



# Application of Marginal Analysis Tool in Enterprise Production and Operation Decision

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**Abstract.** Modern enterprises how to introduce and use marginal analysis management accounting tools, from the perspective of professional centralized management business, in the production of loss products, product parts are homemade or outsourcing, from product design, process technology, staffing, auxiliary consumption, equipment and production line layout, production organization, quality control, and according to the cost of production process, so as to reduce product cost, improve profitability, for enterprise decision to provide strong support.

**Keywords:** Marginal analysis of production and operation and application

## 1 Introduction

Marginal analysis is based on the analysis of the cost performance state, and divides the product cost into the fixed cost and the variable cost according to the variable cost method [1]. Fixed cost refers to the cost that does not change with the change of business volume within a certain range, such as depreciation of production equipment, plant rent, etc. The variable cost refers to the cost that changes positively with the change of business volume within a certain range, and the variable cost of unit product remains unchanged, such as direct labor under raw materials and piece system, etc. However, in the actual production, the mixed cost makes the binary division of the product cost not easy, which has two different properties: fixed cost and variable cost, so it still needs to be decomposed. As the basic method and tool of management accounting, marginal analysis can be used in combination with a variety of other methods, suitable for many types of decision analysis, with a wide range of application, and the method is simple, easy to understand, easy to master.[2]

In the fierce market competition, enterprises are mainly facing the following problems:

Technology cost reduction needs to be further strengthened. The products of the enterprise are special products, and the performance requirements of the products are high. Research and development personnel often pursue the best performance in the

design, but ignore the cost, which needs to achieve the best integration of product cost and performance from the perspective of technology.

Product pricing power is gradually weakened, and the cost control pressure is greater. With the reform of state organs, the product pricing strategy tends to be market-oriented, and the independent control ability of domestic product prices is becoming weaker and weaker. With the gradual disappearance of demographic dividend and the country's macro-control of overcapacity reduction, labor costs and material prices fluctuate higher, the pressure of cost control continues to increase, and the difficulty of improving product competitiveness increases simultaneously.

Basic management needs to be further refined, and the management level needs to be continuously improved. With the continuous expansion of the industrial scale of the enterprise, the management scope is getting wider and wider, the management difficulty is getting more and more difficult, and the requirements for the management level are getting higher and higher. The basic management data of the enterprise needs to be sound enough, and the granularity of the management is getting more and more fine. In order to adapt to the changing internal and external environment and support the rapid development of various industries, it is urgent for enterprises to use management accounting tools to improve their management level.

## **2 System design**

### **2.1 Objectives of applying marginal analysis tools**

Using marginal analysis tools, through analysis and judgment, we can find out the key points to reduce costs and costs, and formulate feasible plans for implementation and improvement, reduce product costs, enhance market competitiveness, improve product economic benefits [3], provide strong support for management decision-making, and provide guarantee for the development of enterprises.

### **2.2 The general idea of applying marginal analysis tools**

Decision goal oriented, on the basis of determining the decision target, collect relevant information, using marginal analysis tools and methods, the loss products, parts of homemade and outsourcing from a comprehensive business perspective decomposition, analysis, put forward and formulate feasibility improvement plan, after the enterprise leadership decision, into the enterprise business plan, organize the implementation and feedback improvement, so as to improve the economic benefit of the enterprise.

### **2.3 Application of the content of the marginal analysis tools**

First, according to the actual situation of the production and operation of enterprises, the specific problems and goals should be solved for the special orders and their pricing [4], self-made and outsourcing, sales or deep processing.

The second is to analyze the impact of a decision on related income, related cost or profit, in the case of a wide collection of measurable and unmeasurable information, focus on the incremental cost, marginal cost, opportunity cost, replacement cost, pay cost, exclusive cost, processing cost, separable cost, delay cost and avoid cost, through marginal analysis preliminary determine whether to achieve the decision goal.

Third, from the design, production process and other technical perspectives to develop improvement plans, products and parts of the improvement, and test, demonstration. According to the improvement plan, under the premise of considering the measurement factors, non-measurement factors and the existing economic resources, the relevant cost of products and parts is determined, for decision analysis, to provide support for enterprise decision-making.

### **3 Application process**

#### **3.1 Organizational structure**

Establish a decision analysis leading group, headed by the general manager and the deputy group leader, to guide and coordinate the decision making analysis of the centralized management departments of the enterprise; review and approve the decision analysis matters and related matters; and hear the progress report of the decision analysis work.

Set up a decision analysis and management office, mainly responsible for formulating decision analysis and management methods, formulating decision analysis plans [5], monitoring and feedback all links in the implementation process, summarizing and analyzing the implementation results, and reporting to the enterprise leading group.

Set up a professional analysis and centralized management department, mainly responsible for the analysis, improvement, implementation and control of specific decision-making projects from the perspective of centralized business management based on its professional skills.

#### **3.2 Participating departments, functions and responsibilities**

In order to ensure the deepening of the marginal analysis work, the enterprise management attaches great importance to, actively organize, participate in the scheme improvement, and clear lead department, participation departments and related personnel [6], provides organizational guarantee for marginal analysis, under the guidance of enterprise management, enterprise departments closely linkage, work together, to ensure that the marginal analysis work completed.

Decision Analysis and Management Office. Affiliated to the financial department of the enterprise, the enterprise financial department is responsible for leading the implementation of decision-making analysis.[7]

Professional analysis and centralized management department. Including finance, operation, sales, production, research and development, technology, procurement, manpower, tooling, quality, equipment and energy departments and their corresponding personnel, their specific responsibilities are shown in Table 1.

**Table 1.** Responsibilities table of Professional Centralized Management Department (owner-draw)

order number	project	responsible department	Content and matters
1	Accounting statistics	treasurer's department	Provide raw and processed accounting information and statistical information data, including production and sales volume, revenue, cost (standard cost, actual cost), profit, etc., and lead the marginal analysis
2	scheme of operations	Operation department	Provide the annual and monthly rolling business plans for the products
3	market conditions	marketing department	Provide customers' development plan, operation status, capital situation, purchase price, payment terms and other relevant information; provide product market demand, enterprise market share and competitors; and conduct price negotiation with customers
4	organism of production	line department	Provide production capacity, equipment status, production organization and arrangement, logistics route, workshop layout, production capacity use and other production organization related information
5	direct material	R & D and Technology Department	Provide technical information on materials, production process, and complexity of products and parts design; demonstrate material improvement; optimize manufacturing process means and route; and provide technical support for manufacturing
6	bought-in components	purchase unit	Provide suppliers on the development plan, operating status, capital status, production capacity, quality, product price and other related information; negotiate the price with suppliers, and purchase the required products and parts at the best price on the premise of the quality assurance
7	labour cost	Human resources department	Provide human resource information such as staffing, hierarchy, capacity status, and salary status; formulate operation time, working hours, efficiency standard and labor cost standard, and put forward specific suggestions for corresponding improvement
8	Cost of tooling	tooling management department	Provide actual consumption of tooling; determine standard life and propose improvement to reducing tooling consumption

9	energy cost	Equipment Energy Department	Provide actual energy consumption; determine standard energy consumption and propose specific improvements for standard consumption
10	Costs of accessories	Auxiliary materials management department	Provide actual consumption of accessories; determine accessories consumption standard and propose improvement suggestions for reducing consumption
11	cost of spoiled goods	Quality management department	Provide the quality information of all production workshops and suppliers; formulate the waste cost standard according to the difficulty of different parts, and make specific suggestions for the quality improvement
12	cost of production	treasurer's department	Divide the variable manufacturing cost and the fixed manufacturing cost; determine the manufacturing cost consumption standard

### 3.3 Deployment requirements for resources, environment, information technology and other conditions

Organizational structure guarantee. Marginal analysis requires the establishment of a decision analysis organization, by the enterprise management layer of the participation of the whole process, to ensure that the enterprise from the top to the bottom of the unity of thought, consistent action, so that the decision analysis work is carried out as planned.

Close cooperation of all departments. Problems in the process of decision analysis and improvement, need to establish regular communication mechanism, led by decision analysis management office, regularly organize professional analysis centralized management department progress and decision analysis problems in the process of decision analysis full communication, coordination, to ensure that the professional analysis centralized management department closely cooperate, information sharing, better implement decision analysis improvement work.

Cost system as the support. Marginal analysis focuses on implementing improvements and determining the variable costs of products and parts during the production process. If the enterprise establishes a standard cost system, and the standard cost is refined to the production process of products and parts, or the actual cost accounting system is refined by the enterprise to the parts and their production process, with the corresponding cost system to do the support, then the data will be more accurate and practical when determining the improved variable cost.

Informatization acts as a means. The cost of products and parts should be finely managed by the means of information. When the decision scheme is implemented, the standard cost of decision analysis should be input into the standard cost system. In the actual production, the actual cost of products and parts and the standard cost should be compared and analyzed, and the differences should be found out and improved to achieve the expected results.

### 3.4 Specific application mode and application process

Marginal analysis is a complex process of putting forward problems, analyzing problems and solving problems. It usually needs to adopt scientific analysis methods according to multiple information, and make the best choice after careful analysis and calculation. Therefore, in the whole process, how to use the relevant information and data, according to the corresponding standards to determine the best scheme, generally according to the following steps

Determine the decision-making goals. For a product, the decision analysis goal of the enterprise is: whether to produce a product; if a product is produced, whether the product involved parts are self-made or outsourcing, how to reduce the production cost?

Collect and sort out information and conduct preliminary analysis. All professional analysis and centralized management departments shall collect and provide corresponding information according to their centralized management business.

Formulate improvement plans and provide decision support. The analysis of the centralized management departments of each major, after a deep analysis from the business level, found that there is room for improvement of materials, standards, specifications, models, packaging mode, production process, personnel configuration, and the cost of parts in each production process can be further compressed[8]. After the improvement, it is expected that the improvement of product performance can enhance the bargaining power, improve the product reputation and selling price, and reduce the product cost on the premise of ensuring the quality, so that the product cost performance can achieve the best. Therefore, it is necessary to analyze the professional centralized management departments to formulate improvement plans and demonstrate, to provide support for the management level to make decisions.

Implementation plan and feedback results. After the plan is determined, it will be incorporated into the enterprise plan and organized and implemented. In the implementation of the plan, there are a variety of uncertain factors that are difficult to predict. The professional analysis and centralized management departments constantly find problems in the implementation process, and feed back to the original plan, find out the deviation, and take effective measures to improve in time, to ensure the successful completion of the plan objectives.

## 4 Analysis

Through the implementation and application of management accounting tools, the enterprises revise and improve the standard cost management system, establish the continuous data of the historical consumption of products and parts, and lay a solid foundation for the enterprise business decision-making. Promote the management level of enterprises significantly improved, the business ability continues to enhance, and the business performance continues to improve.

## **4.1 Basic application conditions of marginal analysis tools**

### **4.1.1 To be closely integrated with business activities.**

Marginal analysis is not only financial cost analysis, but more importantly, the implied business activities behind financial costs [9]. Only by deeply integrating with business activities and improving business activities, can the predetermined decision goals be achieved.

### **4.1.2. Correctly divide related costs and unrelated costs.**

The key to marginal analysis is to analyze and determine the related costs of products and parts. The same cost in some cases is the related cost in some cases, while in the other case, it is the irrelevant cost, which needs to be analyzed according to the actual situation of business activities.

### **4.1.3. A process standard cost management system should be established.**

In the case of establishing the process standard cost, the process standard cost system provides the required cost information for the decision plan, which makes the cost of the decision plan more accurate and true, and then directly affects the decision result.

### **4.1.4. Cost granularity should be refined to the minimum unit.**

In the process of marginal analysis, the finer the cost granularity is, the more conducive to the pre-advance prediction and post-hoc analysis of cost management, which ensures the realization of the predetermined goals of the decision scheme.

## **4.2 Key factors for the successful application of marginal analysis tools**

### **4.2.1. Correct guidance from the superior unit.**

The continuous support and correct guidance of the superior unit has strengthened the confidence of the enterprise to promote, and gained the attention and support from all levels from the management level to the business personnel, forming a powerful driving force for tool promotion.

### **4.2.2. The enterprise management layer attaches great importance to it.**

Enterprise management layer of marginal analysis tools to use unified thinking, consistent action. It provides strong support for the marginal analysis from the business level in their respective charge, and ensures the implementation of the tools from top to down. The close linkage of the centralized management departments of each professional analysis ensures the full participation and the integration of industry and finance.

### **4.2.3. Be problem-oriented.**

Adhere to the actual needs of production and operation, to solve problems as the goal, choose tools to be practical, continue to promote, the tools with fine, use in place.

#### **4.2.4. All departments have made unremitting efforts.**

The centralized management departments of various majors have overcome many difficulties such as consciousness transformation, conflict between departments and loss of backbone personnel, and as always adhere to the use of tools in different operation periods to ensure the in-depth use of tools.

### **4.3 Advantages and disadvantages of marginal analysis tools in the application**

#### **4.3.1. Main advantages.**

First, through the continuous promotion of marginal analysis tools, the relationship between related income, related costs and profits is effectively analyzed. Through quantitative analysis, the operating risk of the enterprise is more directly reflected, which provides a strong support for the enterprise decision-making, and effectively guides the operation and management of the enterprise. Second, marginal analysis puts forward the optimal conditions and standards for optimal resource allocation, optimal income allocation and maximum economic efficiency. More directly reflects the operating risks of the enterprise, is conducive to promoting the enterprise to make the optimal decision, so as to improve the operating efficiency. Third, it promotes the enterprise to consolidate the basic management level, improve the profitability of products, improve the economic operation efficiency, and enhance the influence of the enterprise.

#### **4.3.2. Main disadvantages.**

The cost-effectiveness trade-off is a dilemma in the implementation of marginal analysis tools. In the process of promoting the marginal analysis, the prediction and determination of the variable cost information of relevant units is more complicated, which consumes a lot of human and material resources. Its correctness or not will directly affect the business decision.

### **4.4 Suggestions on the promotion and application of marginal analysis tools**

The purpose of marginal analysis is to observe, measure and analysis the marginal cost, marginal income and marginal profit of the alternative to make the best choice. When the difference between enterprise marginal income and marginal cost is marginal profit. When the marginal income is greater than the marginal cost and the marginal profit is positive, the total profit of the enterprise will increase with the increase of production and sales; when the marginal income is less than the marginal cost and the marginal profit is negative, the total profit will decrease with the increase of production and sales, or even loss. That is to say, the total profit will reach its maximum only if marginal revenue is equal to (or close to) marginal cost and marginal profit equals (or close to) zero. It can be seen that the results of marginal analysis and the quantitative relationship between marginal income and marginal cost are an important basis for de-



termining the optimal production and sales scale of related products. This decision analysis method can be applied to product production and product pricing decisions.

#### **4.4.1. Strengthen the information system.**

Modern enterprises do not produce a single product, but a variety of products produced at the same time, and each product involves dozens of parts, hundreds, more than thousands of parts. Therefore, enterprises need to carry out fine management by means of information technology, solidify relevant forms and basic data, reduce the workload, and improve work efficiency.

One is the logistics management system. Industrial enterprises, especially in the machining industry, have more material varieties, and some enterprises reach tens of thousands of kinds, and the material cost accounts for a high proportion of the product cost. Therefore, enterprises should establish a logistics management system to control the links of "entry, exit and storage" of materials, and refine the accounting of products, parts, equipment, processes and other minimum units when receiving materials in the production workshop.

Second, the cost accounting system. The biggest difficulty of cost accounting is that the calculation is not accurate, especially the tooling, accessories, energy, labor costs and other costs, generally according to the product and parts of the working hours, output, weight, area, quantity and other factors are allocated. Enterprises should establish a cost accounting system, and refine the cost accounting to the production line, the team group and even the process.

Third, the standard cost system. Using the basic data of the standard cost system, the actual cost of products and parts and standard cost comparative analysis, find out the weak link of the actual cost control in the process of production and operation, targeted to formulate corresponding measures and improve, help enterprises gain profits in the fierce market competition, in order to survive and development.

#### **4.4.2. Establish a marginal analysis working mechanism.**

The enterprise shall formulate a management system, clarify the organization and functions and responsibilities, stipulate the scope of economic business, formulate forms and processes, etc. Any economic business stipulated in the marginal analysis system shall be submitted to the enterprise management through marginal analysis for decision before implementation.

#### **4.4.3. Marginal analysis ideas should penetrate through the whole business chain.**

With marginal contribution analysis for the theory of product input-output management ideas to the whole business chain extension and development, to combine each link of enterprise supply chain, in supply, research and development, production and management cost, financial cost, human cost to make the necessary exploration and research, the marginal contribution of management thinking into each manage-

ment link. In order to achieve the business objectives, the internal management of the enterprise needs a clear division of labor, unity and cooperation, and close cooperation.

#### **4.4.4. Several technical points in the application of marginal analysis tools.**

The following technical points of marginal analysis decision have certain reference significance for the use of marginal analysis tools to implement production and operation decision:

pricing decision. In formulating the product sales price policy, the greater the marginal contribution of the product, the better; however, the total marginal contribution of the whole product should be sufficient to cover the total fixed cost, and there should still be a certain surplus. In special pricing, the marginal contribution remains positive is the minimum standard to accept orders.

New product development decision. The enterprise uses the remaining production capacity to develop a variety of new products. The fixed cost of the surplus production capacity has nothing to do with the decision-making, the marginal contribution is positive, and the new product development is feasible.

Additional Order Decision. In enterprises with excess capacity, increasing output will generally only increase the variable cost of products. When the unit income of the additional product ordered is greater than the unit variable cost of the product, that is, when the marginal contribution of the product is greater than 0, it can dilute the fixed cost of the enterprise and still make a positive contribution to the enterprise, so additional orders should be accepted.

loss product decision making. If the marginal contribution of the product is greater than 0, the production of the product can still cover some fixed costs of the enterprise, and the enterprise is still profitable, and should continue to produce. In this case, if the production capacity is left idle, it will cause losses to the enterprise, because the fixed costs occur as usual. If the marginal contribution of the product is less than 0, and the production of the product cannot even cover the variable cost, which is an absolute loss product, the production of the product should be stopped.

## **5 Conclusions**

To support the enterprise sustainable and healthy development of industry, ensure the overall profitability, realize value creation, enterprise introduced marginal analysis management accounting tools, in special orders and pricing, homemade or outsourcing, sales and processing activities, analysis of a variable factors cause other related variable factors changes, the analysis of product design, process optimization technology changes, and through the shift process fine management, reduce the product cost, improve profitability. In addition, the use of marginal analysis and management accounting tools helps enterprises to develop flexible pricing strategies, determine reasonable selling prices, and make products more attractive, so as to expand market share, increase operating income, improve competitive position, and achieve the best economic benefits.

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