

A Preliminary Study on the Programmatic Module Construction of Collective Negotiation

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Abstract: *Insufficient reference data, information asymmetry, and inability to scientifically determine the growth rate are the main obstacles restricting the proposal of a reasonable and effective collective negotiation plan. In the context of the country accelerating the national cyber development strategy, the construction of digital China, and labor unions vigorously promoting the construction of intelligent labor unions, this paper follows the whole process of collective negotiation, utilizing human decision making (intervention) and computer information processing (AI, etc.), and tries to establish six modules, including big data screening, policy and regulation correction, cloud computing processing, rights and interests compensation, psychological expectation revision, and supervision, to intelligentize the main process of collective negotiation. The scientific operation of the modules is ensured by establishing a dynamic prediction platform based on improving data accuracy and a dual-layer linkage data sharing platform based on improving the breadth of data from All-China Federation of labor unions (ACFTU) to grass-roots labor unions vertically and from industry to enterprise labor unions horizontally. At the same time, reasonable wage increase range and quantitative correction scheme under special circumstances are given through the use of "negative feedback" principle of automatic control theory, the large cycle of closed-loop control system, and the analysis of the absolute and relative value range of wage increase in two-dimensional coordinates. Using qualitative and quantitative analysis methods, the exploration of intelligent collective negotiation can be creatively carried out, and they provide innovative ideas for breaking through the barriers of collective negotiation between labor and management, formulating scientific and feasible collective negotiation plans, and promoting win-win and stability for both labor and management.*

Keywords: *intelligent labor union, collective negotiation, procedural modules, wage increase and dynamic correction in the post-epidemic period*

1. Introduction

Collective negotiation is an important part of realizing democracy in the whole process. Promoting fair and just salary distribution through negotiation is of great significance to promoting common prosperity. In the context of accelerating the construction of a cyber powerful and digital China, it is more intelligent and scientific to promote collective negotiation through the construction of smart labor unions, modularization and data-oriented thinking. Moreover, they are effective new ideas and methods to stimulate win-win stability between labor and capital.

2. The construction of intelligent labor union is a powerful mean to break through the main obstacles of collective negotiation

Collective negotiation is of great significance to the construction of a harmonious and stable labor relation and an effective way to promote win-win and stability between labor and capital. However, in reality, there are often situations where "the enterprise is unwilling to talk, and the labor side is afraid talk". The enterprise is "unwilling to talk" in the fear of the labor side requesting excessive demand on account of maximizing profit. On the other hand, the labor side is asymmetrical in grasping the information of the enterprise compared with the capital side, and it is difficult to follow various factors such as regional government regulation policies, industry standards, enterprise operating conditions, labor protection, putting forward reasonable wages and other rights and interests demands, so that they "dare not talk about it". To solve this phenomenon and propose a scientific and reasonable negotiation plan, it is necessary to resolve the three main obstacles of insufficient reference data, information asymmetry, and the inability to scientifically determine the increase.

The "14th Five-Year Plan for the Development of China's Labor Movement and Labor Union Work" clearly stated: speed up the construction of intelligent labor unions, create an upgraded version of labor union work, build a system for improving labor union governance capabilities based on big data technology, construct an innovative system of labor union service applications based on Internet technology, and build a basic support system for labor union network information based on cloud computing technology. This provides ideas and points out the direction for the use of big data, cloud computing and other new-generation information technologies in collective negotiation, using intelligent means to break through major obstacles, thereby proposing a intelligent, scientific, reasonable, and win-win negotiation plan.

3. The establishment and function analysis of the collective negotiation program module

According to the whole process of the collective negotiation process, it is recommended to set six levels of modules (Figure 1)^[1]. At the same time, according to the characteristics of different modules, two methods of manual and computer information processing (AI, etc.) are used as the module operation mechanism and correction principles:

Module 1: Big Data Screening Module. Before using this module, two steps of preliminary preparation are required. The first is the manual preparation stage: the enterprise labor union puts forward a negotiation request and reports to the superior labor union. The enterprise replies to the negotiation offer, and the labor union elects employee representatives (in Western countries, the industrial labor union takes the lead, and the negotiating cartel is the main representative of the negotiation). Both labor and management make demands. At the same time, financial information, operating data, production reports, wage distribution and other relevant materials provided by the employer are entered into the data sharing platform. The second is the data collection stage, which collects relevant data in various aspects according to the data sharing platform (detailed below). After the completion of the two phases, through the big data screening function of the module, the demands of both employers and employees will be comprehensively reviewed, filtered, and screened for the data provided by the enterprise, and big data will be provided for the shared platform to form a database.

Module 2: Policies and Regulations Correction Module. Through the appeals of both employers and employees and the big data formed, laws, regulations, and policies are defined, data boundaries are drawn, and appeals and data that do not comply with laws and regulations are eliminated to ensure the legal compliance of data so that both parties can use it in the next stage of data analysis.

Module 3: Cloud Computing Processing Module. This module is the core module of the whole system. According to the database established in Module 2, firstly, enter the business data of the enterprise into the data prediction platform (detailed below) to predict the business data of the next year. After the pre-judgment, the big data group identified by both employers and employees including the pre-judged experience data of the next year will be processed. In the specific processing, regression, statistics, probability, golden section, marginal analysis, and system operation analysis can be used according to different situations to process data. The author of this paper proposes to use two-dimensional coordinates to analyze the wage increase range, and the "negative feedback" principle in the automatic control theory and the closed-loop control cycle system to analyze the increase correction (detailed below).

Module 4: Equity Compensation Module. Although the measurement data plan formed by module three is scientific, it does not have "temperature". This module can strive to realize the fairness and justice of all labor groups through poverty relief, labor union support, labor protection and other rights and interests compensation measures under the basic principle of benefit priority.

Module 5: Psychological Expectation Modification Module. After forming a preliminary collective negotiation plan between the labor and the capital, through continuous psychological contests and revisions between the labor and the capital, the dual balance of psychological and social utility is achieved. This module mainly involves psychologists and sociologists.

Through the data processing of the above five modules, combined with the actual situation of both employers and employees, synthesizing social and industry conditions, a negotiation plan that conforms to policies and regulations has begun to take shape. At this time, putting forward the win-win plan of wage increase range and labor efficiency increase is both scientific and reasonable, and there is no lack of temperature or care.

Module 6: Supervision Module. The reason why many collective negotiations have been abandoned

halfway is that the after-the-fact supervision and implementation mechanism is incomplete. Therefore, in order to avoid this situation, a third-party supervision should be established, such as the labor inspection team, labor unions, industries, and enterprises to jointly promote and strengthen supervision, establish supervision of both the labor and management, and the common module that ensures the simultaneous improvement of wage growth, labor efficiency, and the effective implementation of the negotiation plan.

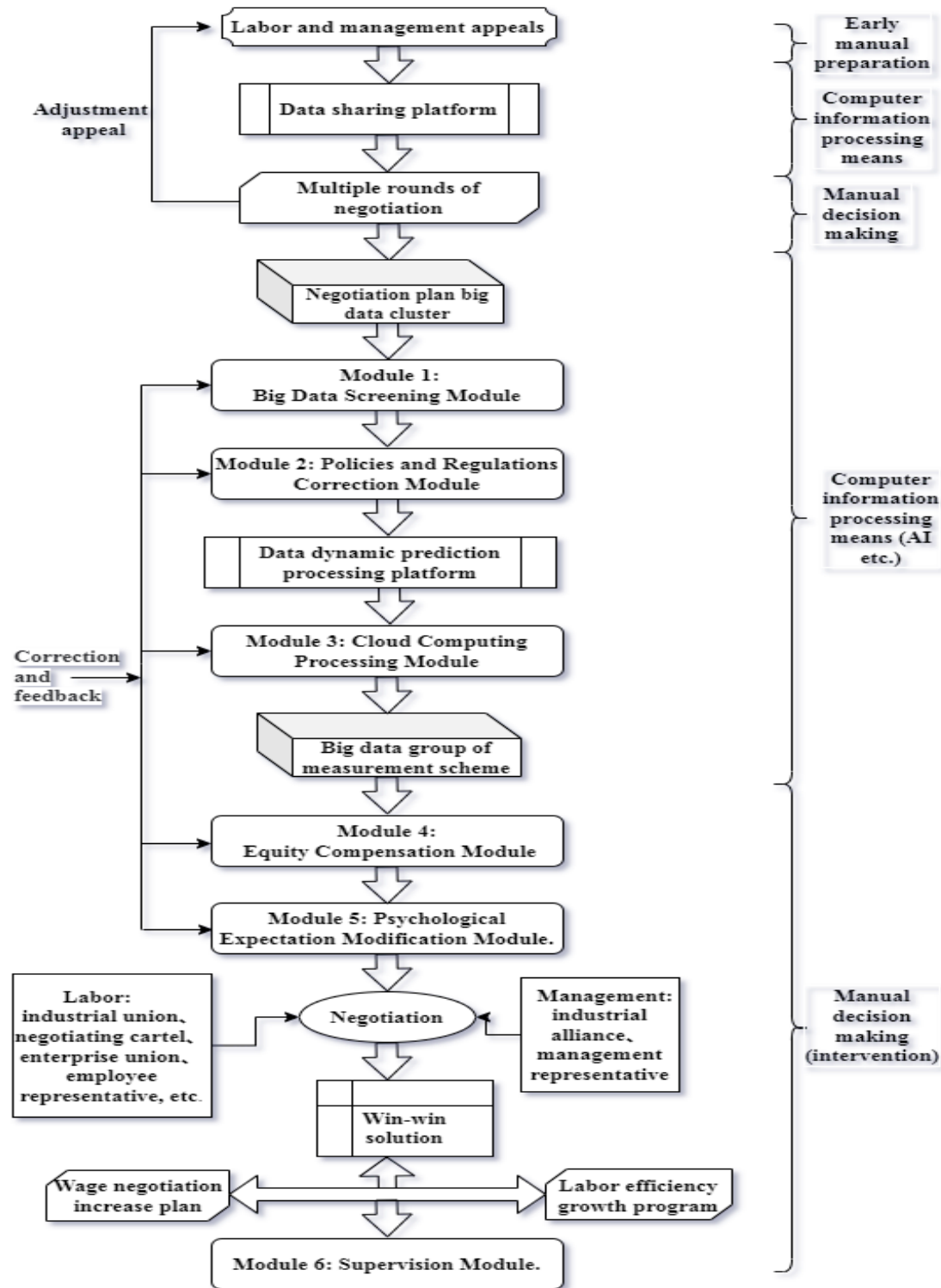


Figure 1: Programmatic module architecture and operation process of collective negotiation

4. Establishment of data sharing platform

Data collection is the prerequisite for ensuring the smooth operation of modules and providing accurate negotiation solutions. The author believes that it can start from improving the breadth of data, establishing a large data sharing platform, and realizing information and data sharing. Accordingly, it is necessary to break through restrictions such as ownership, administrative division, and departmental ownership and take multiple measures to obtain data to the greatest extent (Figure 2). Based on the establishment and improvement of data breadth, a two-tier linkage data sharing platform from the ACFTU to the grassroots labor unions vertically and from industry to enterprise labor unions horizontally realizes the completeness and sharing of data collection. With the tool of data sharing platform, it becomes possible for enterprises to have relatively transparent data. In this case, it is not ruled out that the employer will choose to disclose economic data to gain the initiative and avoid embarrassment in the negotiation process. In other words, the establishment and use of this platform not only increases the extensiveness of data, but also forms a certain deterrent force against the capital, so that it is possible for both parties to evaluate data more reasonably and form a negotiation result that is easy for both parties to accept.

It is true that applying this technology to collective wage negotiations may be more difficult than expected in the integration of multiple technologies, data processing algorithms, and model building. The perspective of data collection and mining may be different from traditional data collection and processing in labor union work. It requires the cooperation of experts and scholars in more fields, and it even requires third parties such as professional data processing agencies to provide necessary commercial services.

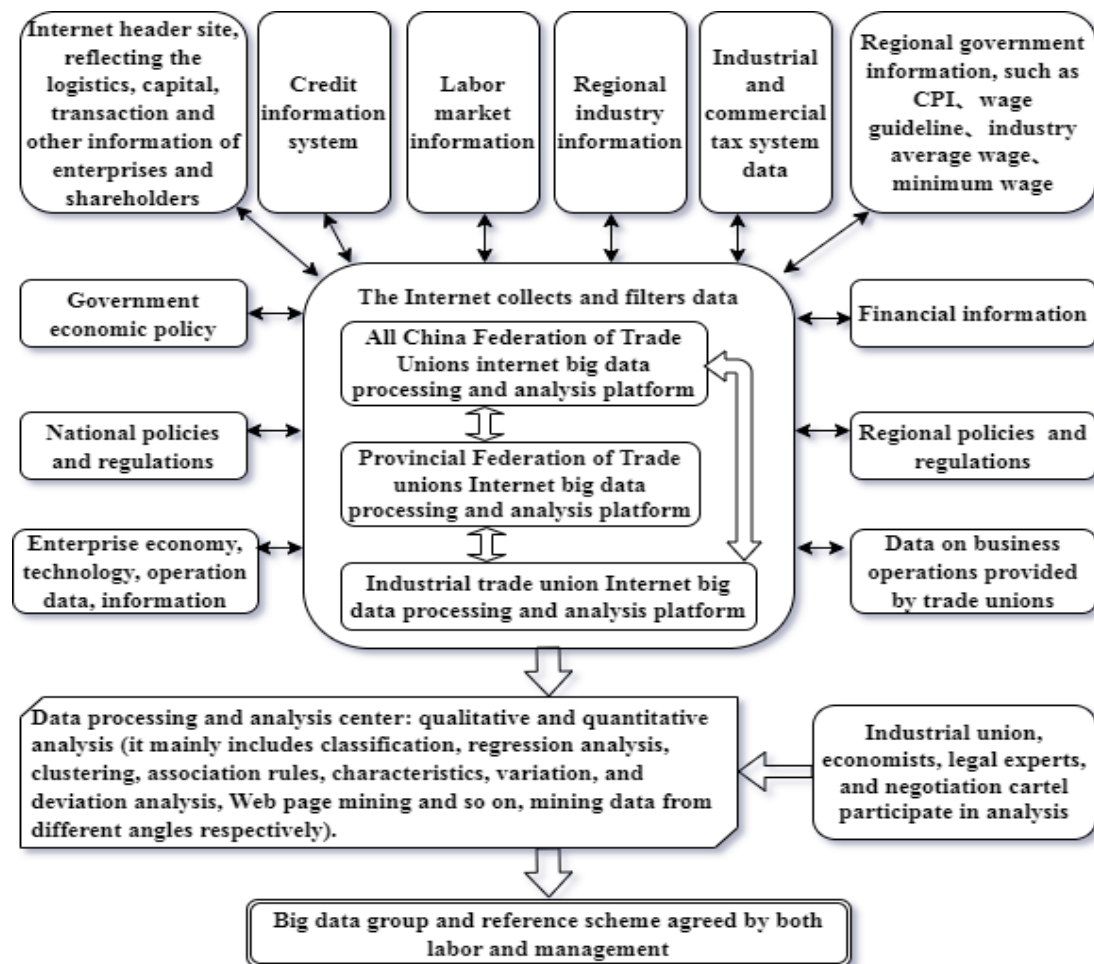


Figure 2: Data sharing platform module architecture

5. Establishment of data dynamic prediction processing platform

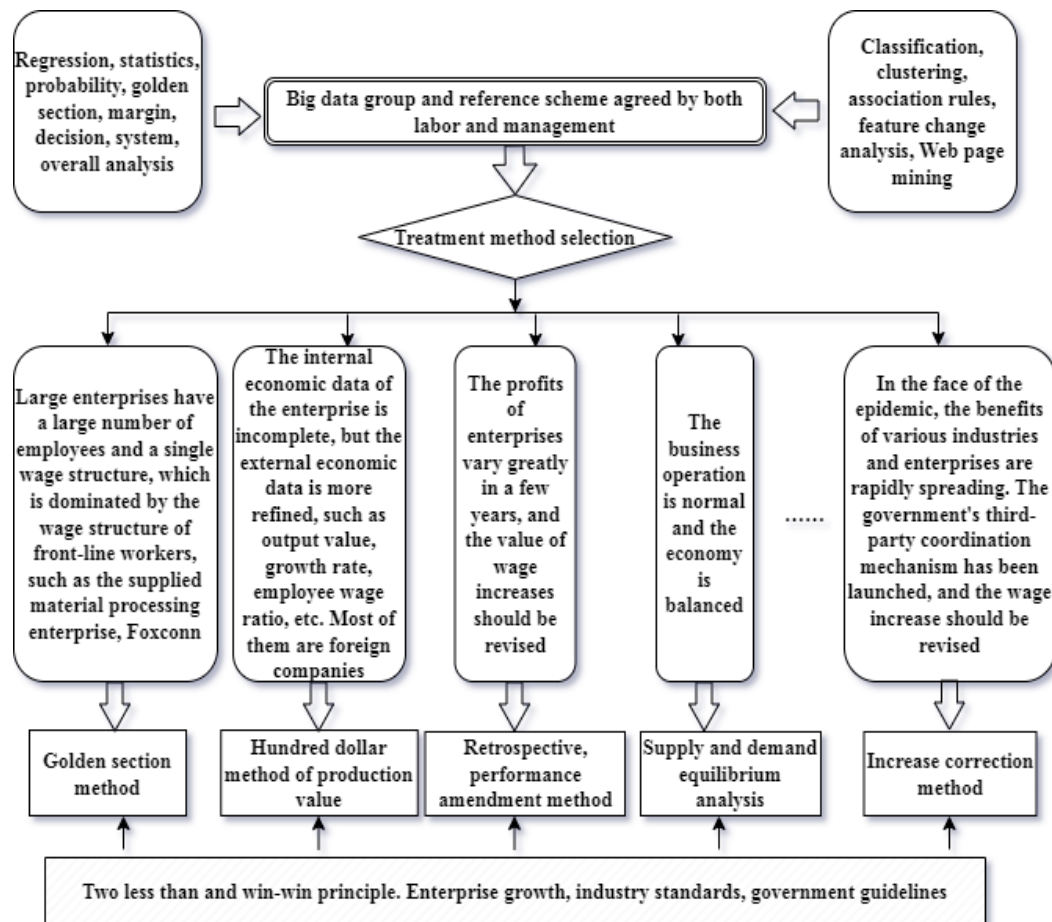


Figure 3: Cloud Computing Processing Module Platform Architecture

The main function of collective negotiation is to ensure the coordinated growth of employees' wage income and the economic benefits of enterprises, and to integrate and coordinate the pursuit of profit maximization by enterprises and the pursuit of benefit maximization by employees. Since collectively negotiated wage increases are negotiated in advance for the next year's increase, it is necessary to establish a data prediction platform to carry out predictions based on data processing (Figure 3). The data basis of the pre-judgment platform is the original data such as the financial information and economic indicators of the enterprise collected by the data sharing platform in the current year, and the data after the integration, processing, mining and analysis of the related data through module 1 and the data screening and the correction of the policy and regulation boundaries of the second module. The pre-judgment platform analyzes the company's next year's benefits through data integration, in-depth processing, and mining analysis, and provides it to the cloud computing processing module to determine the next year's salary increase through the data processing platform to form useful data for this collective negotiation, relying on Internet+, big data, and the advantages of labor unions, to achieve a new breakthrough in the means of collective wage negotiation. In this process, the analysis of wage increase is difficult and important. The hundred-yuan output value, the analysis of supply and demand balance, and the golden section method^[2] listed in figure 3 are all analysis methods for increase, which are not here elaborated.

6. Increase rate of wage collective negotiation and dynamic correction under special circumstances

Wage increase is the focus of collective negotiation, and it is also a difficult point in the process of data processing. In collective negotiation, the wage increase is usually determined by three aspects: first, the collective negotiation between the labor and management of the enterprise, proposing the range of wage increase; second, comparing with the industry average wage (the industry average wage

is the weighted average wage of all enterprises in the industry within the region); the third is to adjust the growth rate according to the regulation and control guidelines formulated by the government to ensure the stability of the regional economy. Combined with this reality, the author proposes that in the data processing module, the method of wage increase range analysis in two-dimensional coordinate space is used to explore the increase. At the same time, due to the occurrence of special circumstances such as the epidemic, the balanced economic system has been broken. In addition to using two-dimensional coordinate space analysis, the "negative feedback" principle of automatic control theory and the large-cycle analysis method of closed-loop control systems are used to correct the increase^[3]. The situations are detailed below:

6.1 Research on the value of wage increase in a balanced economic system

Inspired by the set theory in fuzzy mathematics, the author clarifies the thinking of solving fuzzy problems, and graphically abstracts the analysis, so as to facilitate the understanding of the mathematical and logical relationship between quantities. Qualitative elaboration of the definition of increases is more precisely applied in the process of establishing collectively negotiated wage increases. Figure 4 below takes wage income (absolute value) as the vertical axis and wage growth rate as the horizontal axis. The upper and lower limits of industry wage income (absolute value), the upper and lower limits of enterprise wage income (absolute value), the average wage income of the industry, the mean value of regional wage income, and the upper and lower limits (absolute value) of the government guidance line of the growth rate, as well as the baseline are shown on the two-dimensional coordinate plane map, forming a measurement range (Figure 4) .

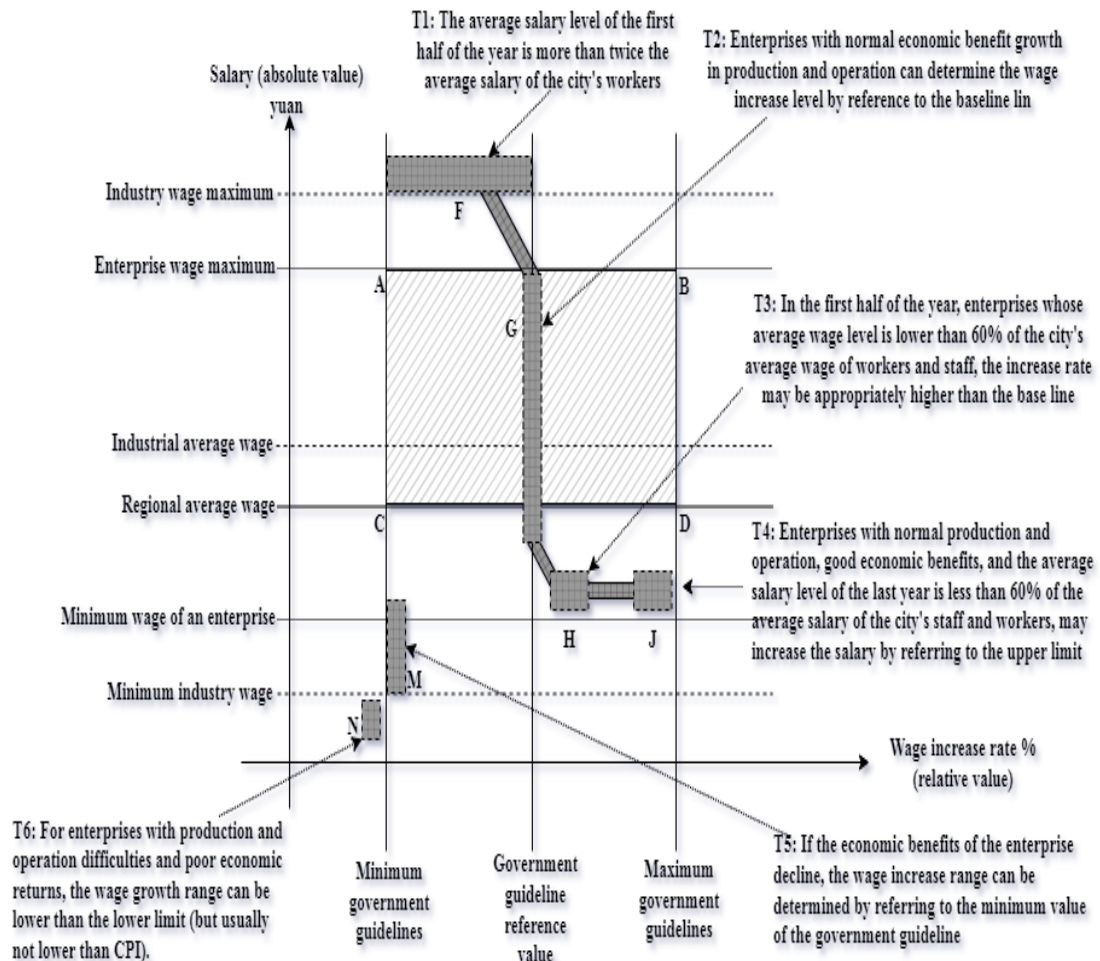


Figure 4: Reasonable Value Range of Wage Increase

T1-T6 are the regulatory policies usually adopted by the government when various benefits of the enterprise appear. T1-T4 are the usual scenarios, but so are T5 and T6 during economic downturns (and in exceptional circumstances such as the pandemic, detailed later). The specific analysis is as follows:

(1) If the average salary of the industry and the benchmark value of the government's guidance line are not considered, the salary increase rate (relative value) should be determined by the upper and lower lines of the government's guidance, and the absolute value of salary should be taken within the range of the maximum salary of the enterprise and the average salary of the region. The two-dimensional coordinates are expressed as the range of the rectangle ABCD in Figure 4.

(2) If the regulatory policies (T1-T6) usually adopted under the guidance of the government are taken into account, the absolute value of wages and the rate of wage increase (relative value) in the two-dimensional coordinate range are shaded blocks F, G, H, J, M, N in the figure. Obviously, the value ranges of F, G, H, J, M, and N are larger than the value range of the rectangle ABCD.

(3) If we connect F, G, H, and J shaded blocks through segmented polylines (including the values near the segmented polylines), F-G-H-J connection discounted shadow modules (including F, G, H, and J shadow modules and segmented broken line shadow module) will form, which not only covers the emergence of government regulatory guidance policies T1-T4 (T5 and T6 are temporarily excluded), but also simulates the range of possible values for situations other than government regulatory guidance policies T1-T4. The F-G-H-J connection shadow module must not only conform to the value range of the industry and enterprise, but also be closest to the government's regulation and control policy, which is the optimal range of the value range. This provides us with a very reasonable theoretical basis for collective negotiation. The probability of occurrence of government regulation and guidance policies T5-T6 is not high because when this happens, companies usually close down or change career, which will be described in detail later.

(4) The impact of industry average wages on the F-G-H-J connection discounted shadow module may have the following extreme situations, which must be dealt with separately:

1) For high-tech industries, especially those that are technology-intensive and have strong professional barriers, the fluctuation of the upper and lower limits of wages itself is relatively large, and the average wage of the industry has a very limited impact on it.

2) For labor-intensive industries, the technical threshold is relatively low, and personnel mobility is relatively strong. The gap between the upper and lower limits of wages in these industries is relatively small, and the average wage has a great impact on it. This means that the industry average wage is an important reference point when determining the scope and level of wage increases. In actual collective negotiation, for example, when Foxconn was conducting collective negotiation, it first proposed: "We will not give too much consideration to the government's regulation and control policies or the demands of employees. We will pay more attention to the average salary level of the existing market conditions because the turnover of people does not affect us too much."

(5) In Figure 4, since the wage growth rate (relative value) in the horizontal axis is impossible to change in the order of the upper and lower limits of the government guidance line and the baseline, the arrangement is unique. On the vertical axis, the upper and lower limits of industry wage income (absolute value, 2 elements), the upper and lower limits of enterprise wage income (absolute value, 2 elements), the average wage income of the industry, and the average wage income of the region have a total of 6 elements. Among the six elements, since the order of the upper and lower limits of enterprise wage income and the upper and lower limits of industry wage income cannot change, their arrangement is also unique. Excluding the fact that the average wage income of the industry cannot be higher or lower than the upper and lower limits of the industry's wage income, and the situation that the average wage income of the region cannot be higher than or lower than the upper and lower limits of the industry's wage income, the remaining 24 arrangements, according to different arrangements, the value range of ABCD is different. The corresponding F-G-H-J connection discount module is also different, but the analysis method is completely similar and will not be elaborated in this article.

6.2 Dynamic correction of wage collective negotiation increase under special circumstances

In a balanced economic system, the supply and demand quantities and prices of various commodities and services are interrelated, which is a relatively stable and mutually adaptive state ^[4]. A considerable period of time after the outbreak of the epidemic and in the post-epidemic era also includes special circumstances such as a sudden change in a certain company within the year. Whether it is a company, industry, or region, the equilibrium point of economic operation will change, and the balance between labor supply and wages will change accordingly, resulting in the imbalance of labor supply and demand in the whole region. The wage gap among workers widened rapidly, and the original wage balance changes. As time goes on, if the equilibrium state of the system cannot be

restored or a new equilibrium state cannot be formed, it will cause economic instability, and the government's "automatic stabilizer" --- the role of the tripartite coordination mechanism must be implemented. That is: when the government formulates a certain system or regulation through decision-making so that the economic phenomenon reaches a certain standard, the government must carry out income and expenditure distribution activities correspondingly according to the requirements of the system and regulations. What needs to be emphasized is that the application of the third-party coordination mechanism of the government only plays a buffer role in emergencies, so as to ensure that the original equilibrium state will not be greatly damaged and impacted, and the transition to a new equilibrium state will be smooth to avoid a state of loss of control. If a new equilibrium point is formed, the economic activities of enterprises and industries tend to be normalized, and enterprises and industries operate normally at the new equilibrium point, then the government's third-party coordination mechanism intervention should be gradually reduced until it is completely eliminated.

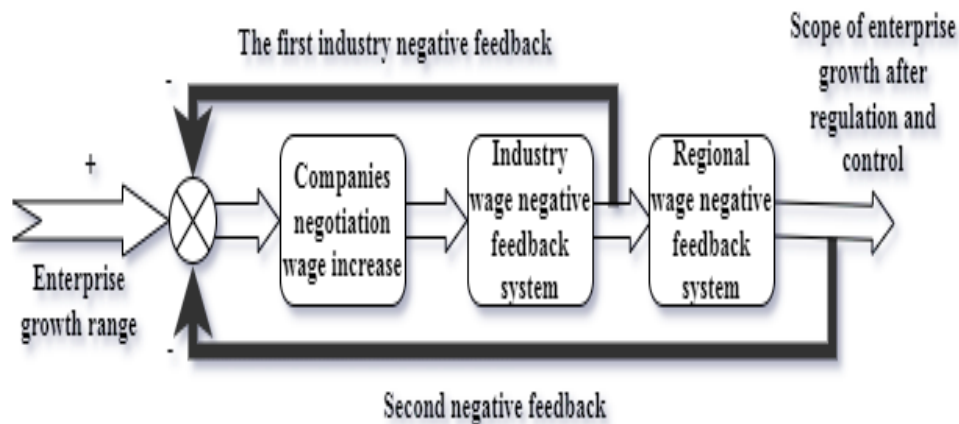


Figure 5: Negative feedback loop control system for salary increase under special circumstances

The government's third-party coordination mechanism mainly uses means such as minimum wage guarantee, tax refund, tax rebate, interest discounts, and fiscal transfer payments to support enterprises to bridge the wage gap with other industries. Therefore, the first industry negative feedback is formed here (Figure 5). Then, through this negative feedback transfer function of the industry, after the industry system determines the range of the revised increase, it compares it with the wage guidance line determined by the regional government. The minimum line is guaranteed first. If the two are close, it is obviously a stable value. If there is a gap between the two, the government will use a third-party coordination mechanism to adjust the gap, forming a second industry negative feedback (Figure 5). After this adjustment, the wage increase of enterprises is smaller relatively to the gap among different industries, and the gap of the economic development level in the region is also gradually reduced. Through such two negative feedbacks, the salary increase of enterprises is relatively reasonable, the industry and regional economy are relatively stable, the macroeconomic stability is ensured, and the government's regulation and control goals are achieved: the old economic system is smoothly transitioning to the new balanced economic system, avoiding system out of control. Excluding the continuous and sharp decline in corporate profits, other adjustments are all negative feedback adjustments. Through the application of the "negative feedback" principle in the data processing module, the wage increase value is corrected. Among them, the industry wage collective negotiation is to determine the industry wage standard, which is to compare the wage negotiation range determined by the enterprise with the weighted average of industry wages. Usually, the main basis for determining the negotiated value is the average wage close to the industry. If it is higher, it will be lowered, and if it is lower, it will be raised appropriately; that is to follow the industry wage comparison principle of negative feedback effect.

Under special circumstances, it is the best choice for us to ensure the stability of the system from the determination of the wage increase process of the enterprise and the analysis and establishment of the negative feedback large cycle control system of wage increase under special circumstances according to the characteristics of the open-loop and closed-loop control systems (Figure 6)^[5].

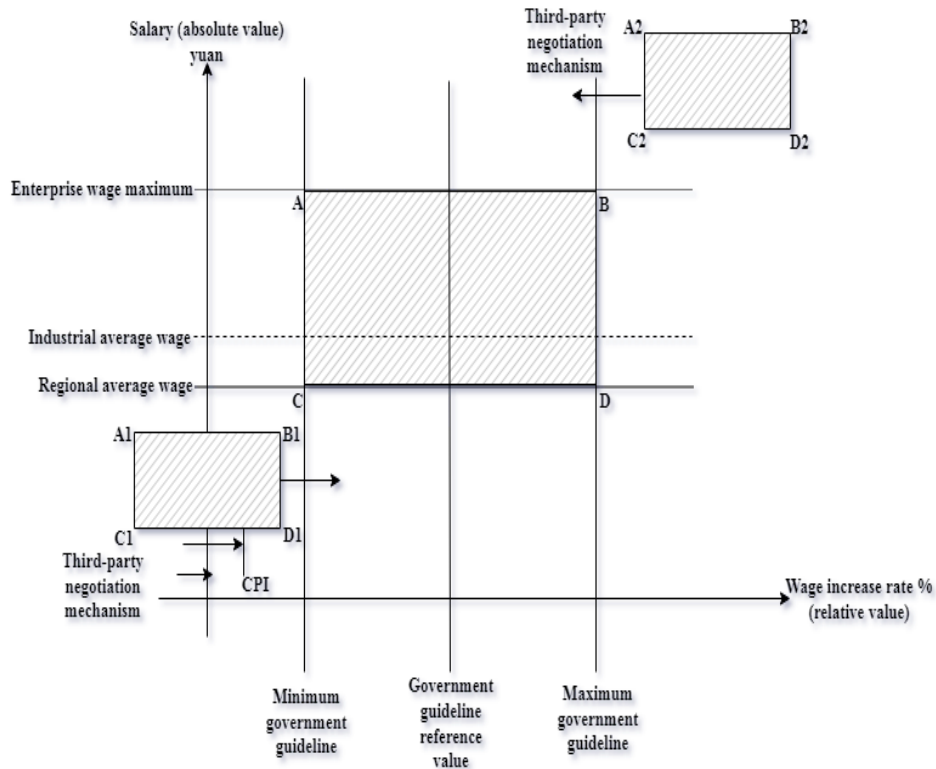


Figure 6: Changes in control values under special circumstances

ABCD in Figure 6 is the specific standard that does not consider the average salary of the industry and the government guidance mentioned above. The wage increase is determined by the upper and lower limits of the government guidance, and the absolute value of wages is within the range of the maximum wage of the enterprise and the average wage of the region. In special cases, such as after the epidemic, there will be two extreme situations. For example, if the company's benefits are very good (such as pharmaceutical companies), it is reflected in Figure 6 that the rectangle ABCD changes to the rectangle A2B2C2D2. And, there is a sudden drop in profit, or even a loss (such as a foreign trade enterprise), which is reflected in Figure 6 as the rectangle ABCD changes to the rectangle A1B1C1D1. Here, we conduct an in-depth study on the determination of collectively negotiated wage increase S for enterprises in the event of losses (or substantial decline in benefits):

S2 (increase rate to be negotiated by the enterprise this year) is smaller than S1 (increase rate negotiated by the enterprise in the previous year), which is the inevitable result of the decline in corporate efficiency under special circumstances.

(1) Let P be the weighted average rate of return on net assets of the company's domestic capital in N years. N is the reasonable number of years agreed by both parties, such as the date from the establishment of the enterprise to this year (calculated in years) or an economic cycle value of the enterprise (industry).

$$P = \frac{\sum_1^N \{ \text{Capital's return on equity} \times \text{Net assets} \}}{\sum_1^N \text{Net assets}}$$

If S2 is within the range of the golden section value of 0.618P-0.382P, even under the epidemic, the enterprise can not only maintain the collectively negotiated wage level S1 of the previous year, but also enable the enterprise to continue to expand reproduction smoothly. If S2 is greater than 0.618P but less than P (0.618 is the optimal method of the golden section), even under the epidemic situation, the enterprise can basically maintain the wage level agreed upon through collective negotiation, but it will be difficult for the enterprise to expand reproduction. If S2 is equal to P, according to the principle of equivalence of economic rights and interests, the basic wages of employees can be guaranteed to remain unchanged, but the operating conditions of the enterprise will deteriorate. See reference [2].

(2) Let Q be the weighted average of the wage negotiation increase between the employer and the labor of the enterprise and M be the number of employees:

$$Q = \frac{\sum_1^M \{ \text{Wage increases negotiated between labor and management} \times \text{Number of employees} \}}{\sum_1^M \text{Number of employees}}$$

S2 is close to the value of Q, that is to elongate the average value of the wage increase of employees. It is also a plan for both labor and capital to correct the growth rate under the epidemic situation.

At the same time, the ratio of the average wage increase difference in the previous two or more years (such as an economic cycle) can be used as the correction factor.

(3) If the values of S2 and F are close, F is the weighted average of the average growth rate of the industry, and n is the number of enterprises in the industry:

$$F = \frac{\sum_1^n \{ \text{Wage increases reasonably negotiated between labor and management of enterprises in the same industry} \times \text{Output of each enterprise} \}}{\sum_1^n \text{Output of each enterprise}}$$

Both employers and employees adopt a reasonable balance of "replenishment with abundance".

In fact, this plan mainly adopts the principle of industry comparison to determine the wage increase rate. In the case of industrial benefit that generally drops sharply, it is to stabilize the workforce and ensure the stability of the industrial economic system. Undoubtedly, in the industry, enterprises whose wages are lower than the industry average wages increase wages to around the average wage (increase). Enterprises with higher than average wages will not increase or increase less. The basic measures to ensure industry stability are also a priority for maintaining industry stability.

In the value range of the increase in the rectangle A1BC1D1, the enterprise may suffer losses (as shown in Figure 6, the left side of the horizontal axis is a negative value). At this time, when the enterprise adopts the above methods and cannot solve the wage problem, both labor and capital need to treat emergency rationally first. Secondly, the government's third-party coordination mechanism is activated in a timely manner. Under the organization of the government (including labor unions), the salary increase or decrease is revised. If the enterprise proposed wage increase is within the increase value range of the rectangle A1BC1D1, it is required to ensure that the wage increase cannot be lower than the CPI at least and to ensure that the basic income of workers cannot be substantially reduced due to the rise in the price index. In the developed Western wage negotiation system, there are similar cases. It is usually necessary to ensure that the wage increase of the enterprise is not lower than the CPI value, but there are also cases where the increase is zero.

We will use the above-mentioned correction principles, methods, and processes to summarize the above-mentioned special circumstances in which the company's profits have dropped significantly or suffered losses, as shown in Figure 7 below:

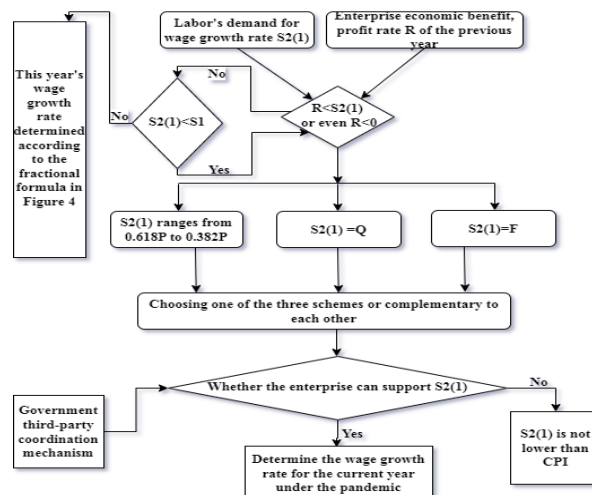


Figure 7: Flowchart of corporate profit decline or loss increase correction

The above-mentioned aspects express the correction principle of S2. As long as the above-mentioned analysis principles, methods, application of several key values and understanding of the relationship are grasped, the above analysis methods can be flexibly adopted in the module according to different situations and the weight of various factors, and the quantitative determination of

the increase of S2 can be followed by scientific methods.

7. Conclusions

To sum up, this paper, with innovative ideas, attempts to establish the whole process module of collective negotiation, collaboratively establish the platform of data screening and sharing, and try to use mathematical methods to dynamically analyze the increase in the system and make corrections, which is a bold attempt to collective negotiation. However, if the system needs to be implemented, the project is indeed large. However, the author hopes to introduce a new example through shallow thinking. Looking forward to more experts and scholars to pay attention to and share the wisdom of collective negotiation. This article is limited by the author's research level and time. The research on some issues is still superficial and solitary, and I sincerely hope that experts, scholars, and relevant practitioners can give criticism and correction.

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