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Application of Cost Analysis Method in Powder Metallurgy Enterprise Management

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Abstract: *Cost management plays an important role in the operation of powder metallurgy enterprises. Based on the theoretical basis of cost analysis, this paper studies the cost components of powder metallurgy enterprises, analyses the problems existing in the application of cost analysis in powder metallurgy enterprises, and puts forward targeted strategies. The existing problems include: accuracy and completeness of data, improper selection and application of analysis methods, disconnection between cost analysis and enterprise strategy, and lack of professional quality and awareness of personnel. Specific strategies include: establishing a sound data management system, rationally selecting and optimizing cost analysis methods, strengthening the integration of cost analysis and enterprise strategy, and improving personnel professional quality and cost management awareness. The research results are helpful to enhance the competitiveness of enterprises in the market and maximize the economic benefits.*

Keywords: *Cost analysis method; Powder metallurgy; Enterprise management; Problem analysis; Application strategy*

1. Introduction

Powder metallurgy, as an important material preparation and forming technology, plays an indispensable role in modern industrial system. It is based on metal powder or a mixture of metal powder and non-metal powder as raw materials, through forming and sintering processes, to manufacture metal materials, composite materials and various types of products [1]. The main end customers of powder metallurgy parts are automobiles, household appliances and power tools [2]. In recent years, with the rapid development of the global manufacturing industry, the powder metallurgy industry has also made significant progress. In the operation process of powder metallurgy enterprises, cost management has a vital role, which is directly related to the survival and development of enterprises. Cost management directly affects the price competitiveness of products, through effective cost management, enterprises can reduce the production cost of products, so as to have greater flexibility in market pricing. Secondly, cost management is related to enterprise profit margins. Effective cost management can help enterprises accurately control various expenses, optimize resource allocation, improve production efficiency, so as to reduce the total cost and increase profit margins. Cost management can help enterprises cope with market risks. The market environment is complex and changeable, the price of raw materials fluctuates, and the market demand changes. Effective cost management can enhance the anti-risk ability of enterprises. This study deeply discusses the application of cost analysis method in powder metallurgy enterprise management, which will enrich and improve the theoretical system of powder metallurgy enterprise cost management. Through the in-depth study and application of cost analysis method, enterprises can more accurately calculate costs, in-depth analysis of cost composition, find out the key points of cost control, improve the efficiency and effect of cost management, enhance the competitiveness of enterprises in the market, and maximize economic benefits.

2. The Theoretical Basis of Cost Analysis

Through collecting, sorting, calculating and analyzing various cost data in the process of production and operation of enterprises, cost analysis can deeply understand the cost composition, cost change trend and the relationship between cost and business activities, reveal the root cause of cost and clarify

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the key factors affecting cost. Thus, it provides decision-making basis for enterprise managers to help enterprises achieve cost control, efficiency improvement and strategic goals [3]. From the perspective of connotation, cost analysis is not only a simple cost accounting, but also a comprehensive analysis of the cost formation process, covering all aspects of enterprise operation from raw material procurement, production and manufacturing, product sales to after-sales service. Through detailed analysis of the cost of each link, the potential of cost reduction can be tapped.

The basic principles of cost analysis are based on cost behavior theory, cost-benefit principle and the correlation between cost and business activities. Cost theory divides cost into fixed cost and variable cost. Fixed cost remains unchanged within a certain range of business volume, while variable cost changes in direct proportion with the change of business volume [4]. Cost-effectiveness requires enterprises to weigh the relationship between costs and benefits when making cost analysis and decision-making, and ensure that the benefits brought by the cost control measures are greater than the costs. The principle of correlation between cost and business activities holds that the business activities of an enterprise are the root cause of cost. By analyzing the correlation between business activities and cost, the cost control points can be accurately identified and targeted measures can be taken to reduce costs.

3. Cost Components of Powder Metallurgy Enterprises

3.1 Raw Material Cost

As the main raw material, the cost of metal powder is affected by various factors, and the rising cost of raw materials leads to the continuous reduction of corporate profits [5]. The price of different kinds of metal powder varies greatly, and the price is affected by factors such as market supply and demand and international market price fluctuations. The cost of additives can not be ignored, binders, lubricants and metal additives, although the amount is relatively small, but play a key role in product quality and production process.

3.2 Equipment Depreciation and Maintenance Costs

Powder metallurgy production requires a variety of specialized equipment, including presses, sintering furnaces and powder making equipment, which have high acquisition costs. Equipment will gradually wear and age during use, requiring depreciation [6]. Regular equipment maintenance and maintenance can ensure the normal operation of the equipment and reduce the probability of failure. Maintenance costs include routine inspections, parts replacement and lubrication maintenance.

3.3 Energy Cost

Energy consumption such as electricity and gas is large in the production process. In the sintering process, heating the billet to a higher temperature requires a lot of energy consumption. The power consumption is mainly used for the operation of the equipment, including the press drive and the operation of the pulverizing equipment. Energy costs are closely related to energy prices and the management level of enterprises. Reasonable energy management measures can reduce energy costs.

3.4 Labor Cost

The wages and benefits of operating workers are the main part of labor costs, including basic wages, overtime pay, bonuses, social insurance and housing provident funds [7]. Administrative costs are also a part of labor costs, including administrative salaries and office expenses. Office expenses, including the purchase of office supplies, utilities, communications and travel expenses, are relatively small but need to be controlled reasonably.

Inspection equipment acquisition and maintenance costs are the main quality control costs. In order to test product quality, enterprises need to purchase a variety of testing equipment, and need to be calibrated and maintained regularly to ensure the accuracy of test results. The processing cost of unqualified products also belongs to the cost of quality control. Unqualified products found in the testing process need to be reworked or scrapped, which will increase the cost of enterprises.

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3.5 Shipping and Packaging Costs

Larger weight or larger volume products, the transportation cost is relatively high. The longer the transportation distance, the higher the transportation cost [8]. The mode of transportation also affects the transportation cost, and the price and service characteristics of different modes are different. Enterprises need to choose the right mode of transportation according to the characteristics of products and the needs of customers. Packaging costs include the purchase of packaging materials, packaging design and packaging labor costs.

4. Application of Cost Analysis in Powder Metallurgy Enterprises

4.1 Data Accuracy and Completeness Issues

Powder metallurgy enterprises often face many data quality problems, which seriously affect the effectiveness of cost analysis. In daily operations, cost data comes from a wide range of sources, covering raw material procurement, production and processing, equipment maintenance and sales and transportation. The data collection methods and channels of each link are different, which easily lead to errors in the process of data transmission and summary. Missing data is also a common problem in the cost analysis of powder metallurgy enterprises. Some data may be missing due to untimely recording, omissions by recording personnel, or system failures. In addition, the cost data update is not timely is also a prominent problem. The market environment changes rapidly, raw material prices fluctuate frequently, and production processes and equipment are constantly updated and improved, which all lead to dynamic changes in costs.

4.2 Improper Selection and Application of Analytical Methods

When some powder metallurgy enterprises choose cost analysis methods, they fail to fully consider their own production characteristics and management needs. Some small powder metallurgy enterprises choose complex activity-based costing. Although activity-based costing can allocate indirect costs more accurately, its implementation cost is high, and it needs a lot of data support and professional personnel operation. For small enterprises, lack of perfect information system and professional personnel, cannot accurately collect and process the data required by activity-based costing, resulting in inaccurate cost analysis results. Non-standard operation is also a common problem, in the application of factor analysis, factor decomposition is not appropriate to lead to the deviation of analysis results. In addition, some enterprises in the application of cost analysis methods, lack of flexibility and innovation, cannot effectively control costs.

4.3 Cost Analysis is Disconnected from Business Strategy

Some powder metallurgy enterprises are too concerned about short-term cost reduction, ignoring long-term strategic goals. In terms of equipment investment, in order to save money, the renewal plan is postponed and the old equipment is continued to be used. Although the current acquisition cost is reduced, the production efficiency is low, the energy consumption is large, the maintenance cost is high, the total cost is increased, the competitiveness of the enterprise is weakened, and the strategic goal of the enterprise is contrary to the pursuit of long-term sustainable development. The lack of effective communication mechanism among various departments within the enterprise is also an important reason for the disconnection between cost analysis and enterprise strategy. Cost analysis is usually the responsibility of the finance department, but the generation of costs involves all departments of the enterprise. Some powder metallurgy enterprises have short-term interest orientation, pay too much attention to immediate benefits, and ignore the support role of cost analysis for enterprise strategy.

4.4 Lack of Professional Quality and Consciousness of Personnel

The lack of professional quality and consciousness of staff in powder metallurgy enterprises in cost analysis seriously restricts the effective application of cost analysis in enterprises and affects the level of enterprise cost management. In terms of professional knowledge, some employees have a low understanding and mastery of cost analysis methods. In terms of skill level, employees lack the skills required for cost analysis and management. In addition, enterprises do not pay enough attention to the cultivation and education of employees' cost awareness, and lack effective incentive mechanism and

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training system. The enterprise has not included the cost consciousness into the staff training content, and has not systematically trained the staff on the cost management knowledge, resulting in the staff's insufficient understanding of the importance of cost management. At the same time, enterprises lack the corresponding incentive mechanism, unable to mobilize the enthusiasm of employees to participate in cost management.

5. The Application Strategy of Cost Analysis in Powder Metallurgy Enterprises

5.1 Establish a Sound Data Management System

Powder metallurgy enterprises should establish standardized data collection, collation, storage and update mechanisms to ensure the accuracy and integrity of cost analysis data. In the data collection stage, it clearly defines the data collection responsibilities and standards of each department, and formulates detailed data collection lists and processes. Sensors are installed on the production line to collect the operating parameters and production data of the equipment in real time and automatically transmit them to the production management system. In terms of data sorting, the collected data is classified, summarized and reviewed. The data is classified according to cost items and cost factors, and the cost data is divided into raw material cost, equipment depreciation cost and labor cost. It establishes a secure and reliable data storage system and adopts database management technology to centrally store and manage cost data. It formulates a data backup strategy and stores the backup data in off-site storage devices. In order to ensure the timeliness of cost data, enterprises should establish a data update mechanism, update the cost data timely according to the market changes and the production and operation situation of the enterprise. When the price of raw materials fluctuates, the purchasing department shall update the purchasing cost data in time. When the production process changes, the production department should update the cost data in the production process in time.

5.2 Reasonable Selection and Optimization of Cost Analysis Methods

Powder metallurgy enterprises should reasonably choose cost analysis methods according to their actual conditions, and constantly optimize and innovate them. When choosing a cost analysis method, it is necessary to fully consider the production characteristics, scale, product structure and management requirements of the enterprise. For large powder metallurgy enterprises, activity-based costing is given priority to allocate indirect costs more accurately and improve the accuracy of cost accounting. In the process of applying the cost analysis method, the method is constantly optimized and innovated. When using the factor analysis method, the factors that affect the cost are decomposed reasonably to ensure the comprehensiveness and rationality of the factor decomposition. When analyzing changes in raw material costs, we not only consider direct factors such as raw material prices and purchase volumes, but also consider indirect factors such as transportation costs, storage costs and quality factors. In addition, powder metallurgy enterprises should actively introduce advanced data analysis tools and technologies to improve the efficiency and accuracy of cost analysis. It utilizes big data analysis technology to mine and analyze massive cost data, discovering the patterns of cost changes and potential cost control opportunities. Data mining algorithm is used to analyze the relationship between raw material price fluctuation and market supply and demand, so as to provide a more accurate basis for enterprises to make purchasing decisions.

5.3 Strengthen the Integration of Cost Analysis and Enterprise Strategy

Powder metallurgy enterprises should incorporate cost analysis into their strategic planning and decision-making process to realize the synergy between cost management and enterprise strategic objectives. When formulating an enterprise strategic plan, the results of cost analysis should be taken into consideration. Through cost analysis, we can understand the current cost situation and advantages of the enterprise and clarify the key points of cost control. In the process of enterprise strategic decision, the cost analysis is taken as the decision basis. When making investment decisions, the cost-benefit analysis method is used to comprehensively evaluate the costs and expected benefits of the investment project. When making production decisions, production plans and layouts should be reasonably arranged based on the results of cost analysis. The optimal production scale is determined according to the cost behavior analysis. In order to realize the effective integration of cost analysis and enterprise strategy, the communication and collaboration between various departments should be strengthened. It is necessary to establish a cross-departmental cost management team, composed of personnel from

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relevant departments such as the finance department, purchasing department, production department and sales department, to jointly participate in cost analysis and management work. At the same time, cost management is incorporated into the enterprise performance appraisal system, the responsibilities and objectives of each department in cost management are clarified, and all employees are encouraged to actively participate in cost management, so as to realize the coordinated development of cost management and enterprise strategic objectives.

5.4 Enhance Personnel Professional Quality and Cost Management Awareness

Powder metallurgy enterprises should take a variety of measures to strengthen staff training, establish incentive mechanism, improve the professional quality of staff cost analysis and cost management awareness. In terms of employee training, a systematic training plan should be formulated and targeted training should be carried out for employees in different positions. At the same time, some methods and skills for cost reduction should be imparted to production staff, and their awareness of cost management and operational skills should be enhanced. It is necessary to organize production staff to visit advanced enterprises for study and learning, to acquire advanced production management experience and cost control methods. Internal training courses should be carried out, with lectures given by technical backbones and management personnel within the enterprise, sharing experience in cost management during the production process. In order to improve the enthusiasm of employees to participate in cost management, enterprises should establish an effective incentive mechanism. Enterprises establish a special reward fund for cost management to provide material rewards to departments and individuals who perform outstandingly in cost management. In addition, enterprises should also strengthen the construction of cost management culture and create a good atmosphere for all employees to participate in cost management. Enterprises guide all employees to establish the concept of cost savings and reduction through measures such as leaders taking the lead and role models setting examples, making cost management a voluntary behavior of employees and forming a corporate culture where all staff participate in cost management.

6. Conclusions

Through theoretical analysis and practical experience, a series of valuable conclusions are drawn. Through the comprehensive application of a variety of cost analysis methods, enterprises can accurately calculate costs, in-depth analysis of cost composition, so as to effectively reduce costs. Cost analysis encourages enterprises to optimize the production process, increase research and development investment, improve product quality and performance, meet the higher needs of customers, and further enhance customer satisfaction and loyalty. In investment decision-making, through cost-benefit analysis, enterprises can comprehensively evaluate the cost and expected income of investment projects, reduce investment risks, and ensure the scientific investment decision. With the rapid development of science and technology, emerging technologies such as artificial intelligence, big data and blockchain provide a broad space for cost analysis method innovation. In the future, we will explore the construction of intelligent cost analysis model, use artificial intelligence algorithms to analyze and forecast massive cost data in real time, find cost trends and potential risks in advance, and provide more timely and accurate information support for enterprise decision-making.

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