Analysis of Power Marketing and Comprehensive Energy Collaborative Development Mode by Using Particle Swarm Optimization Algorithm

Quan Sun, Wenjun Qi, Shuai Yuan, Tingting Zhang and Yan Pan
Jiangsu Frontier Electric Power Technology Co., Ltd., Jiangsu, 211102, China

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Abstract: Nowadays, the power marketing using particle swarm optimization algorithm is the key trend in the coordinated development mode of comprehensive energy. The application of power marketing platform using particle swarm optimization algorithm helps to promote the efficient development of the coordinated development mode of comprehensive energy, and has a direct impact in the application of the coordinated development mode of comprehensive energy. Nowadays, using the particle swarm optimization algorithm of electric power marketing platform running integrated energy coordinated development mode application research mainly focused on theory, the electric power marketing content, comprehensive energy coordinated development of content, lack of practical case analysis, etc., also not clear using the particle swarm optimization algorithm of the importance of electric power marketing platform operation. In order to study the particle swarm optimization algorithm of electric power marketing platform operation of the actual impact of comprehensive energy coordinated development mode, this paper with comprehensive energy coordinated development mode analysis method, to use the particle swarm optimization algorithm of electric power marketing platform operation content and indicators, discussion analysis, on the basis of the particle swarm optimization algorithm in the power marketing platform running integrated energy coordinated development mode application regression analysis, and combined with the problems existing in the operation of electric power marketing platform analysis, thus targeted feasibility solution strategy. The research results show that the coordinated development mode of comprehensive energy is helpful to the operation and development of the power marketing platform using the particle swarm optimization algorithm, and the application results of the coordinated development mode of comprehensive energy are more effective.

1 INTRODUCTION

Today, the power market is gradually treating the power marketing using particle swarm optimization algorithms and the operation degree of the market as the focus of its lasting progress, which also constitutes the main competitive advantage of its high-level power marketing (De, and Wang, et al. 2022). This paper first studies the application index and quantitative application means of scientific comprehensive energy collaborative development mode of power marketing association using particle swarm optimization algorithm (Geng, and Zheng, et al. 2022). By applying the application framework and strategy of this comprehensive energy collaborative development mode, and referring to the operation of the power marketing platform using the particle swarm optimization algorithm, this research carries out the application of the comprehensive energy coordinated development mode of the operation of the power marketing platform using the particle swarm optimization algorithm (Huang, and Ren, et al. 2024). The research goal is to promote the comprehensive energy coordinated development mode of particle swarm optimization algorithm of power marketing analysis and problems, enhance the use of particle swarm optimization algorithm of power marketing analysis and problems associated scientific management ability, and promote the particle swarm optimization algorithm of power marketing analysis and the problem of integrated energy coordinated development mode application

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and the progress of research technology (Li, and Han, et al. 2024).

2 RELATED WORKS

Based on this background, the construction and progress of the power marketing industry using particle swarm optimization algorithm need to continuously adjust to adapt to the transformation of various power environment, all of which are closely related to the special power marketing environment using particle swarm optimization algorithm (Li, and Hu, et al. 2024). With the progress of power marketing using particle swarm optimization algorithm, its industry and the surrounding natural and power environment are interwoven and limited (Liu, and Sun, et al. 2023). With the continuous progress of power marketing using particle swarm optimization algorithm, especially driven by the current power marketing market, the disorder and lack of planned expansion of the power marketing industry using particle swarm optimization algorithm has caused serious damage to the power environment, causing many power marketing problems (Liu, and Xu, et al. 2023). The power marketing analysis and problem correlation using particle swarm optimization algorithm are similar to other fields, and the scientific power environment problems caused are gradually increasing (Stecyk, and Miciula, 2023). Therefore, it is inevitable to promote the development of power marketing using particle swarm optimization algorithm and choose the path to sustainable development (Yin, and Zhou, et al. 2024).

This research should take the reasonable operation of the power marketing system, the stability of the power marketing system and the maximum utilization of the power resources as the goal of the power marketing by using the particle swarm optimization algorithm, so as to promote the sustainable development of the power marketing industry (Zhang, and Jiang, et al. 2023). For using particle swarm optimization algorithm of power marketing in comprehensive energy coordinated development mode application index system, the core is to seek a standardized method, to measure and integrated coordinated development of energy mode application of electric power marketing resources, use and management of each link of "reduce, recycling, reuse" level. This study aims to compensate for the defects between indicators, such as lack of connection, subjectivity and randomness, through the principle and method of power marketing index generation.

Comprehensive energy coordinated development mode application using particle swarm optimization algorithm of electric power marketing index system belongs to a new category, so, in the process of formulating the execution index system, the study requires clear the meaning of particle swarm optimization algorithm of electric power marketing and the goal of comprehensive energy coordinated development model. For the application of the integrated energy collaborative development mode of the power marketing platform using the particle swarm optimization algorithm, it is a variable and dynamic open system, which must have a set of representative standards covering all related topics. Therefore, this research needs to clarify which problems are corresponding, and also needs to build an application framework of integrated energy collaborative development model. In view of the hierarchical relationship between the various indexes, this study needs to be accurately interpreted. The advanced index can not conflict or intersect with the lower indexes derived from them. After the application index of the comprehensive energy coordinated development model of power marketing using the particle swarm optimization algorithm is determined, this study needs to create the application model of the comprehensive energy coordinated development model and implement the corresponding calculation according to its measurable characteristics.

3 METHODS

3.1 Power Marketing Using the Particle Swarm Optimization Algorithm

The power marketing function using the particle swarm optimization algorithm is a way to evaluate the operational efficiency, which mainly means by setting a power marketing vector using the particle swarm optimization algorithm to improve the expected output, and also reduces the input and unexpected output accordingly. However, there are some deficiencies in this approach. For example, if there are non-zero relaxation variables in power marketing using particle swarm optimization algorithms, then the efficiency estimate may be overstated. Based on the previous steps, we calculate the relaxation variables of power marketing using the particle swarm optimization algorithm, and also introduce the theory of power marketing function that

does not use the particle swarm optimization algorithm:see Eq. (1).

$$\overrightarrow{Q_0}(W,E,R,T,Y)= \\ D\{\mathrm{FG}:[(W,E,R,T,Y)+J\times K(L)]\in A \quad (1)$$

In formula (1), Q (W, E, R, T, Y) represents a preset power marketing vector using the particle swarm optimization algorithm, D represents the changing trend of input-output, and FG represents the proportional factor vector, which can be used to measure the increase or decrease of input-output. J represents the standardized weight vector of each input-output index, and K (L) is used to indicate the key nature of each input-output index. Thus the model represents the total weight of the increase or decrease of all the input-output variables. It can be seen that the power marketing function using the particle swarm optimization algorithm can adjust the input and output involuntarily. The power marketing vector using the particle swarm optimization algorithm can be obtained by solving the following models: see Eq. (2)

$$\overrightarrow{Q_0}(W,E,R,T,Y)=ASDF+HJKL \quad (2)$$

Formula (2), ASDF represents using particle swarm optimization algorithm of electric power marketing system in a series of overlapping window efficiency evolution, and to measure the particle swarm optimization algorithm of power marketing optimization the application of integrated energy coordinated development model, in order to more accurately reflect the integrated energy power marketing optimization of the application of dynamic changes, see Eq. (3)

$$Z.X.\sum_{n=1}^{N}C_nV_n \le V-B_kN_k \quad (3)$$

In formula (3), Z and X representatives respectively calculate the average value of different technologies and CV representatives, which can obtain the final annual application of the integrated energy collaborative development mode of power marketing optimization using particle swarm optimization algorithm, see Eq. (4)

$$\sum_{n=1}^{N}A_nS_n \le S\text{-}D_LF_L \quad (4)$$

In formula (4), AS represents the sample size requirement. When the explanatory variables D and F account for a large number, they may face "dimension decline", so as to reduce the accuracy of power marketing.

3.2 Coordinated Development Model of Integrated Energy Sources

A number of studies show that there may be a linear relationship between the application and regulation of the coordinated development model of comprehensive energy. Some scholars have proved that the application of the comprehensive energy coordinated development model will directly reduce the regulation and improve the quality of power environment, while some scholars have found that there is no significant causal relationship between the two, see Eq. (5)

$$\sum_{n=1}^{N}Z_nX_n \le X-C_EV_E \quad (5)$$

In formula (5), ZX represents the robustness test result, and CV represents obtains the regional heterogeneity of the average impact of power marketing resources on the application of integrated energy optimization collaborative development mode by particle swarm optimization algorithm, see Eq. (6)

$$\sum_{n=1}^{N}S_nD_n \ge D+F_yG_y \quad (1)$$

In formula (6), SD represents the equilibrium degree of the coordinated development of comprehensive energy, D represents the controllable factor of the equilibrium degree, and FG represents the heterogeneity test factor of the coordinated development of comprehensive energy, see Eq. (7)

$$\sum_{n=1}^{N}G_nH_n=H-J_cK_c \quad (7)$$

In formula (7), GH represents that the traditional parametric model needs to assume the functional relationship between variables, H represents that it needs to pay attention to the average effect between the explained variables and the explained variables, JK represents that there are many non-linear relationships between variables in real life, and the traditional parameter estimation has certain limitations, see Eq. (8)

$$TY, TU, TI, TO, TP \geq 0; \quad n = 1,2,\cdots,N \tag{8}$$

Based on the formula (8), T represents the constant factor of integrated energy coordinated development, Y, U, I, O, P on behalf of electric power marketing resources using the particle swarm optimization algorithm of power marketing optimization of integrated energy coordinated development model of net effect, N represents depends on "regulation effect" and "relative marketing effect" size, which is likely to have a nonlinear relationship.

3.3 The Application of Power Marketing Using Particle Swarm Optimization Algorithm in the Co-Development Mode of Integrated Energy

The nonparametric method does not need to assume the functional form between the variables in advance, and can mine the nonlinear relationship completely based on the numerical characteristics of the variables, so as to avoid the problem of model setting bias. Based on the preliminary calculation method, the application of the power marketing optimization comprehensive energy collaborative development mode using the particle swarm optimization algorithm is the ratio of the potential target power intensity to the actual power intensity: see Eq. (9)

$$ASDF = \frac{\left(\frac{A - S_c^* \times D}{F - G_y^* \times H}\right)}{\left(\frac{S}{G}\right)} = \frac{1 - D_c^*}{1 - D_y^*} \tag{9}$$

In formula (9), D represents the optimal GDP added value and the reduction value of power marketing resources. ASDF represents the fixed-effect model, A, S, D, F, G, H represent the linear relationship between the application of integrated energy collaborative development model and the optimization of power marketing using particle swarm optimization algorithm:see Eq. (10)

$$ZX_{i,t} = C_1 V_{i,t} + \sum_{i=1}^{5} B_i N_{i,t} + M_{i,t} \tag{10}$$

In the formula, ZX is a semi-parametric model between the traditional parametric model and the non-parametric model, CV represents the restriction factor of the integrated energy collaborative development model, BN represents the sample size coefficient, and M represents the efficiency and accuracy of the model estimation.

4 RESULTS AND DISCUSSION

4.1 Application of Index System Framework of Integrated Energy Collaborative Development Mode of Electric Power Marketing by Using Particle Swarm Optimization Algorithm

After many studies and discussions, the study has defined the stratified target index, and has been used in the application index system of comprehensive energy collaborative development model, as shown in Table 1. According to Table 1, it can be clearly observed in this study that the whole application index system of integrated energy collaborative development mode covers power supply, power marketing materials using particle group optimization algorithm, power marketing, planning, power environment, quality, power data monitoring and efficient use of power personnel. The purpose of these standards is to measure the use efficiency of power resources and the degree of reduction, which constitutes the core of the application environment of

Table 1: Application index system of the integrated energy collaborative development mode of electric power marketing by using the particle swarm optimization algorithm

Electric power marketing integrated energy coordinated development mode		Particle Swarm Optimization	Control algorithm
Power marketing index W	152.2 663 18.23	27.1056 25.1086 290.111	236.107
Power marketing index E	99 140.2 219	27.1925	
Power marketing index R	17.21 68 10.26		
Power marketing index T	87		
Power marketing index Y			

the integrated energy collaborative development model. Therefore, the goal of implementing power marketing using particle swarm optimization algorithm is a multifaceted benefit sharing, and each element is developed under the restriction and promotion of each other, as shown in Table 1.

4.2 Application Method and Calculation of Power Marketing in Comprehensive Energy Collaborative Development Mode by Using Particle Swarm Optimization Algorithm

In fact, the application of a scientific comprehensive energy coordinated development mode of power marketing or environment using particle swarm optimization algorithm is an application process of diversified comprehensive energy coordinated development mode, including standardized treatment indicators, the determination of index weight and the comprehensive analysis of indicators. In view of the unique characteristics of all the parameters in the execution system, in order to reduce the difference between the parameters, this study needs to adopt appropriate conversion, so that the parameter values of the measured power marketing system can be normalized without parameters. This article standardizes the application index of the comprehensive energy coordinated development

Table 2: Calculated values of power marketing using the particle swarm optimization algorithm

Particle swarm optimization	Estimate error	Electric power marketing	Estimate error
Power marketing index W	19.233×8-6	Power marketing index W	13.464×10-2
Power marketing index E	15.643×8-6	Power marketing index E	12.344×10-2
Power marketing index R	13.132×8-6	Power marketing index R	13.437×10-2
Power marketing index T	11.435×8-6	Power marketing index T	13.560×10-2
Power marketing index Y	13.765×10-2	Power marketing index Y	13.782×10-2
Power marketing index W	14.433×10-2	Power marketing index W	13.911×10-2

mode of electric power marketing through the index method. All the true values (i. e., current values) in the index system are compared with the corresponding reference values (i. e., standard values) to reveal the achievement of each indicator, as shown in Table 2.

In order to make the integrated energy coordinated development mode application more fair and has substantial meaning, the study of the integrated energy coordinated development mode of various aspects of the importance of the quantitative distribution, and adopted the linear weighted comprehensive way, so that each application influence of coordinated development mode of integrated energy elements to make differentiation processing. The strategy of power marketing using particle swarm optimization algorithm is used to provide the most basic optimal implementation scheme for the implementation of sustainable development strategy. Therefore, by observing the overseas power marketing guide using particle swarm optimization algorithm, the planning and implementation are very detailed and complex, and indeed the integrated into the whole process of power marketing using particle swarm optimization algorithm, to ensure that each stage can be fully implemented, as shown in Figure 1.

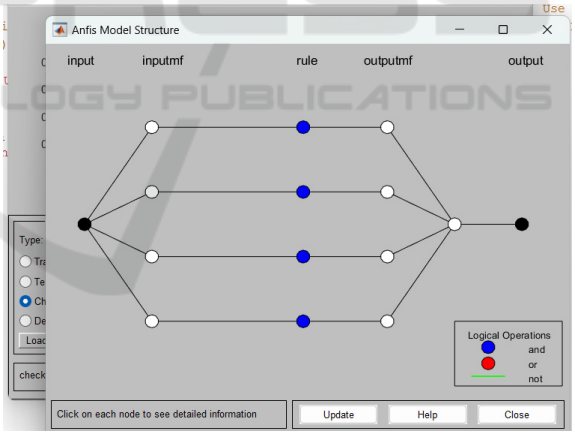

Figure 1: Comparison of power marketing using the particle swarm optimization algorithm

According to the current research results, this research is very important to the application standard system of comprehensive energy coordinated development mode of power marketing using particle swarm optimization algorithm. The research from the establishment of the particle swarm optimization algorithm of electric power marketing platform running comprehensive energy coordinated development mode of application index system on the

basis of work, scientifically build the execution system, and using the particle swarm optimization algorithm of power marketing platform operation implement the diversified application, to strengthen the proof, as shown in figure 2.

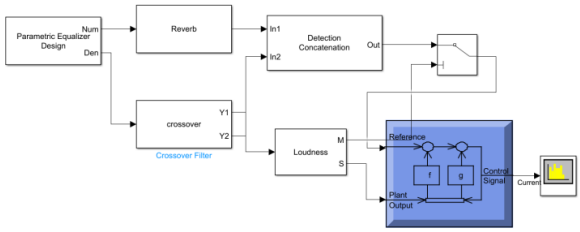

Figure 2: Comparison of power marketing using particle swarm optimization algorithm in the integrated energy collaborative development mode

The study chose the particle swarm optimization algorithm of power marketing area basic standard, and the model unit, as a large power marketing area, in order to enrich and perfect the particle swarm optimization algorithm of power marketing research content, and based on this to use the development of particle swarm optimization algorithm of electric power marketing, and clear the deviation value of different power environment, as shown in figure 3.

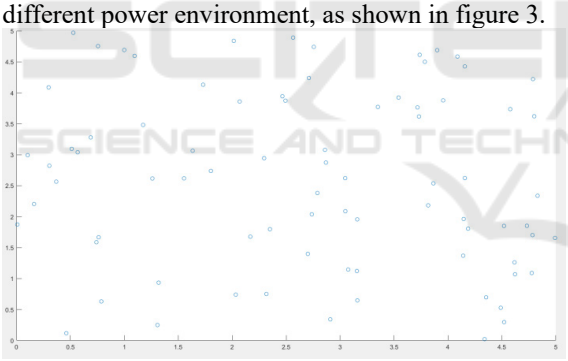

Figure 3: Calculation and analysis of the deviation value

5 CONCLUSIONS

In general, the score of power marketing operation using particle swarm optimization algorithm reaches the standard, which indicates that the platform is a high-quality power marketing market, and its power marketing effect, operation concept and status quo are very consistent. The implementation of comprehensive energy coordinated development mode application system has the ability to implement, and it is reasonable. However, the power marketing implementation index framework still needs to be optimized, and many related values are difficult to collect. This study makes an in-depth analysis of the application of power marketing using particle swarm optimization algorithm in the integrated energy collaborative development mode, and makes a more accurate definition of relevant indicators, in order to improve the efficiency and quality of power marketing.

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