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Construction and Development of Quality Systems for Energy Enterprises

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ABSTRACT

In response to many issues identified in earlier research, the article proposes development directions and suggestions for building a quality system for system energy enterprises. Firstly, a scientific and reasonable quality evaluation system should be established, including evaluation standards, methods, and processes. This article focuses on the construction and development of the quality system of energy enterprises, aiming to analyse the current situation, problems, advantages, and disadvantages of system energy enterprises in constructing the quality system and propose corresponding countermeasures and suggestions. Firstly, the article reviews the basic situation of system energy enterprises, including an industry overview, main products and services, market size, and growth trends. Next, the article analyses the current situation of building a quality system for energy enterprises, including existing quality systems, evaluation methods, and application situations. Through analysis, it was found that there are some problems in the construction of quality systems in energy enterprises, such as incomplete quality evaluation systems, single evaluation methods, and inaccurate evaluation results.

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1. Introduction

With the continuous development of China's market economy, the competition among industries is becoming more and more intense. Managers are the decisive factors in business management. This is mainly because managers play a crucial role in enterprise management. The ability and basic quality of the management

staff directly determine the pros and cons of the operation efficiency of the enterprise. In the energy enterprise,the quality of managers' competency affects the results of communication and cooperation between enterprises to a large extent. The operation and production of energy enterprises are closely related to the economic development and people's lives in China. Therefore, it is of great significance for the stable operation of energy enterprises to build a competency quality system for managers of energy enterprises.

Based on this, this paper analyzed and studied the construction and development of the competency quality system of managers in energy enterprises by constructing the competency model and the model analysis method.

2. The State of the Art

Domestic and foreign scholars have conducted some research on the competency quality system of managers in enterprises. However, overseas scholars began early and achieved more achievements in this field. Although scholars in China started in this field late, some achievements have been made.

Gluhova believes that the roles of managers in an enterprise include planning, directing, personnel, and reporting [1]. Medkova believes that energy companies involve a wide range of energy, including crude oil, refined oil, electricity, water, steel and mineral products and other resources [2]. From this point of view, the operation of energy enterprises is related to the national economy and people's livelihood, and its importance is self-evident. Tiahunova believes that managers' competency in energy enterprises includes administrative management, interpersonal coordination, leadership, and personal characteristics [3]. Bufquin believes that the factors affecting energy managers' competency quality are mainly the environment, the system and the individual [4]. Zhao believes that from the perspective of enterprise culture, it is helpful to improve the human resources of managers of energy enterprises and promote the effective development of enterprises by building up the competency quality of enterprise managers [5].

The above researches are the introduction and discussion of the status quo of the research on competency quality. Although these studies have carried out detailed elaboration on the energy enterprise and competency quality, the existing research results lack practical research on the introduction of competency quality systems in energy enterprises. Therefore, aiming at the shortcomings of the existing research, this paper put forward the method of establishing a competency model to analyze and study the construction and development of the competency quality system of energy enterprise managers. In the third part, the concrete contents of the research object and the competency model were elaborated. In the fourth part, the specific data of the model analysis were obtained, and the data results were analyzed. In the last part, this article was summarized and the relevant conclusions were given.

3. Methodology

This article mainly analyzed and studied the construction and development of the competency quality system of energy enterprise managers by constructing the method of competency model. The author chose an energy enterprise as the main research object and used the strategy deductive method to analyze the role of the managers of the energy companies and the strategic culture of the company, and combined the behavioral events of the excellent managers, concluded the competency characteristics, established the competency hypothesis model, and conducted a questionnaire survey of company managers. The questionnaire used the Likert five-point scoring method to investigate the importance of managers to various competency characteristics. SPSS software was used to carry out exploratory factor analysis according to questionnaire statistics data, and the modelling software was used to validate the factorial analysis and determine competency models.

At present, many enterprises in the energy industry have begun to pay more attention to the analysis and training of managers' competency. It is the most effective way to improve the comprehensive quality of enterprise managers by applying the competency model to con-

Dimensionality	Indicator	Occurrence times	Proportion
Leadership	Planning ability	18	6.79%
	Problem-solving ability	16	6.04%
	Decision-making ability	13	4. 9%
	Ability to train subordinates	15	5.66%
Interpersonal skills	Interpersonal skills	17	6.42%
	communication skills	16	6.04%
	Group construction	13	4.9%
Administrative capacity	Self-confidence	18	6.79%
	Achievement orientation	17	6.42%
	Personal influence	12	4.54%
	Conceptual thinking	14	5.28%
	Direct and decisive	10	3.79%
	Initiative	9	3.39%
	Plan management	20	7.55%
Administrative capacity	Safety management	15	5.66%
	Information gathering	15	5.66%
	Technical transformation	17	6.42%

Table 1. Interview statistics of competency of managers in energy enterprises

struct the competency quality system of enterprise management personnel. Fig.1 shows the actual scenario of activities undertaken by energy companies to research managers' competency. Korchynskyi believes that the competency model uses behavior to define and describe the knowledge, skills, quality, and working ability required of employees to complete their work and determines the competencies and the proficiency required to accomplish a particular job through the definition of different levels and a description of the specific behavior at the corresponding level [6]. Gryzunova believes that these behaviours and skills must be measurable, observable, and directive and have a critical impact on the individual's performance and the success of the business [7]. Shao believes that the competency model is the main method of competenc y identification. Its characteristics can be represented by the following aspects [8]: firstly, the competency model includes a series of competency collections, such as knowledge, skills, the degree of customer awareness and so on, which reflect the industry's overall quality requirements for employees. Secondly, the competency model is

differentiated. Even two companies in the same industry do not have the same requirement for the ability and quality of behaviour, which reflects the special requirements of an enterprise for personnel. Thirdly, the competency model has timeliness. Espino believes that in a period, the competency of employees required by the enterprise may be a set of combinations. Still, when the background of the environment changes, the requirements for the competency of employees will change. Accordingly, that is, the competency model will change [9].

According to the actual situation of an energy enterprise, the concrete process of establishing the competency model of managers is as follows:

Figure 1. Scenario of competency communication activities of the managers in energy companies

Firstly, as shown in Table 1, the questionnaire and the relevant interviews were conducted to obtain information and data on the competency quality of managers in various sectors of the energy enterprise to create a good foundation for establishing a competency model. As shown in Table 2, the distribution of posts in the questionnaire survey was basically that the number of management personnel in the Technical Department was the largest, followed by the Ministry of Construction, Organization Department and Planning Department, the number of managers in the Operations Department and Legal Department was relatively low.

Variable	Category	Number	Proportion
Post	Technology Department	23	31.51%
	Construction Department	11	15.07%
	Organization Department	12	16.44%
	Planning Department	10	13.7%
	Operation Department	8	10.96%
	Legal Department	9	12.33%

Table 2. Job distribution of questionnaires

Secondly, according to the recycling questionnaire obtained by the questionnaire statistics, the sample characteristics of the competency quality of energy enterprise managers were analyzed. The calculation of sample size for sample feature analysis is shown in equation (1).

Among them, N is the sample size, Z is the statistic, E is the error value, and P is the probabilit y value. Wang believes that after the sample size is determined, the characteristics of the competency sample of the energy enterprise managers can be analyzed [10]. The feature analysis mainly extracts and analyzes the competency characteristics of the managers of various departments from the aspects of job category, gender, working time of energy enterprise managers and so on. Novikova argues that the main purpose of the analysis of sample characteristics is to determine the study's sample size and the main factors of competency quality to build an effective competency quality system for enterprise managers [11].

$$N = Z^2 \times \left(P \times \left(1 - P\right)\right) / E^2 \tag{1}$$

Thirdly, the sample feature analysis is the basic premise of factor analysis. This paper mainly used the exploratory factor analysis method to study the competency quality of energy enterprise managers. Exploratory factor analysis mainly calculates and adjusts each influencing variable and factor relation of the object of study. In general, effective exploratory factor analysis requires factor analysis as the basic premise. Meding believes that only by using the method of factor analysis to deconstruct the object of study can the effective exploratory factor analysis be realized [12]. Library believes that the exploratory factor analysis of the competency quality of managers in energy enterprises mainly includes three steps: correlation test, variance interpretation and factor rotation [13]. Firstly, the formula (2) was used to test the correlation of competency factors of energy enterprise managers selected in this paper. Among them, $s\hat{}2$ is the variance of personnel competency factor, m is the average value of competency factor of managers obtained by questionnaire survey, and x is the factor variable. Then, the explanatory analysis was carried out according to the calculated variance. Finally, statistical software was applied to perform rational factor rotation of relevant factors affecting the competency of managers in energy companies so as to integrate and classify the influencing factors of competency quality of the energy enterprise managers.

$$s\hat{}2 = 1/n\left[\left(x_1 - m\right)\hat{}2 + \left(x_2 - m\right)\hat{}2 + \cdots + \left(x_n - m\right)\hat{}2\right] \tag{2}$$

Fourthly, according to the results of the above sample feature analysis and exploratory factor analysis, the indicators of the competency model were determined to determine the competency model of energy enterprise managers. The competency model of the energy enterprise management personnel established in this paper includes six main factors: solving problems, logical thinking, sense of responsibility, endurance and enthusiasm constitute the first main factor; learning ability, interpersonal ability and coaching ability constitute the second main factor; executive ability, planning ability, decision-making ability and solidarity ability constitute the third main factor; strategic thinking and opportunity control constitute the fourth main factor; employee motivation and personnel management constitute the fifth main factor; flexibility, objectivity and loyalty, as well as business ability, constitute the last major factor. Freyman argues that these principal factors contain managers' coordination ability, overall planning ability, opportunity ability, and human ability and driving ability [14]. The author used the competency model to analyze and study the competency quality system of the energy enterprise management personnel from the perspective of the main factor of the competency model.

$$\alpha = \left(k/k - 1\right) \times \left(1 - \left(\sum S^2 i\right) S^2 x\right) \tag{3}$$

Fifthly, the reliability analysis method was used to verify the competency model, to determine the effectiveness of the competency model further. Reliability analysis mainly refers to calculating the reliability of the model factor and performing the scale test. The reliability formula of the model factor is shown in equation (3). Among them, α is the factor reliability value, k is the total items of the scale test, $S^2 i$ is the test variance, $S^2 x$ is the total item variance. From the calculation results of the reliability value, this paper judged the fitting degree of the competency model of the managers of the energy enterprises established in this paper. It verified the

feasibility of the application of the competency model. Once the model's fit is inconsistent with the application criteria, the research variables can be adjusted accordingly. Then, the model's reliability can be analyzed until the model fit conforms to the application standards. Yang believes that when the model fit meets the application standard, the manager's competency model can be applied to building the competency quality system. Finally, the competency quality system of managers in energy enterprises was obtained [15]. The competency quality system of managers in energy enterprises can be used to analyze the qualities of managers in their enterprises, and can take appropriate training measures to help managers continue to improve their management capabilities in the case of effective analytical results, and can eventually achieve the business objectives of the continuous development of enterprises.

4. Result Analysis and Discussion

This paper mainly chose the managers of the various departments of the representative enterprises of the energy industry as the research objects to analyze and study the construction and development of the competency quality system of the energy enterprise managers through the establishment of the competency model. Among them, the managerial roles of the selected managers in the energy sector are highly diverse. At the same time, the data obtained from the model analysis are shown in the following tables:

Dimensionality	Self-evaluation	Peer or subordinate evaluation	Superior evaluation	Percentage of difference
Leadership qualities	12.42	11.28	11.63	10.57%
Management coordination	6.7	6.7	6.7	10.47%
Co-ordinate arrangements	17.24	17.05	18.39	10.82%
Vision opportunities	8.84	7.98	8.48	20.46%
Manpower management	2.27	2.08	2.11	10.24%
Work-driven	1.67	1.72	1.61	20.02%

Table 3. Scoring of the Competency of managers in energy enterprises

Table 3 shows the competency scoring of six dimensions of managers' leadership traits, management coordination, overall arrangement, vision opportunity, human management and job driving from the competency quality system of energy enterprise managers constructed by applying the competency model established in this paper. The data show little difference between the level of leadership, subordinate and self-evaluation on the competency quality of managers by applying the competency model of enterprise managers. From the data of the percentage difference shown in Fig. 2, it can be seen that the difference in each dimension score is small. From the perspective of the competency dimension, the difference between opportunity vision and job-driven two dimensions is large. It can be seen that the competency quality level of the

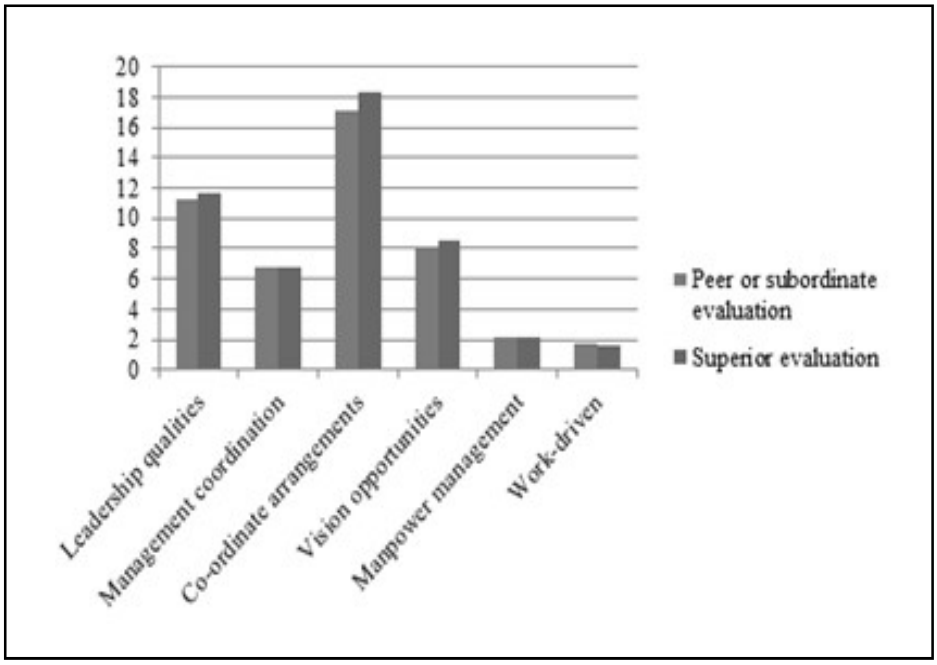

Figure 2. Comparative analysis of competency score of managers in energy enterprises

managers of the energy enterprises obtained by the competency model is in line with the actual situation; that is to say, it is feasible to apply the competency model to construct the competency quality system of the managers in energy enterprises. At the same time, improving the competencies of the managers of the energy companies can proceed from both the opportunity vision and the work-driven two dimensions.

Module	Features	Self-evaluation	peer	Subordinate 1	Subordinate 2	Average value	Superior evaluation	Difference ratio
Opportunity vision	Strategic thinking	11	10	9	8	9	10	20.47%
	Opportunity control	13	13	12	13	12.67	13	10.42%

Table 4. Scoring of features of opportunity vision and competency dimension

According to the above analysis, the two dimensions of opportunity vision and job drive of competency quality of managers in this energy enterprise have great room for improvement. The author made a model analysis of the two modules of opportunity vision and work drive of the energy enterprise managers from the perspective of competency. It can be seen from Table 4 that the difference in strategic thinking characteristics of the managers in energy enterprises is great in the dimension of opportunity vision, and the characteristic difference of opportunity control is far below strategic thinking. It can be seen that the competency quality of the strategic thinking of managers in energy enterprises needs to be improved. It can be seen from Table 5 that there are great differences between the two competency characteristics of loyalty and objectivity of the energy enterprise managers under the working driving dimension. It can be seen that the loyalty and objectivity of the energy enterprise managers need to be improved. The internal driving force and flexibility of energy enterprise managers in this paper are relatively different and stable, so the internal driving force and flexibility of managers are the advantages of competency of the energy enterprise managers.

Module	Features	Self-evaluation	peer	Subordinate 1	Subordinate 2	Average value	Superior evaluation	Difference ratio
Work-driven	Loyalty	9	9	10	12	10.33	10	30.78%
	Objectivity	12	11	12	13	12	12	20%
	Internal drive	13	14	13	13	13.33	13	10.24%
	Flexibility	14	14	15	14	14.33	13	8.44%

Table 5. Scoring of features of opportunity vision and competency dimension

In summary, the competency model proposed in this paper can be applied to building the competency quality system of energy enterprise managers, which has high feasibility. At the same time, in the energy enterprise, internal drive and flexibility are the major advantages of managers in terms of competency quality. However, strategic thinking, loyalty and objectivity are the three main competencies managers in energy enterprises must focus on. Therefore, the author believes that energy companies can effectively build the competency quality system of managers from the following aspects and continuously improve the competency quality level of managers: firstly, from the perspective of corporate culture, the enterprise can combine strategic objectives and development plans of enterprises to promote energy conservation and promote the coordinated development of energy and environment, so as to strengthen the energy consciousness of enterprise managers and promote the strategic thinking level of managers; secondly, from the point of view of results-oriented, enterprises can help managers to establish their own specific goals of work, stimulate managers' work enthusiasm, and fundamentally enhance managers' loyalty and sense of responsibility to the enterprise; thirdly, enterprises put managers into the working group of the construction of competency quality system, so that managers can further understand and cognize the effectiveness and importance of competency quality system; fourthly, managers can participate in the process of building the system to continuously reduce the quality of competency system of negative emotions, so as to effectively enhance the energy enterprise management objectivity; at the same time, managers can constantly reduce the negative emotions of the competency quality system in the process of participating in the system building, so as to effectively improve the objectivity of managers in energy enterprises.

5. Conclusions

To improve the competency of managers in energy enterprises, this paper analyzes and studies the construction and development of the competency quality system of managers in energy enterprises by constructing the competency model. Finally, the main conclusions were obtained: the competency model established in this paper is highly feasible in building the competency quality system of managers in energy enterprises. These two competency quality levels of internal drive and flexibility of managers in energy companies are good, but these three competency qualities of strategic thinking, loyalty and objectivity need to be improved.

In conclusion, the competency model proposed in this paper is highly applicable to constructing the competency quality system. Still, its construction process involves sample and exploratory factor analysis, which is complicated and requires computer software. Therefore, future research can reduce the computational workload by optimizing the operation process and increasing the sample size to enhance the competency model's effectiveness and find ways to improve the competency quality of managers in energy companies.

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