Quantitative analysis of enterprises’ talent management based on logistic model

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Abstract. With the development of my country's economy, the competition among enterprises has intensified. While obtaining more development opportunities, enterprises are facing new pressures and challenges. Continuously optimizing and adjusting corporate management models is necessary for enterprises to obtain development in more stable basis. Based on the background of human capital data in Beijing in 2019, this article uses the average salary, salary growth rate and job search frequency in different industries and different positions as independent variables, while the impact of turnover rate on the company as dependent variables, using binary logistic regression method, based on the analysis of the results of the calculation example, the practicality of the model is tested and reasonable suggestions are made, which have great reference significance for the enterprises’ talent management work.

1. Introduction
Compared with the orderly and stable business environment in the past, the current business environment is more disorderly, complex and unpredictable. In order to adapt to market changes, companies must accurately and effectively acquire, train, and retain talents, and give full play to the role of talents, in order to achieve long-term and steady development in market competition.

In this regard, relevant experts and scholars have conducted some discussions and studies on enterprise talent management. In 2018, Chen Quanrun discussed the role of blockchain in corporate financial management, marketing, and human resources, the policy risks and internal risks in corporate management of blockchain technology, and the application countermeasures of this technology [1]. In 2020 Kan Zhuo Measures aimed at the tourism market under the background of big data, proposed tourism enterprise talent management reform and innovation strategies to promote the development of talent management of tourism enterprises under the background of big data, and improve the operation and management level of tourism enterprises [2]. Xu Yunxiao established The SWAL talent training work model (S stands for support, W stands for worksheet, A stands for ability, L stands for level), focuses on solving the problems existing in the talent training of state-owned enterprises, and effectively improves the pertinence, scientificity, effectiveness, and effectiveness of talent training and systemic [3].

The above-mentioned discussion and research on enterprise talent management work is still at the level of theoretical analysis, and there are still great difficulties when enterprises implement it. This article will establish a logistic model to quantitatively analyze the enterprise talent management work to obtain more objective and effective talent management methods.
2. Model and principle
With the advent of the 21st century, the market economy is developing rapidly and enterprises are blooming everywhere, which undoubtedly increases the intensity of market competition. Under the new situation of the current society, the rise and fall of an enterprise is closely related to the talent management model. Therefore, the only way for an enterprise is to do a good job in talent management. This article investigates the average salary, salary growth rate, job search frequency and turnover rate in the real estate, finance, high-tech, consumer goods and education industries in 2019, measuring talents’ attitudes towards corresponding positions, and will apply logistic regression analysis to corporate talent management Work in progress to provide data support and countermeasure suggestions.

2.1. Establish a logistic model of enterprise talent management
Turnover rate is an important indicator used by enterprises to measure the flow of human resources within the enterprise. Through the inspection of turnover rate, we can understand the attraction and satisfaction of employees. Excessive turnover rate generally indicates that the employee's mood is more volatile, the labor-management relationship is more serious, and the cohesion of the company is reduced. It can lead to an increase in human resource costs (including direct and indirect costs) and a decrease in organizational efficiency. However, it does not mean that the lower the employee turnover rate, the better. Maintaining a certain level of employee turnover in market competition can enable companies to use the talent competition system of survival of the fittest to maintain the vitality and innovation of the enterprise.

In this paper, the impact of the turnover rate on the company is taken as the dependent variable. When $\eta \geq 25\%$, $\sigma$ is set to "1", it means that the turnover rate at this time is higher and has a greater impact on the enterprise; when $\eta < 25\%$, the value is "0"", which means that the turnover rate at this time is low and the impact on the company is small; for this kind of problem, the normal linear model is obviously inappropriate. In this case, logistic regression can be used to determine the relationship between the level of turnover in a certain industry position and the influencing factors. The model expression is:

$$\ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3$$

(1)

Which, $p$ represents the probability of whether the turnover rate has an impact on the company, $\beta_0, \beta_1, \beta_2, \beta_3$ represents the parameter to be evaluated, and $X_0, X_1, X_2, X_3$ respectively represents the influencing factors of the impact level of the turnover rate: salary growth rate, average salary level and job search frequency.

3. Example analysis
3.1. Data sources
This paper collects 2019 annual industry data of human capital in Beijing, involves in industries including real estate, finance, education, technology, consumer goods, energy, chemical industry, environmental protection and other fields, with various industries popular jobs as observation object. 34 samples are chosen, and the wage growth rate, average wages and job search frequency are investigated. The detailed data is shown in the table 1.
Table 1. 2019 annual industry data of human capital in Beijing.

| Post | Salary growth rate % | Average salary | Job search times | Turnover rate% |
|------|----------------------|----------------|-----------------|---------------|
| 1    | 7.8                  | 223353         | 157728          | 21.8          |
| 2    | 7.7                  | 191268         | 154690          | 25.4          |
| 3    | 7.4                  | 184140         | 159300          | 24.7          |
| 4    | 7.2                  | 203940         | 159386          | 21.7          |
| 5    | 8                    | 192060         | 154828          | 22.1          |
| 6    | 6.4                  | 112160         | 157605          | 53.2          |
| 7    | 5.5                  | 266720         | 148663          | 18.7          |
| 8    | 5.6                  | 421490         | 126419          | 12.8          |
| 9    | 6.3                  | 250260         | 133569          | 22.8          |
| 10   | 7.3                  | 398440         | 147039          | 27.2          |
| 11   | 7.6                  | 408320         | 112061          | 29            |
| 12   | 7.8                  | 276600         | 118385          | 18.1          |
| 13   | 8.7                  | 210740         | 115432          | 29            |
| 14   | 8.8                  | 378680         | 149493          | 29.1          |
| 15   | 9.7                  | 184307         | 50366           | 18.8          |
| 16   | 6                    | 176492         | 117737          | 15.8          |
| 17   | 12.1                 | 188789         | 138299          | 21.5          |
| 18   | 7.3                  | 167966         | 147318          | 18.3          |
| 19   | 7                    | 170604         | 141504          | 16            |
| 20   | 8.5                  | 181317         | 141177          | 12            |
| 21   | 16.3                 | 135774         | 130238          | 20.2          |
| 22   | 13.1                 | 145391         | 145169          | 24.3          |
| 23   | 18.4                 | 164112         | 145656          | 25.9          |
| 24   | 11.9                 | 145650         | 132827          | 18            |
| 25   | 14.3                 | 162205         | 108714          | 27.9          |
| 26   | 9.3                  | 234048         | 152077          | 28.5          |
| 27   | 9.9                  | 354480         | 165016          | 29.5          |
| 28   | 11.9                 | 338916         | 164276          | 30.4          |
| 29   | 8.9                  | 269160         | 158130          | 18.1          |
| 30   | 7.2                  | 157281         | 154555          | 29.5          |
| 31   | 7.3                  | 177711         | 102287          | 28.5          |
| 32   | 7.7                  | 206627         | 123548          | 30            |
| 33   | 6.7                  | 162023         | 140406          | 24.5          |
| 34   | 8.3                  | 16983          | 149353          | 30.5          |

3.2. Single-factor linear analysis

First, SPSS software is implemented to perform a linear analysis of the data under the influence of a single factor, and then the impact of salary growth rate, average salary level, and job search frequency on the turnover rate are analyzed. The output is shown in table 2.

Table 2. Equation coefficient.

| Model       | Unstandardized Coefficients | Standardized coefficient | s   | significance |
|-------------|-----------------------------|--------------------------|-----|--------------|
| B           | Standard error              | Beta                     |     |              |
| Constant    | 24.561                      | 4.095                    | 5.998| 0.000        |
| Salary growth rate% | -0.005                      | 0.438                    | -0.002| -0.012       | 0.990        |
Figure 1. Salary growth rate and turnover rate unary linear regression results.

It can be seen from figure 1 that the regression curve and the scatter plot show the same trend as a whole, which has certain statistical reference value. When the salary growth rate rises, the turnover rate will slowly decrease. The difference in the impact of different industries on turnover rates is the reason for this phenomenon. For example, in the real estate industry, the golden age of the real estate industry has passed. The salary growth rate has declined, and the turnover rate will increase slightly. Among them, the phenomenon of high salaries among industries will also decrease, but the phenomenon of talents flowing from the real estate industry to other industries has begun to increase. After the outbreak in 2017-2019, the cultural travel industry has also shown a cooling trend, and the turnover rate has also reached a new high. In high-tech-related industries, traditional software development has a low ceiling, and talented people flow to the Internet and artificial intelligence industries. The development of the artificial intelligence industry is fierce, talent competition is intensive, and salary growth rates have increased, but it has also caused high levels of turnover in various industries. Therefore, when the industry-wide salary growth rate changes, the industry-wide turnover rate does not change significantly.

| Model       | Unstandardized Coefficients | Standardized coefficient |
|-------------|-----------------------------|--------------------------|
|             | B              | Standard error | Beta      | t       | significance |
| Constant    | 26.685         | 3.366          | 7.929     | 0.000   |
| Average salary | -9.967x10-6 | 0.000          | -0.120    | -0.697  | 0.491        |
Figure 2. Unary regression results of average salary and turnover rate.

According to table 3 and figure 2, the significant coefficient of the impact of average salary level on turnover rate is 0.491, and the turnover rate shows a downward trend when the salary level increases. For example, with the release of various regulatory policies in the financial industry, customer assets flow from investment banks to asset management companies, which have allowed the financial industry to recover salary increases. At the same time, the popularity of technology talents in various industries has risen, causing traditional technology industry talents to flow to other industries. Turnover rates in other industries have increased. In the consumer goods industry, due to sales, stores, and front-line workers account for a relatively high proportion, and the turnover rate remains high. Therefore, with the increase in salary levels, the turnover rate of the whole industry has shown a downward trend as a whole.

Table 4. Equation coefficient.

| Model           | Unstandardized Coefficients | Standardized coefficient | t    | significance |
|-----------------|-----------------------------|--------------------------|------|--------------|
| Constant        | 16.106                      | 7.88                     | 2.044| 0.049        |
| Job search times| 6.09 × 10⁻⁵                 | 0.185                    | 1.081| 0.288        |
Figure 3. Unary linear regression results of job search frequency and turnover rate.

According to table 4 and figure 3, the significant coefficient of the influence of job search frequency on turnover rate is 0.28. The higher the job search frequency, the higher the turnover rate of this position. With the changes in the market environment, emerging hot jobs and the emergence of extremely competitive salary levels attracting market talents, which make job search frequency increase, market talent flow accelerates, and turnover rate increases. For example, the financial industry has been greatly affected by the tightening of risk control and the country's macro-control, resulting in intensified internal competition and a sharp increase in demand for inter-bank lending business and product managers. And financial technology is one of the key industries promoted by the country this year. Companies need to make finance and technology more compatible, they need better software engineers, better products and operation talents to promote the rapid development of the industry. At this time, talents in the industry that are in full development will be attracted by industry positions with high salary levels and high salary growth rates. Therefore, before the job search frequency of the whole industry increases, the turnover rate has shown an overall upward trend.

Table 5. Logistic regression analysis.

| B       | std.error | walds | df | Significance |
|---------|-----------|-------|----|--------------|
| Pay growth % | 0.303     | 0.361 | 0.701 | 1 | 0.402 |
| Job search times | 0.115     | 0.337 | 0.104 | 1 | 0.747 |
| The average pay | 0.313     | 0.363 | 0.747 | 1 | 0.387 |
| Constant | -0.176    | 0.346 | 0.26 | 1 | 0.61 |

The significance coefficient of salary growth rate is 0.402, the significance factor of job search frequency is 0.747, and the significance factor of average salary is 0.387, which has certain reference value and can be used for reference analysis of enterprise talent management. According to the above table, the multiple linear regression equation is:

\[ y = -0.176 + 0.303X_1 + 0.115X_2 + 0.313X_3 \]  \hspace{1cm} (2)

The formula (1) is changed by Logit, and the binary Logistic regression equation obtained is as follows:

\[ P = \frac{e^{-0.176+0.303X_1+0.115X_2+0.313X_3}}{1+e^{-0.176+0.303X_1+0.115X_2+0.313X_3}} \]  \hspace{1cm} (3)

It can be seen from the above multiple linear regression equation that the factors affecting the turnover rate are composed of three variables: salary growth rate, average salary level, and job search frequency. These three variables are used to apply binary "Logistic" regression to determine the turnover rate of the company. The impact level is predicted. Predicting the level of impact of the turnover rate of 34 positions on the company, combined with the actual turnover rate, found that the prediction accuracy rate is relatively high, which has a certain reference value for the management of the enterprise.

Based on the above results, it can be known that the employee’s turnover intention has an important impact on the reasonableness of the salary. After the employees are paid, they do not only pay attention to how much they receive, but also compare their own pay with the salary and at the same time. Compare other employees in the company to determine whether the salary they receive is reasonable. If employees of a company are dissatisfied with the salary they receive, they will feel resistance to their positions and the company, makes new plans for their career development, and usually takes actions to vent their dissatisfaction, such as reducing their investment in work. Failure to obey the company’s arrangements and passive sabotage may ultimately result in the voluntary resignation of employees or the dismissal of employees by the company.
4. Conclusions
In the competitive model of market economy, the long-term development of an enterprise requires not only optimizing product quality, but also optimizing the work efficiency and innovation ability of employees, and constantly following the development and changes of the market. Therefore, enterprises should attach great importance to the design of salary differences for different positions. The reasonable allocation of human resources can also use the salary difference as an effective way to improve the enthusiasm of employees, so that employees can improve their work efficiency and ensure the company's market competitiveness. Through a good salary difference management model, it can have a positive incentive effect on employees, effectively improving the working atmosphere in the enterprise, can increase employees' executive power, and enhance collective cohesion and competitiveness.

In addition, as the post-90s employees gradually occupy an important position in the workplace, the phenomenon that employees who have higher requirements for the quality of life and hope to be recognized and respected becomes more and more obvious. According to the relevant survey results, it can be seen that companies relying solely on market-competitive salaries can no longer meet the differences in the needs of employees of all ages, and the leading level of benefits, the company’s good development prospects and the corporate culture recognized by employees have become the he most effective advantage for talent attraction and retention. Many companies have also begun to devote more energy to diversified comprehensive returns. By satisfying the individual needs of employees, it can motivate employees to better serve the company, create more value for the company, and improve the overall competitiveness of the company and corporate strategic goals.

Acknowledgement
Scientific Research and Planning Project of The Education Department of Jilin Province "Innovation Model of Big Data Driving The Improvement of Governance Capacity of County Government of Jilin Province".
The project of number: JJKH20201270SK

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