

On a multi-standard ABC analysis method in the inventory management of Small and medium-sized enterprises

Zhang Yongxia

Hohhot Vocational College, Hohhot , Inner Mongolia

Abstract:

with the development of thirty years, China's small and medium-sized enterprises make the important role in the spring tide of market economy, which has become the national economy "half of the country ". But the small and medium-sized enterprises have their own problems, such as personnel and funds limited, so how to use the least money to solve the practical problems is the key need of enterprises. A multi-standard ABC analysis method can greatly reduce the enterprise's cost and easy to use.

Keywords: ABC analysis method inventory fuzzy theory entropy theory

With the development of economy, the inventory management plays an important role in logistics management in enterprises. there are have some measures almost do not cost a lot, but it can get good results, for example -- ABC analysis method is one of them, which is widely used in practice. ABC analysis is a kind of application of the Pareto principle in economics in the inventory management, it will be divided the company's products into A, B and C, and different categories of products using different methods of inventory management.

1. The application of ABC analysis method in the small and medium-sized enterprise's inventory management

The ABC analysis is a kind of management method from the ABC curve. ABC curve is also called Pareto (Pareto) curve. The basic idea is, " vital few and the majority of the general ". In all the inventory, the cumulative percentage of species ranged from 5% to 15% and the average amount of funds occupied the cumulative percentage of 60% ~ 80% items identified as A class; the cumulative percentage of species ranged from 20% to

30%, and the average amount of funds occupied the cumulative percentage is 20% ~ 30% of the goods, identified as B class; the rest as class C. The different objects use different management methods and means ^[1]

2. The drawback of traditional ABC analysis.

2.1 Single classification

In the China's enterprises, when you use "ABC" analysis, classification is often fall into one category of goods. For example, A distribution center in a commodity inventory management using " ABC " analysis, finally classification results is likely to be: A products (household appliances) B products(washing supplies)C products(Stationery etc).So some bias is simple, and obliterate the distinction of best-selling products and unallowable goods, inventory structure also do not talk to go up ^[2].

2.2 Doesn't reflect whether the material is easy to obtain in the market.

For example, a higher value of some materials, is divided in the A class, but this kind of material in the market is very easy to get, the procurement cycle is very short, so it is not need for key management in accordance with the A material; some of the material, the value is not high, according to ABC classification is divided into class C material, but the material in the market it is difficult to obtain, once it can not arrive on time, may cause the enterprise unnecessary losses, for this material, although the value of small, but it also need the key management.

3. A multi-standard ABC analysis method

Due to the limitation of the traditional "ABC" analysis method, this paper based on following rules classified the inventory into three categories:

3.1 The time of material inventory, which is based on the time of inventory purchasing and inventory decisions. These will affect the entire supply chain's

turnover time, which will affect customer satisfaction, and the strength of the whole supply chain competitiveness.

3.2 The degree of material inventory's risk, which is based on the nature of the inventory items. Such as whether inventory items are sufficient, if it is not, the conversion of item's cost are high or not, high risk can increase the difficulty in inventory management. The general effect of inventory risk factors are: the goods substitutability, storage of goods, supplier reliability, possibilities of enterprise self-made outsourcing, and social logistics system security etc.

3.3 Cost value proportion, the inventory object, which is a measure of the shopping contribution degree of enterprise product quality. To make this kind of division, mainly in order to better allocation of time and resources, the greater contribution to enterprises should attach great attention to the item in the inventory strategy.

3.4 The proportion of product ingredients;

3.5 The product of volume in the total volume of inventory;

3.6 The technical level of inventory of materials;

3.7 Stock loss;

3.8 The strength of effectiveness product

4. By using multiple standard "ABC " analysis method combined with fuzzy theory and entropy theory

This paper adopts fuzzy comprehensive evaluation method, namely considering the proportion of the value of material, inventory time and the degree of risk classified the inventory material. This can improve the traditional "ABC " analysis method, from this paper you would divided three types of products, through the multiple standard "ABC " and different types of materials using differential method of inventory management and purchasing method. We will give you examples to illustrate it.

4.1. set up a factor set

According to the enterprise situation, we would determine the evaluation factors. Due to the actual situation of each enterprise is different; the decision factors are not the same.

Here, we consider the following factors:

- The procurement time (days);

- Stock time (days);
- The value of the product as a percentage of the total amount of inventory;
- The proportion of product ingredients;
- The product of volume in the total volume of inventory;
- The technical level of inventory of materials;
- Stock loss;
- The strength of effectiveness product

Therefore the factor set

$$X(x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8) \quad (1)$$

Factors $X(x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8)$

denote(1)-(8)

4.2. to establish the evaluation set

Setting inventory in 5 kinds of materials, and evaluation of

$$Y = Y(y_1, y_2, y_3, y_4, y_5) \quad (2)$$

The $Y = Y(y_1, y_2, y_3, y_4, y_5)$

respectively for 5 kinds of materials.

4.3. establishing single factor evaluation set

The single factor evaluation matrix determination is the key of fuzzy evaluation, according to their actual situation, enterprises finally determined by technology, production management personnel evaluation and expert advice. Here, we establish the single factor evaluation table (3) as shown in the table below:

If you have the exact data (percentage of product value; stock total amount purchasing time (days); inventory time (days); and so on), you would accord to your numbers. If there is no exact data accord to the expert scoring method. A comparison is made between the two factors in the same layer; we introduce the standard as the standard 1-9.

Establishing single factor evaluation set as following: (this is 5 kinds of materials, we consider the eight factors)

$$X = \begin{bmatrix} 4 & 3 & 2.5 & 1 & 0.5 \\ 5 & 4 & 2 & 2 & 1 \\ 0.4 & 0.2 & 0.2 & 0.1 & 0.1 \\ 4 & 2 & 2 & 3 & 4 \\ 0.1 & 0.2 & 0.2 & 0.2 & 0.3 \\ 5 & 3 & 3 & 2 & 5 \\ 9 & 7 & 5 & 1 & 2 \\ 7 & 9 & 5 & 1 & 3 \end{bmatrix} \quad (3)$$

$$\text{Normalized : } y_{ij} = x_{ij} / \sum_{j=1}^n x_{ij}$$

$$= \begin{bmatrix} 0.364 & 0.273 & 0.227 & 0.091 & 0.045 \\ 0.357 & 0.286 & 0.143 & 0.143 & 0.071 \\ 0.4 & 0.2 & 0.2 & 0.1 & 0.1 \\ 0.267 & 0.133 & 0.133 & 0.2 & 0.267 \\ 0.1 & 0.2 & 0.2 & 0.2 & 0.3 \\ 0.278 & 0.167 & 0.167 & 0.111 & 0.278 \\ 0.375 & 0.292 & 0.208 & 0.042 & 0.083 \\ 0.28 & 0.36 & 0.2 & 0.04 & 0.12 \end{bmatrix} \quad (4)$$

4.4. Establish the weight of each factor set

Establish weight sets usually by statistical methods and expert advice, this paper determined by entropy algorithm: determine the indicators of information entropy e_i

$$e_i = k \sum_{j=1}^n y_{ij} \ln y_{ij} \quad (5)$$

$k = 1/n$, k is a constant. $0 \leq e_i \leq 1$ The number

of raw materials involved in the evaluation in this paper is five, namely $n = 5$, $k = 1/\ln 5 = 0.621$,

$$e_i = (0.880, 0.913, 0.913, 0.971, 0.967, 0.965, 0.865, 0.967)$$

The entropy w_i defined index for

$$w_i = (1 - e_i) / \left(m - \sum_{i=1}^m e_i \right) \quad (6)$$

The weight of each factor set

$$0 \leq w_i \leq 1, \text{ 且 } \sum_{i=1}^m w_i = 1$$

$$w_i = (0.216, 0.156, 0.155, 0.051, 0.059, 0.063, 0.242, 0.059)$$

(7)

4.5. fuzzy evaluation

$$R = \begin{bmatrix} 0.364 & 0.273 & 0.227 & 0.091 & 0.045 \\ 0.357 & 0.286 & 0.143 & 0.143 & 0.071 \\ 0.4 & 0.2 & 0.2 & 0.1 & 0.1 \\ 0.267 & 0.133 & 0.133 & 0.2 & 0.267 \\ 0.1 & 0.2 & 0.2 & 0.2 & 0.3 \\ 0.278 & 0.167 & 0.167 & 0.111 & 0.278 \\ 0.375 & 0.292 & 0.208 & 0.042 & 0.083 \\ 0.28 & 0.36 & 0.2 & 0.04 & 0.12 \end{bmatrix}$$

$$B = w_i * R = (0.340, 0.255, 0.193, 0.099, 0.112) \quad (8)$$

Material1 > material 2 > material 3 > material 5 > material4

This can be seen as a material 1 in articles A, which is the key management on a goods, materials 2 for type B, material 3, 5, 4 for the type C, so we can be use different management methods to different products.

5.Conclusion: the material 1, 2 accounted for more than half of all materials, if we the focus on the materials 1, material 2, compressed to 50% of time and cost. Using this method will help the enterprise improve the inventory management.

Reference

- [1].BingLiao.Research on inventory product classification based on combination of AHP and ABC analysis method. [J]. Technology and Marketing. 2008.1
- [2].Pengwei Li. ABC analysis in the application of logistics enterprises in China. [J]. Commodity storage and Maintenance. 2004.2