Design and Research of Strategic Management Intelligent System for Small and Micro Enterprises Based on Multi-objective Optimization

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Abstract: At present, the task scheduling mechanism still lacks uniform standards and norms. Many scholars are studying the task scheduling characteristics of cloud computing, taking one of the indicators such as task completion time, cost, reliability, and energy consumption as the optimization goal. The research on multiobjective scheduling strategies is relatively few and immature. This paper aims to study the design and research of strategic management intelligent systems for small and micro enterprises based on multiobjective optimization. Firstly, this paper studies the basic task scheduling model and the existing task scheduling algorithms. This paper analyzes the present situation and existing problems of performance management of small and micro enterprises and puts forward the establishment of a performance appraisal system based on enterprise strategic objectives to solve the existing problems in performance management of small and micro enterprises. After understanding and analyzing the basic situation of Company A and its budget management system, this paper finds that there are many problems in this company's system. Aiming at these problems, it puts forward a brand-new design concept of the enterprise's comprehensive budget management system, integrates various internal resources of the enterprise, and improves the company's management concept.

1. Introduction

Separate performance management from other parts of human resource management. Performance management belongs to the human resource management system, and it is a essential part of human resource management. When designing performance management system, we need to consider the overall management system of the enterprise: firstly, the performance management system should adapt to the organizational structure, position system and overall strategy of the company; secondly, the performance management system should consider the company's position management, recruitment system and employee planning; finally, the performance management system should be matched with the recruitment system, training system, salary and reward and punishment system. When designing the performance management system, we must recognize its

importance in the human resource system and pay attention to its coordination and promotion effect with other parts of the human resource system. Only in this way can we give full play to the performance management. Multi-objective optimization algorithms can optimize these problems well [1-2].

In the design and research of strategic management intelligent systems for small and micro enterprises based on multiobjective optimization, many scholars have studied it and achieved good results. For example, Khalifat Z proposed a personnel management system based on the quantitative index calculation model and objective function model. Its principle is to design a management model based on three processes in the personnel management system: input, process, management rules, and personnel management rules in business organizations. This model solves the efficiency problem of personnel management to some extent [3]. Silva A, F, D proposed a genetic algorithm with dual fitness. The algorithm mainly takes the average completion time as the optimization objective [4].

The research goal of this paper is to draw lessons from and apply the latest theories in the field of performance management at home and abroad, take the enterprise strategy as the guide, take the multiobjective optimization model as the main line, introduce the performance appraisal scheme combining process evaluation with benefit method, and construct a performance management model oriented by strategy. Based on this goal, the main work of this paper is: to deeply analyze the performance management system currently implemented by small and micro enterprises. Through extensive data collection and literature review, this paper summarizes the performance management modes adopted by small and micro enterprises and the main problems existing in these modes. As well as the characteristics and requirements of this system, the main tools and design ideas for establishing this system model. It also introduces in detail how to build a process evaluation system and how to use the multiple linear regression mathematical model to determine the corresponding parameters in the evaluation index of the benefit method.

2. Design and Research of Strategic Management Intelligent systems for Small and Micro Enterprises based on Multi-Objective Optimization.

2.1 Task Scheduling Model of Cloud Computing Multi-Objective Optimization

Cloud computing task scheduling generally includes a variety of scheduling indicators, including optimal time span, cost, energy consumption, load balance, etc., and task completion time is the most important scheduling goal. Users all hope that their tasks can be completed in the shortest time, and achieving the optimal span is the common goal of users and cloud computing. The degree of load balance determines the resource utilization rate of the system. If the load on cloud resources is too low, the resources will be wasted. If the load on cloud resources is too high, the service performance of the system will decrease. This "on-demand, pay-as-you-go" business model of cloud computing makes the cost more important to both cloud service providers and users. Cloud service providers hope to reduce the cost of cloud computing operations and gain more benefits. Users not only care about the processing time of the task, but also need to consider the execution cost of the task. Therefore, task completion time, cost, and system load balance are essential scheduling objectives [5-6].

2.2 Design of Performance Management Model Based on Strategy Orientation

The project of establishing a strategic-oriented performance management system can't be accomplished overnight. It is a step-by-step process that needs constant improvement. By analyzing the relationship between performance management and strategy, this paper adds a strategic

management module to the original performance management model and optimizes the model by using multiobjective optimization algorithm. First of all, through the decomposition and balance of the strategy, the enterprise's strategic decomposition will be transformed into a more operational specific goal, and then the goal will be decomposed to the corresponding departments and individuals, to determine the goals of the departments and individuals. Thus, the overall strategic goals of the company will be linked with those of the departments and individuals. The overall strategic goal of the company is transparent to every employee, and every employee knows what role his work content plays in the strategic goal of the company [7-8].

In addition, after the company's strategic objectives are transformed into performance management objectives, the company's strategic objectives can be realized through the management of performance objectives. Performance management system is a closed-loop system composed of the formulation of individual and team performance goals, performance implementation, monitoring, performance evaluation, performance feedback, performance reward, and performance obstacle analysis. The difference between this paper and traditional performance management lies in the introduction of a personal development plans in this process, with the aim of realizing the enterprise's performance goals by continuously improving employees' working ability [9-10]. In the performance management system based on enterprise strategy, it is necessary to incorporate the personal ability and development plan of each employee in the enterprise into the content of the management system. The managers of the enterprise must pay attention to the personal development of employees and give maximum support to the development of each employee. With the implementation of the personal development plan, through the implementation of the personal development plan, employees' performance is improved, while their personal abilities are also developed. On the one hand, this stimulates employees' enthusiasm for work, and on the other hand, it enables the organization to have sustainable human capital [11-12].

2.3 Improvement of Heuristic Function Definition

In the algorithm proposed in this paper, the heuristic function is defined as follows:

$$\eta_{ij} = Load_i \times \frac{1}{et_{ij}} \tag{1}$$

Etij is the execution time of task I on virtual machine J .. In the case of no test rate Loadi, the smaller the expected execution time etij and the larger the η_{ij}, the higher the probability of selecting the current virtual machine for this task [13-14].

The load function of the virtual machine is:

$$Load_j = 1 - \left(\left(E_j - E_{avg} \right) / \sum_{J \in vm} E_J \right) \tag{2}$$

2.4 Multi-Objective Optimization Task Scheduling Combined With Ant Colony Algorithm Problem Model Description

Task scheduling combined with ant colony algorithm can be described by a graph G=(T,V,E). As shown in Figure 1[15-16].

In Figure 1, T is the set of tasks Ti, V is the set of virtual machines Vj, and E is the set of tasks of virtual machines. Ant's selection of path eij indicates that tasks Ti are assigned to virtual machines Vj [17-18].
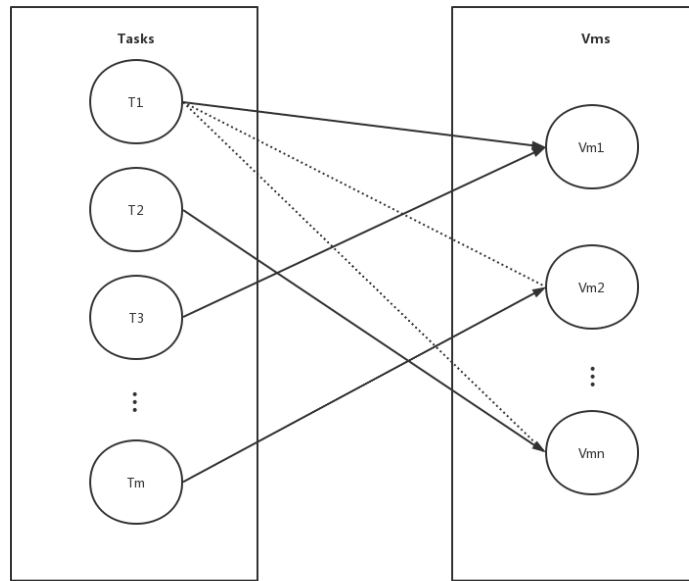
Figure 1: Graph representation of multiobjective optimization task scheduling

3. Design Research and Design Experiment of Strategic Management Intelligent systems for Small and Micro Enterprises Based on Multi-Objective Optimization.

3.1 Design of Iterative Termination Conditions of the Algorithm

General swarm intelligence algorithm has three termination conditions. First, set the maximum number of iterations. When the algorithm iterates with the maximum number of iterations, it will end. This setting method needs to accumulate previous experience and set a reasonable maximum number of iterations. Second, a lower bound and an error value of the given optimization problem. When the difference between the target value and the lower bound obtained by the algorithm is less than the given error value, the algorithm is terminated. Clearly, this method is not suitable for this research. Because our optimization goal doesn't have an expected value. Third, the current optimal solution is the same for k consecutive times or the difference between the values is less than 0.001%. In this paper, the first method is selected for the termination condition of the iteration, and a reasonable maximum number of iterations is set on the basis of a large number of experiments.

3.2 Experimental Design

Firstly, this paper studies the value of pheromone heuristic factor A in multiobjective optimization algorithm. The task processing speed and iteration times of different values of a are inferred. Secondly, it studies the optimization and performance improvement of the corresponding departments by the strategic management system constructed in this paper.

4. Design Research and Experimental Analysis of Strategic Management Intelligent systems for Small and Micro Enterprises Based on Multi-Objective Optimization.

4.1 Research and Setting of Pheromone Heuristic Factor A

The pheromone heuristic factor A determines the relative importance of the information

accumulated during ants' movement in guiding ants to choose virtual machines. The bigger A is, the more likely it is for ants to choose the previous path. The randomness of the search is weakened and it is easy to fall into the local optimum. On the contrary, the smaller a is, the slower the convergence speed of the algorithm will be. The experimental results are shown in Figure 2 and Figure 3.
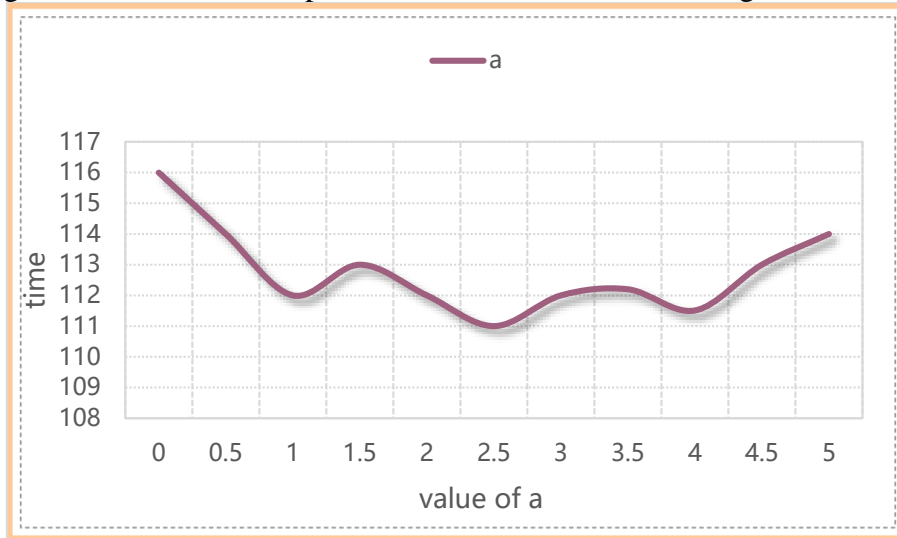

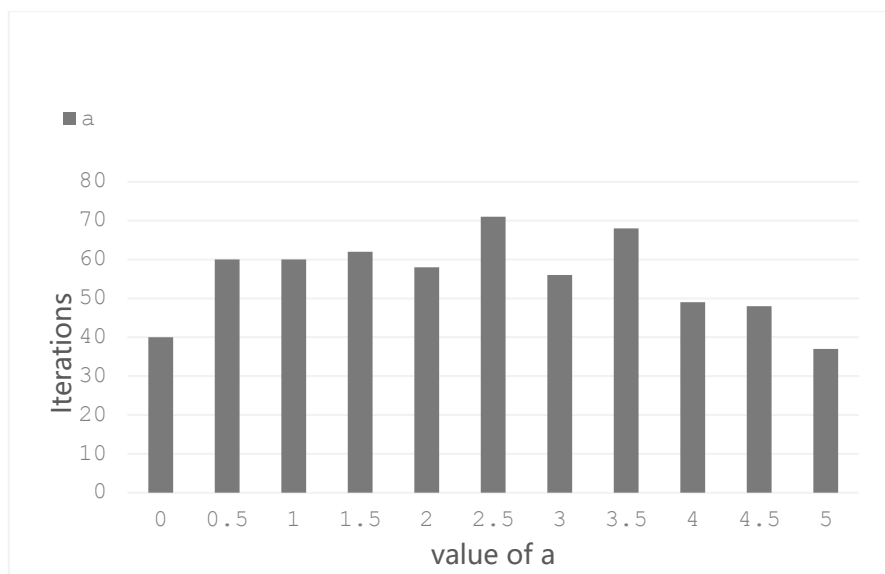Figure 2: an influence on the optimal solution of the algorithm

Figure 3: An Influence on the convergence speed of the algorithm

As can be seen from Figure 2, when other parameters are fixed, the pheromone heuristic factor A has a great influence on the performance of the algorithm. When A is small, the algorithm is easy to fall into the local optimal solution, and the result of the solution is not very good. Compared with the pheromone on the optimal solution, the influence of pheromone on ants' path selection is reduced. The path that is not conducive to the better solution found in each iteration is the guidance for future ants. When a is larger, pheromones are given more attention in the ant search process, which makes the positive feedback on the path of local optimal solution stronger. Because the initial optimal solution is probably not the real global optimal solution, but too large, gives it more influence. As can be seen from Figure 3, although there are fluctuations, the convergence of the algorithm is accelerated with the increase of A on the whole. When a is 0, the algorithm becomes a

greedy search with heuristic function as the main influence and converges to the local optimum. A is too large. Although the convergence speed of the algorithm is faster, it converges to the local optimum. It is concluded that the value of A is better between 1 and 4. In this paper, a is chosen as 2.

4.2 System Performance

In order to verify the performance of the enterprise strategic management system based on multiobjective optimization. In this paper, the task handling of the performance department and the personnel department after optimization is compared with that before optimization. Record the percentage increase compared to the previous one. The experimental data are shown in Table 1.

Table 1: Improvement of departmental strategic management

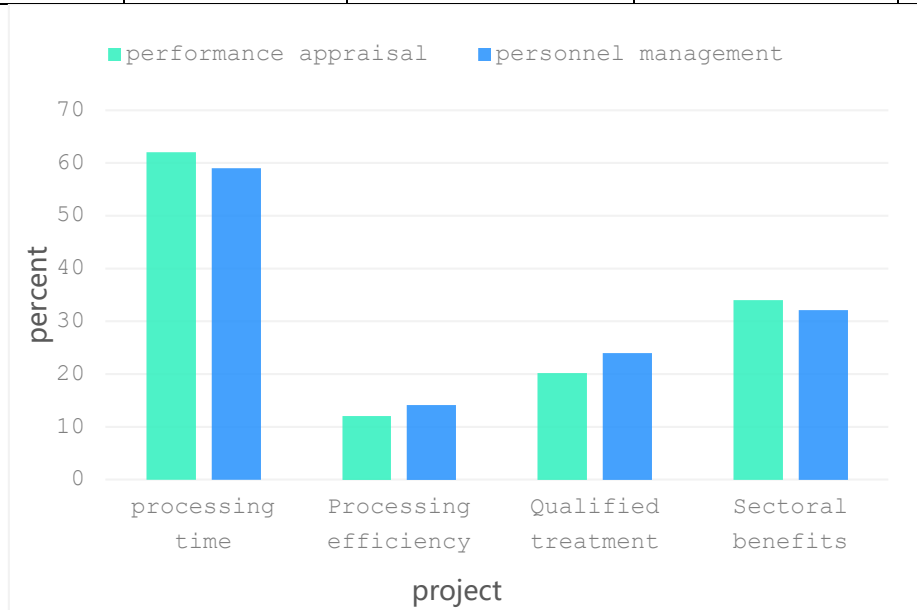|	processing time	Processing efficiency	Qualified treatment	Sectoral benefits
performance appraisal	62	12	20	34
personnel management	59	14	24	32

Figure 4: Improvement of two departments after multiobjective optimization

It can be clearly seen from Figure 4 that the strategic management system based on multiobjective optimization constructed in this paper can effectively improve the task processing time. And the task processing efficiency is slightly improved compared with that of manual work. In the case of using this management, the performance of all departments has been improved by more than 30%.

5. Conclusions

This paper adopts the method of multiobjective optimization to study the company's enterprise strategy performance. In the process of systematic research, following the design idea of combining contingency concepts, holistic concept, and systematic concepts, and using the balanced scorecard

and other strategic performance management tools, this paper probes into how entrepreneurial private enterprises can achieve their strategic goals through the construction of enterprise strategy performance. Performance management is the core of strategic management and human resource management of enterprises. Everyone knows that talents are the key to the development of enterprises, especially in today's highly competitive market environment. How can we give full play to the advantages of "people" to achieve the strategic goals of enterprises? This is bound to require us to decompose the strategic objectives of people and make a performance management system based on the strategic objectives of enterprises by analyzing the needs of human nature. Based on the relevant performance management theories and methods, this paper designs a performance management model based on enterprise strategic objectives by analyzing the characteristics of private enterprise performance management, taking its essence and discarding its dross, which mainly includes strategic management system and performance management system, and the strategic management system includes the formulation and decomposition of strategic objectives. Performance management system includes performance index system, performance management implementation organization system, process management system, etc.

References

[1] Habashi W G, Targui A. (2022) On a reduced-order model-based optimization of rotor electro-thermal anti-icing systems. International Journal of Numerical Methods for Heat & Fluid Flow, 32(8):2885-2913.

[2] Frasquet M, Calderon H, Kolbe D. (2022) The role of market orientation and innovation capability in export performance of small- and medium-sized enterprises: a Latin American per spective. Multinational Business Review, 30(2):289-312.

[3] Khalifat Z, Zivdar M, Rahimi R. (2021) New design and optimization of an industrial three-phase boot separator using the coupled CFD-RSM models. Brazilian Journal of Chemical Engineering, 39(3):583-599.

[4] Silva A F D, Aranda K M, Marins F A S, et al. (2022) A hybrid DMAIC framework for integrating response surface methodology and multi-objective optimization methods . The International Journal of Advanced Manufacturing Technology, 122(9-10):4139-4164.

[5] Ishizaka A, Prikshat V, Patel P, et al. (2022) A multi-stakeholder ethical framework for AI-augmented HRM. International Journal of Manpower, 43(1):226-250.

[6] Sthr J, Herzig C. (2022) Organic pioneers and the sustainability transformation of the German food market: A politically structuring actor perspective. British Food Journal, 124(7):2321-2342.

[7] Karimi T, Yahyazade Y. (2022) Developing a risk assessment model for banking software development projects based on rough-grey set theory. Grey Systems: Theory and Application, 12(3):574-594.

[8] Hasanov M, Isakhanyan G, Dolfsma W, et al. (2022) A smart web of firms, farms and internet of things (IOT): enabling? Collaboration-based business models in the agri-food industry. British Food Journal, 124(6):1857-1874.

[9] Dang H A, Dinh V B, Tong M Q, et al. (2022) A simulation-based multi-objective genetic optimization framework for efficient building design in early stages: application for Vietnam's hot and humid climates. International Journal of Building Pathology and Adaptation, 40(3):305-326.

[10] Chakraborty U, Biswal S K. (2022) Psychological empowerment of women entrepreneurs: a netnographic study on twitter. Management Research Review, 45(6):717-734.

[11] Ismail Z A. (2022) Exploring e-complaint method: learning from the Malaysian Polytechnic institutions. Journal of Facilities Management, 20(3):501-519.

[12] Pratono A H. (2022) The strategic innovation under information technological turbulence: the role of organisational resilience in competitive advantage. Competitiveness Review: An International Business Journal, 32(3):475-491.

[13] Yadav A, Pandita D, Singh S. (2022) Work-life integration, job contentment, employee engagement and its impact on organizational effectiveness: a systematic literature review. Industrial and Commercial Training, 54(3):509-527.

[14] Pattnaik P N, Shukla M K. (2022) E-career canvas for individuals' initiative and MBA graduate employability: an exploratory study. Quality Assurance in Education, 30(2):221-235.

[15] Alam G M, Brescia V, Biancone P P, et al. (2022) Using bibliometric analysis to map innovative business models for vertical farm entrepreneurs. British Food Journal, 124(7):2239-2261.

[16] Burritt R L, Christ K, Rao K K. (2022) Quality of voluntary modern slavery disclosures: top Australian listed companies. Pacific Accounting Review, 34(3):451-478.

[17] Galpin T, Gilligan J. (2022) Rethinking the M&A process: Learning private equity's secret to outperforming

corporate strategic acquirers. Strategy & Leadership, 50(3):21-28.

[18] Mas F D, Massaro M, Calandra D, et al. (2022) Exploring agricultural entrepreneurship and new technologies: academic and practitioners' views. British Food Journal, 124(7):2096-2113.