A Performance Evaluation Method for Employees in Small and Medium-Sized IT Enterprises Based on Multiple Indicators

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Abstract. In recent years, research on performance evaluation of IT enterprises has become a hot topic worthy of attention. In some countries, IT enterprises have become essential in driving economic development. However, there are significant differences in personnel management, performance evaluation, and other aspects among listed IT enterprises, large IT enterprises, and small and medium-sized IT enterprises, making it difficult to standardize performance evaluation for different types of enterprises. Especially for small and medium-sized IT enterprises, there are still specific problems in performance evaluation due to the unique characteristics of the enterprise. The primary manifestation is that standardized evaluation indicators cannot be fully applicable to small and medium-sized IT enterprises, making it challenging to conduct dynamic evaluations based on the characteristics of the enterprise. This article is based on the research and analysis data of performance evaluation management for small and medium-sized IT enterprises in a particular region of China. It proposes a multi-indicator-oriented performance evaluation system for small and medium-sized IT enterprises and offers corresponding guarantee measures.

Keywords: Multiple indicators; small and medium-sized IT enterprises; performance evaluation.

1. Introduction

Some preliminary results have been achieved in employee performance evaluation for IT enterprises. However, there are still many outstanding problems to be solved, for example, how to correctly understand evaluation work and grasp the guiding ideology of evaluation to ensure that employee performance evaluation operations are in place; How to conduct scientific assessments on scientific research and development, engineering and technical personnel, and marketing personnel; How to achieve the scientificity, effectiveness, and pertinence of evaluation standards; How to prevent evaluations from becoming mere formality, and so on. The above issues highlight the necessity of establishing an employee performance evaluation system, which can only be achieved after some time.

Due to the various technical and market issues faced by small and medium-sized IT enterprises, there are still specific problems in personnel performance assessment and other related work, mainly the following: (1) IT enterprise managers generally need more management knowledge and ability. (2) Many IT companies have mispositioned the performance evaluation function of R&D personnel. (3) The actual payment level of performance-based salaries for project teams and R&D personnel is decoupled from the operational performance level of the enterprise or department. (4) The assessment work only focuses on the results of the assessors and ignores the assessment of work quality. (5) Lack of performance training and communication. Whether it is for monthly or annual performance evaluations, the company's human resources department or supervisory leaders rarely engage in formal or informal communication with employees. (6) The forced distribution of assessment results could be more adequate. (7) The excessive emphasis on linking assessment with project benefits has led to competition for high-yield projects, while basic platform research has yet to be conducted.

Based on the above background, this article proposes a management method for performance appraisal based on the research and analysis data of performance appraisal management in small IT enterprises in a particular region of China. This article researches and analyzes the performance
management work of employees in small and medium-sized IT enterprises in a specific area of China, analyzing the current problems and their reasons. At the same time, a multi-indicator performance evaluation model based on screening indicator sets is proposed, and performance evaluation methods and corresponding institutional guarantee measures are designed.

The remaining work arrangement of this article is as follows: The second part introduces the relevant work of this study; The third part conducts research and analysis, and the fourth part proposes a multi-indicator employee performance evaluation model and method; The fifth part summarizes the work of this article.

2. Related works

There are many research results on employee performance evaluation in enterprises. Tian et al analyzed the relationship between executive equity incentives, employee stock ownership plans, and corporate performance based on empirical evidence of environmental uncertainty[1]. Khan et al. analyzed the factors that affect the performance of small and medium-sized enterprises and found that the personality charm and behavior of enterprise managers significantly impact employee performance, which is positively correlated[2]. Ali et al studied the main factors that affect the performance of small and medium-sized enterprises and believed that social media cannot be ignored. After analyzing the influencing factors of employee performance[3]. Xiao et al. concluded that the enterprise's reward mechanism, as the primary work motivation, directly affects the performance level of employees[4]. Wen et al analyzed the relationship between corporate environment and employee performance in the context of digitalization[5]. Reference[6] proposes a performance evaluation method for enterprise employees based on voting procedures, which is based on the actual situation of the enterprise and involves employees in voting to achieve relatively fair employee performance evaluation. Reference[7] proposed a simple weighted employee performance evaluation method and made necessary improvements to the traditional way to gain more intelligent group decision-making. Authority[8] offers a new performance evaluation system for employee performance evaluation indicators. Reference[9] investigated the effectiveness of performance evaluation methods, focusing on the impact of 5S in enterprise management on employee performance evaluation. Reference[10] analyzed the critical role of feedback mechanisms in employee performance evaluation. It used empirical analysis methods to prove that the feedback mechanism for employee performance evaluation in enterprises has a positive effect. Reference[11] analyzed the role of enterprise leaders in the employee performance appraisal process, taking a particular university's employee performance appraisal work as an example. Reference[12] studied the performance evaluation method for temporary employees in enterprises, proposed an evaluation method based on the index comparison method, and demonstrated the effectiveness of this method. Reference[13] takes a water supply and wastewater treatment company as an example to study the performance evaluation method of the traditional balanced scorecard. It proposes an improved method based on grey correlation and data analysis methods. After analyzing the influencing factors of employee performance appraisal in enterprises, the literature[14] believes motivation is the most direct factor. Employees who have motivation in their work can achieve satisfactory performance. The motivation here includes salary, career planning, etc. Reference[15] takes the performance evaluation of employees at the Bank of Uganda as an example to study and evaluate the impact of the Human Resources Information System (HRIS) on employee performance.

In addition, more and more scholars have recently begun to pay attention to other factors that affect employee performance, such as continuous work, job satisfaction, team structure, etc[16-20]. Reference[21] summarizes the main factors that affect employee performance in enterprises, including motivation, leadership, work environment, corporate culture, management organization, compensation, etc.. It provides a decision-making basis for specifying employee performance evaluation methods. Reference[22] proposed the Comprehensive Balanced Scorecard (BSC) and Best Worst Method (BWM) methods for the performance evaluation of insurance company
employees. Literature[23] takes the performance evaluation of hotel employees as an example to analyze the impact of work motivation on performance levels. Reference[24] examined the relationship between customer and employee performance and proposed the mediating effect of customer satisfaction.

3. Research and analysis

This article adopts a sampling method to conduct a questionnaire survey on the performance evaluation work of small and medium-sized IT enterprises in a particular region of China. The survey targets small and medium-sized IT enterprise staff, including software research and development personnel, project management personnel, project managers, enterprise management personnel, etc. Regarding sample selection for the sampling survey, 6 IT companies were selected for research and analysis. A total of 247 survey questionnaires were distributed, and 226 valid questionnaires were collected, with a recovery rate of 90.5%, which meets the expected goals, as shown in Table 1.

<table>
<thead>
<tr>
<th>Corporate</th>
<th>Number of Employees</th>
<th>Questionnaire Number</th>
<th>Valid Questionnaire</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>53</td>
<td>48</td>
<td>42</td>
<td>87.50%</td>
</tr>
<tr>
<td>B</td>
<td>67</td>
<td>41</td>
<td>35</td>
<td>85.37%</td>
</tr>
<tr>
<td>C</td>
<td>76</td>
<td>38</td>
<td>36</td>
<td>94.74%</td>
</tr>
<tr>
<td>D</td>
<td>123</td>
<td>80</td>
<td>78</td>
<td>97.50%</td>
</tr>
<tr>
<td>E</td>
<td>22</td>
<td>20</td>
<td>18</td>
<td>90.00%</td>
</tr>
<tr>
<td>F</td>
<td>23</td>
<td>20</td>
<td>17</td>
<td>85.00%</td>
</tr>
<tr>
<td>Total</td>
<td>364</td>
<td>247</td>
<td>226</td>
<td>91.50%</td>
</tr>
</tbody>
</table>

In the analysis of survey samples, the main focus is on gender, age, length of service, education, salary and benefits, and staff working hours in small and medium-sized IT enterprises, as shown in Figures 1, 2, and 3.

Figure 1 shows male employees accounted for most of the surveyed small and medium-sized IT enterprises, especially technical staff. It indicates that the current personnel composition of IT enterprises is still mainly composed of male employees. Through analysis, this is primarily due to IT enterprises' high work pressure and strong technical expertise. It determines that when conducting performance evaluation work, it is necessary to comprehensively consider from the perspective of gender, especially to pay attention to research and analysis on the different social divisions of labor between men and women.
As shown in Figure 2, small IT enterprises have a clear trend towards a younger age group of employees, and this trend is constantly strengthening, especially among those aged between 25 and 35, who are the leading group of personnel. According to the analysis, this is because IT enterprises require mental labor and are engaged in the transformation of knowledge achievements. Unlike traditional labor methods, young people are needed to learn. Moreover, according to the characteristics of the IT industry, the younger R&D personnel and the mature management personnel are the future trends of industry development.

As shown in Figure 3, there is currently a trend of high education in small and medium-sized IT enterprises. The majority of people are undergraduates or above. It requires that educational factors be fully considered in performance evaluation.

Figure 4 shows the current statistical situation of personnel turnover in IT enterprises in primary and secondary schools. According to statistical data, most employees who work in one company for only 1-3 years will switch to another, indicating that small and medium-sized IT enterprises exhibit significant mobility. Many talents are transitioning towards large IT enterprises or other industries, and the continuous influx of new professionals demonstrates this. This requires that in performance evaluation, full consideration should be given to improving performance and retaining high-level technical personnel.
Fig. 5 Statistical analysis of employees' weekly working hours

Figure 5 shows the weekly working hours of employees in small and medium-sized IT enterprises. The 45 to 50 hours of work per week indicates that employees in small and medium-sized IT enterprises face significant work pressure. The main reason is that many small and medium-sized IT enterprises need a stable and continuous customer flow in project research and development. Therefore, there is a characteristic of flexible work in their work, which cannot guarantee strict working hours. Thus, a reasonable assessment should be made based on the elastic factors of employees' working hours in performance evaluation.

Fig. 6 Annual salary statistics and analysis of employees

Figure 6 shows employees' annual salaries in small and medium-sized IT enterprises (10000 RMB). According to survey data, salaries ranging from 50,000 to 100,000 RMB per year account for the majority, which is relatively low compared to the industry average. Therefore, in performance evaluation, it is necessary to increase the proportion of compensation for employees who make additional contributions.

Based on the above primary data, this article also conducted research and analysis on performance evaluation systems, communication and feedback mechanisms, evaluation standards, and other aspects and summarized the current problems as follows:

1) The setting of assessment indicators is not in line with the company's strategy

At present, there are problems with the decomposition of performance goals in most enterprises; that is, the performance goals of each department and each employee are not derived from the strategic objectives of the enterprise layer by layer but are extracted based on their respective work content. In this way, a disconnect exists between performance evaluation and strategic implementation, challenging and guiding all employees toward the organization's goals.

2) Performance indicators were not quantified to the position and were not detailed enough

The current assessment objectives are only briefly summarized, and each project department has not refined and decomposed performance indicators, combined with corresponding project department responsibilities and job descriptions, and implemented them one by one to each specific project department management position. Employee responsibilities have yet to be fully implemented, resulting in a disconnect between organizational and employee performance management.
(3) The design of performance indicators is too subjective, not comprehensive and objective enough

Currently, most enterprises only set a few assessment indicators that need to be more quantitative and explicit in content based on basic management needs. The assessor evaluates this indicator as designed based on personal intentions. Such assessment indicators cannot provide fair and impartial assessment results, and it is challenging to provide comprehensive and objective evaluations to the assessed.

(4) Lack of scientific and reasonable performance evaluation methods

Small and medium-sized IT enterprises often choose popular performance evaluation methods when conducting performance evaluations. Although these methods are theoretically reasonable, they may not be suitable for the evaluation purposes and specific situations of small and medium-sized enterprises. Relying solely on target assessment can no longer meet performance assessment requirements, making it difficult to achieve the goal of the evaluation.

(5) Lack of reasonable basis for performance management

At present, many small and medium-sized IT companies have performance bonuses, but many companies need to link the determination of individual performance bonuses to individual performance. Some are only paid based on the ideas of company managers or team managers, while others adopt egalitarianism in distribution without exerting its motivating effect on employees.

(6) Lack of communication and untimely feedback on work

Many small and medium-sized IT enterprises need more communication between superiors and subordinates and between departments before performance evaluation. During the evaluation process, the evaluated individuals need the opportunity to defend or provide additional explanations and understand the gap between their own performance and organizational expectations, resulting in low employee recognition of the performance evaluation results and even resistance.

(7) Lack of feedback on assessment results

While most assessment executives in enterprises provide feedback on the assessment results to managers, they need to provide detailed information about the assessment to employees, leading to distrust of the assessment results. As a result, they have lost an opportunity to fully understand themselves, reflect on themselves, and communicate with management in both directions. Performance evaluation does not provide a decision-making basis for employee promotion, transfer, or salary increase, thus losing the significance of performance evaluation.

4. Multi-indicator employee performance evaluation method

4.1 Performance Evaluation Multiple Indicator Fusion Calculation Method

Different staff members need to evaluate the performance evaluation system with multiple indicators. Based on the comprehensive evaluation results, a fusion calculation method is used to assign weights to different hands. After calculating the weighted average value, the performance scores of employees in small and medium-sized IT enterprises are finally determined, as shown in Table 2.

<table>
<thead>
<tr>
<th>Type</th>
<th>Indicators</th>
<th>Value</th>
<th>Indicator weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work performance</td>
<td>Project effect</td>
<td>10</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>Work efficiency</td>
<td>10</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Team level</td>
<td>10</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Management level</td>
<td>10</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Technique level</td>
<td>10</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Innovative learning</td>
<td>10</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Contribute</td>
<td>10</td>
<td>15%</td>
</tr>
</tbody>
</table>
As shown in the indicator weight table in Table 2, in actual calculations, the final performance evaluation score is obtained by multiplying the scores of each section by their weight values, and the sum of the scores ranges from 0 to 100 points.

### 4.2 Execution of Multiple Indicators Evaluation Model

After designing the basic indicator model and calculation method of the performance appraisal multi-indicator evaluation system, it is necessary to determine the execution process based on the developed method. It is required to improve the organization, personnel, and performance appraisal methods in small and medium-sized IT enterprises. The principle is to achieve fair, just, scientific, and transparent performance appraisal evaluation work. Figure 7 shows the architecture of a multi-indicator evaluation system model for the performance evaluation of small and medium-sized IT enterprises.

![Multi indicator evaluation system](image)

According to the calculation model, performance evaluation scoring data is collected for enterprise employees based on 10 indicators during the performance evaluation cycle. The collection methods include voting, inquiry, data analysis, and other methods. The average value should be calculated when obtaining multiple evaluation results for the same indicator. The calculation principle is as follows:

1. Eliminate the highest and lowest results in the assessment score;
2. Calculate the average of the remaining results.

After the calculation results are collected, they will be submitted to the performance appraisal personnel for summary and analysis of notifications. According to the characteristics of small and medium-sized IT enterprises, performance appraisal and evaluation work will be carried out. The specific process is as follows:

1. Different business staff collect and summarize primary data, including attendance and workload. The summarized data is reviewed internally, then by relevant responsible persons, and submitted to the reviewers for processing.
(2) The performance appraisal management personnel calculate the final score of the staff based on the primary assessment data submitted by the team and the rating system and advance the last assessment summary data for review and public disclosure of the results.

(3) If the relevant personnel have objections to the performance appraisal results, they will propose a review. After the study is approved, the performance appraisal results will be modified, and the final performance appraisal summary data will be formed, which will be provided to the relevant departments for subsequent reward and punishment work.

4.3 Application suggestions for the multi-indicator evaluation model of performance evaluation

To ensure the smooth implementation of improved performance evaluation and salary, it is necessary to provide guarantees from the following aspects:

(1) Strengthen the concept of performance evaluation

The company needs to continuously convey the idea of performance evaluation and gradually strengthen this theory in the hearts of every employee so that every employee understands the concept of performance evaluation. Only when this concept is rooted in employees' hearts can performance appraisal become an effective management tool and not degenerate into an assessment tool. It is still unimportant for small and medium-sized software enterprises, as there are relatively few R&D personnel for small and medium-sized software, which is easy to implement and transmit. Of course, when strengthening the concept of performance evaluation, we need to pay attention to methods and strategies, gradually guide R&D personnel to identify with performance evaluation, and progressively make them understand that the purpose of conducting performance evaluation is to help them provide their work-ability, identify their shortcomings, and help them customer service these shortcomings, enhancing their competitive potential.

(2) Strengthen management organizational structure

When implementing evaluation, we not only need to obtain the support of the management but also the management should take the lead and set an example. When formulating performance evaluations, we need the close participation of control, and even the managers are the creators of the performance evaluation system. Only when they are most aware of the specific work of their employees can they be treated in a particular way, and targeted evaluation indicators can be developed? Only then can the developed evaluation indicators have a factual basis and feasibility.

(3) A fair and just competitive environment

A fair and reasonable competitive platform for enterprises, the impact of employment strategies on performance evaluation is crucial. Suppose a company does not have a fair and reasonable performance evaluation. In that case, it will lose its appropriate standards and will not reflect on encouraging innovation, following processes, improving code quality, and R&D efficiency. If you gain fairness, you gain credibility. Once employees lose trust in the company, believing they will devote themselves wholeheartedly to their work and be loyal is challenging. Breaking away from a fair, competitive environment and discussing performance evaluation is just a formality, and it is impossible to achieve good results.

(4) The performance evaluation system cannot remain unchanged

The only constant in today's world is change. Over time, many factors, such as the company's operating environment, current institutional policies, and so on, will change. Personal pursuits also change over time. Performance evaluation also needs to adapt to these changes, continuously improve, and improve constantly. In addition, we cannot be perfect when formulating a performance evaluation system. There will always be some unreasonable aspects, which may only be exposed in the specific implementation process in the future. This is why we need to adjust the shortcomings of our evaluation system promptly so that our performance evaluation can be improved with the actual development of the enterprise and the business situation. Therefore, the performance evaluation system is not static or permanent and requires continuous improvement.
The application of the performance evaluation multi-indicator evaluation model is aimed at the calculation of multiple evaluation indicators and the final performance evaluation score for project managers and software developers in small and medium-sized IT enterprises. The application personnel mainly include project managers, administrators, developers, and software testers.

5. Summary

This article takes small and medium-sized IT enterprises in a particular region of China as the survey object. It uses a questionnaire survey to investigate and analyze the current problems of enterprise performance evaluation work. A multi-indicator performance evaluation system is designed, and corresponding guarantee measures are proposed. This article first studied relevant theoretical literature and conducted in-depth research and analysis on performance appraisal-related theories and methods. Secondly, based on the characteristics of small and medium-sized IT enterprises, six Chinese enterprises were selected as samples to conduct research and analyze the current status of performance appraisal management in small and medium-sized IT enterprises. After analyzing 226 effective survey questionnaires, detailed data analysis was conducted from multiple perspectives, such as IT enterprise employee background and performance appraisal work status. Thirdly, the current problems were elaborated on based on the survey questionnaire results. Finally, a performance evaluation system with multiple indicators was designed, and corresponding safeguard measures were proposed.

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