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Application of EIQ-ABC Analysis Method in Steel Logistics

Cui-xin MA, Yu CHEN, Hui-bin HU, Xiao-yi QU and Xue SUN*

Beijing Union University, 97 North Fourth Ring East Road, Chaoyang District, Beijing, China

*Corresponding author

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Abstract. This paper uses EIQ-ABC analysis method to analyze steel logistics's recent outgoing data on IQ, IK and IQ-IK, for obtaining the proportion of single product outgoing volume and outgoing frequency of various steel in the logistics park to get the classification results of A, B and C, and put forward the storage layout of M steel logistics park according to the results. The application of this method can help iron and steel enterprises to establish a modern warehousing system, improve the overall efficiency of warehousing logistics system, reduce production costs, increase enterprise profits, and improve enterprise service capacity and market competitiveness.

Introduction

Numerous raw materials and finished products, reasonable optimization of warehouse yard are the key to the overall development of warehouse distribution system. It is also an urgent problem for manufacturing enterprises to solve and become a key indicator of competitiveness later. The yard of Logistics Park has never stopped working, but there still exists a serious queuing phenomenon. The purpose of this paper is to solve the urgent and practical problems in warehousing logistics. By using EIQ-ABC analysis method, the IQ cross-analysis is carried out, we obtain the proportion of single product ex-warehouse and its frequency of various steel products, and to obtain the classification results of A, B and C. Putting forward storage layout based on the results will help enterprises to establish a modern warehousing system, optimize warehousing logistics system, reduce production costs, increase enterprise profits, and embrace service capacity and market competitiveness.

EIQ-ABC Analysis

EIQ analysis is an analysis method to study the demand characteristics of logistics centers from the aspects of the types, quantities and orders of goods ordered by customers, and to provide planning basis for logistics centers.[1-3]

The specific analysis of EIQ can be carried out through the following indicators:

(1) EQ analysis - Analysis of the quantity of orders per order.
(2) EN analysis - Analysis of the number of items ordered per order.
(3) IQ analysis - Analysis of the quantity of orders for each variety.
(4) IK analysis - Analysis of the number of orders per product.

ABC Classification

ABC analysis mainly classifies the objects based on the characteristics of commodities and business activities, and then implements different planning and management. ABC classification analysis emphasizes the primary and secondary research objects, classification management, according to the amount of the cumulative percentage of the main eigenvalues, the research objects are divided into A, B, C three categories. Among them, Class A materials (cumulative percentage 0% - 60%), Class B materials (cumulative percentage 60% - 85%) and Class C(cumulative percentage 85% - 100%).

EIQ-ABC Model

This paper establishes EIQ-ABC analysis method by combining EIQ analysis method with ABC classification method. Firstly, EIQ analysis is carried out on the historical outgoing data of M Steel Logistics Park. Then, according to the results of IQ and IK analysis, the existing steel products in M Steel Logistics Park are classified as ABC, focusing on the management of large-volume and high-frequency shipments. In order to rationally arrange the steel storage space of M Steel Logistics Park, we should focus on the management of Class A goods.

Basic Situation of Steel Logistics Park of M Company

Introduction of Iron and Steel Logistics Park

Characteristic Analysis of Iron and Steel Products

This paper mainly analyses the layout of threaded steel. The single product of steel includes three attributes, variety, steel grade and specification, such as variety: threaded steel, steel grade: HRB400, specification: 16 (diameter unit: mm)*9 (length unit: m). According to the analysis of historical data (2017.10-2018.8), there are 68 kinds of steel, except some shipments. And the types of steel with very low frequency, 21 kinds of steel were finally obtained.[4] See Table 1.

Table 1. Types of Thread Steel Storage in Steel Logistics Park.

Varieties	Specifications （unit：mm*m）											
HRB400	12*9	14*9	16*12	16*9	18*12	18*9	20*9	22*12	22*9	25*12	25*9	28*9
HRB400E Anti-seismic	12*9	14*9	16*9	18*9	20*9	22*9	25*12	25*9	28*9			

Generally speaking, there are many kinds of steel products, which are confused in storage, lack of classification of the importance of storing steel products, and a wide distribution of steel products with large demand, which leads to an increase in the number of vehicles running, and a larger volume of material flow in and out of the steel logistics park each time, affecting the efficiency of shipment.

Application of EIQ-ABC Analysis Method in M Steel Logistics Park

Considering the validity of the data, the 10-month order data are screened, and small orders and steels are not considered, which makes the conclusion more realistic. The 21 steels mentioned above are numbered in sequence, (HRB400 12*9, 14*9, 16*12,... HRB400E seismic 28*9 - - C1, C2, C3,..., C21) Indicates the type of steel stored in a logistics center. EIQ analysis is carried out according to the orders of iron and steel varieties.

IQ-ABC Analysis

We sort out the shipments of individual products in the order data according to the categories of steel products. The statistical results are shown in Figure 1.

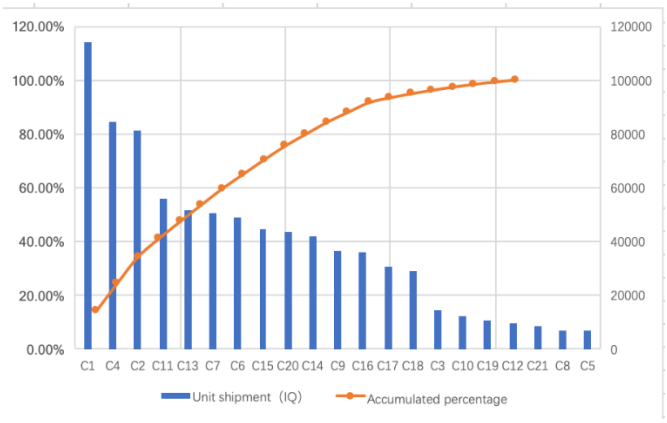

Figure 1. IQ-ABC analysis of plato.

The data in IQ data analysis table of orders are scattered, and the quantity of each steel in Plato is obviously polarized, so the steel can be classified by ABC. The weights of steel C1, C4, C2, C11, C13, C7 and C6 accounted for 59.53% of the total weights and 33.33% of the total types, which were defined as Class A steel. The weights of steel C15, C20, C14, C9, C16 and C17 accounted for 28.49% of the total weights and 28.57% of the total types, which were defined as Class B steel. The weights of C18, C3, C10, C19, C12, C21, C8 and C5 accounted for 111.98% of the total weights and 38.10% of the total types, which were defined as C-type steel.

IK-ABC Analysis

Before the analysis, the number of shipments per item in the order data should be sorted out according to the steel category items. The statistical results are shown in Figure 2.

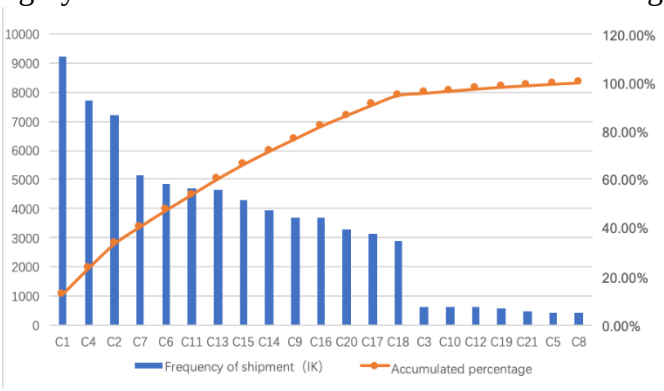

Figure 2. IK-ABC analysis of plato.

According to the IK-ABC classification principle, the frequency of steel C1, C4, C2, C7, C6, C11 and C13 is 60.25% and 33.33% of the total types, which are defined as A-type steel, C15, C14, C9, C16 and C20. The frequencies of storehouse outgoing accounted for 26.22% of the total frequency of storehouse outgoing and 23.81% of the total types, which was defined as B-type steel. The frequencies of steel C17, C18, C3, C10, C12, C19, C21, C5 and C 8 were 13.53% of the total frequency of storehouse outgoing and 42.86% of the total types, which were defined as C-type steel [5-8].

IQ-IK Cross-analysis

IQ-IK cross-analysis is carried out and the results of IQ-IK cross-analysis are shown in Figure 3.

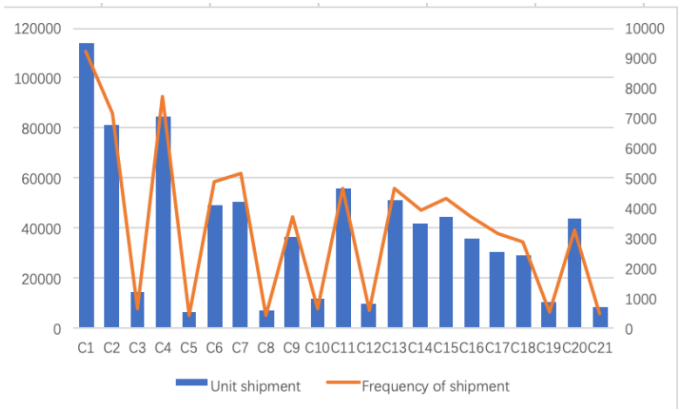

Figure 3. IQ-IK cross-analysis.

We can see the trend of the highest point of the broken line chart and the column chart is correspond from Figure 3. It shows that compared with the small shipment steel, the large shipment is ordered more frequently. Therefore, the results obtained by IQ and IK analysis are basically the same. Finally, we choose the results obtained by IQ analysis method to determine all kinds of steel. The ABC classification of wood is shown in Table 2.

Table 2. ABC Classification of Steel.

ABC classification	Types of steel							
A	C1	C4	C2	C11	C13	C7	C6	
B	C15	C20	C14	C9	C16	C17		
C	C18	C3	C10	C19	C12	C21	C8	C5

Application of EIQ-ABC Analysis in M Steel Logistics Park

Application in Steel Storage

Class A steel (C1, C4, C2, C11, C13, C7, C6) belongs to important materials, so priority should store at a convenient area. It should be located near the gate of the park and occupied with large areas. For class B steel (C15, C20, C14, C9, C16, C17), the storage areas can be located near the exit of park with smaller area, considering that the shipment occupies a certain amount. Class C steel (C18, C3, C10, C19, C12, C21, C8, C5) has so small proportion of shipments and outgoing frequencies that set in remote locations with the smallest.

Application in Steel Management

Category A commodities should strengthen the inventory, strive to inventory once a day, and try to maintain a high inventory, to avoid shortages. Category B goods should also be properly managed, and inventory once a week to maintain adequate inventory. Implement extensive management strategy for category C goods [9-10].

Conclusion

This paper mainly introduces EIQ and EIQ analysis method to analyze order quantity, variety number and outgoing quantity in the park. Three kinds of steel products A, B and C are determined. According to the different outgoing characteristics of A, B and C, the storage area and steel logistics park can be restructured. The application of EIQ-ABC analysis method in can help steel enterprises improve the overall efficiency of warehousing and logistics system, reduce production costs, and provide good decisive support for enterprises.

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