - 4u$$

3.4 Social preferences is low

In the same method, can get the result.

Heterogeneous combination, two team enterprise's total revenue:

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$$w_3 = \frac{(\theta_{11}+1)^2 + (\theta_{12}+1)^2 - 2\gamma_1^2}{k} - 4u$$

Homogeneous composite, two team enterprise's total revenue:

$$w_{3}' = \frac{(\theta_{11} + \theta_{12})^{2} + 4 - 2\gamma_{1}^{2}}{k} - 4u$$

4 Comparison and analysis of results

Compare the mixes of employees involved in this paper and find those groups which maximum the firm's revenue, then compare again to find the optimal choice of grouping employees.

4.1 Compare the equilibrium outcomes among different groups

We have solved the model and come to the conclusion that the unified formula to get the equilibrium results is:

$$a_{ij} = \frac{\theta_{i1} + \theta_{i2} + \gamma_i}{k} \quad \text{or} \quad a_{ij} = \frac{\theta_{1j} + \theta_{2j} + \gamma_i}{k} \quad i, j = 1, 2$$

We can tell that the efforts of the employee has something to do with effort coefficient and social preference.

When employee's capacity is low and the capacity coefficient is 1, the effort is only positively associated with social preference. Additionally, when the employee's social preference is certain, efforts is only relative to

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the capacity coefficient of employee, where that coefficient is greater than 1 means high employee capacity and that coefficient is less than 1 means low employee's capacity

4.2 Comparison of total revenue

Table 1 high staff capacity		
	Total revenue	
Heterogeneous grouping	$w = \frac{(\theta_{11} + \theta_{21})^2 - \gamma_1^2 + (\theta_{12} + \theta_{22})^2 - \gamma_2^2 + 2(\gamma_1 - \gamma_2)^2}{k} - 4u$	
Homogeneous grouping	$w' = \frac{(\theta_{11} + \theta_{12})^2 - \gamma_1^2 + (\theta_{21} + \theta_{22})^2 - \gamma_2^2}{k} - 4u$	
Result	w > w'	

	Total revenue
Heterogeneous grouping	$w_1 = \frac{6 + (\gamma_1^2 + \gamma_2^2) + 2(\gamma_1 + \gamma_2) - 4\gamma_1\gamma_2}{k} - 4u$
Homogeneous grouping	$w_{1}' = \frac{6 + 2(\gamma_{1} + \gamma_{2}) - (\gamma_{1}^{2} + \gamma_{2}^{2})}{k} - 4u$
Result	$w_1 > w_1'$

Table 2 low staff capacity

Table 3 low staff social preference

	Total revenue
Heterogeneous grouping	$w_2 = \frac{(\theta_{11} + 1)^2 + (\theta_{12} + 1)^2 - 2\gamma_2^2}{k} - 4u$
Homogeneous grouping	$w_{2}' = \frac{(\theta_{11} + \theta_{12})^{2} + 4 - 2\gamma_{2}^{2}}{k} - 4u$
Table 4 high staff social preference	

	Total revenue
Heterogeneous grouping	$w_3 = \frac{(\theta_{11} + 1)^2 + (\theta_{12} + 1)^2 - 2\gamma_1^2}{k} - 4u$
Homogeneous grouping	$w_{3}' = \frac{(\theta_{11} + \theta_{12})^{2} + 4 - 2\gamma_{1}^{2}}{k} - 4u$

(1) A conclusion can be reached that whatever the capacity is high or low, the mixes of different social preference will bring into more revenue, which is the best choice of grouping employees for firm because the cost savings calculated in the equations below which is caused by social preference difference increase the total revenues.

$$\frac{2(\gamma_1-\gamma_2)^2}{k}$$

(2)Compare table 3 with table 4, we can see that the mixes of employees of low social preference will get more revenue than those of low ones since $\gamma_1 > \gamma_2$.

(3) Compare the two groups in table 3,

$$w_{2} - w_{2}' = \frac{2(\theta_{12} + \theta_{11} - \theta_{11}\theta_{12} - 1)}{k} \ge \frac{-2(\sqrt{\theta_{11}\theta_{12}} - 1)^{2}}{k}$$
(21)
Only if $\theta_{11} = \theta_{12}$, formula (21)

$$w_2 - w_2' = \frac{-2(\sqrt{\theta_{11}\theta_{12}} - 1)^2}{k} < 0$$

that is $W_2 < W_2$. Therefore, the heterogeneous groups where employees' capacity is low and employees share common capacity coefficient can get higher revenue, similarly, the heterogeneous groups where employees' capacity is high and employees share common capacity coefficient can get higher revenue.

CONCLUSIONS

Grouping employees considering both social preference and capacity is studied in this paper. To conclude, Employees' social preference and capacity have a great influence on the best choice of grouping employees for a firm. First, if the employees whose social preference are double high or double low and who share the common coefficient, it's the best choice of grouping employees of different capacity for firm to group to maximize its revenue. Second, whatever employees' capacity is high or low, it's the best choice of grouping employees of different social preference for firm to group to maximize its revenue. It's necessary to do further study as for the employees who are risk averse.

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