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J. PRACHAŘ, H.FIDLEROVÁ
European Polytechnical Institute, s.r.o, Kunovice, Czech Republic
Slovak University of Technology Bratislava, Faculty of Materials Science and Technology, Trnava, Slovak Republic

INVENTORY MANAGEMENT BASED ON ABC ANALYSIS AS A PART OF LOGISTICS MANAGEMENT IN FIRM*

Introduction

Inventory management and level of the stock are strategic issues and that affect the efficiency of the functioning of the processes and economy of the whole enterprise.

Many examples from the practice have shown that in certain conditions just a change of inventory management belongs to the core strategic aims. Experience also shows that the shortcomings of the inventory management in many of our businesses disproportionately burden, which are the main causes of excessive debt or problems concerning the sales. (Tomek, 1999). Stocks represent a large and costly investment. Their quality management can improve how cash flow and the return of investments. (Drahotský, 2003).

Functions of stock

There can be identified four basic reasons for keeping stock for enterprise:

Time - The time lags present in the supply chain, from supplier to user at every stage, requires that enterprise maintains certain amounts of inventory to use in this lead time. However, in practice, inventory is to be maintained for consumption during 'variations in lead time'. Lead time itself can be addressed by ordering that many days in advance.

Uncertainty - Inventories are maintained as buffers to meet uncertainties in demand, supply and movements of goods.

Economies of scale - Ideal condition of *one unit at a time at a place where a user needs it, when he needs it* principle tends to incur lots of costs in terms of logistics. So bulk buying, movement and storing brings in economics of scale, thus inventory.

Appreciation in value - In some situations, some stock gains the required value when it is kept for some time to allow it reach the desired standard for consumption, or for production.

For inventory management, it is necessary to distinguish principally between the different functions of stocks presented in *Table .1*, which are *buffering*, *storing* and *keeping*. In practice, these functions are often mixed up and the same stock can have several functions (Table 1).

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Table 1 - Functions of stock (Gudehus T., Kotzab H., 2009)

Functions of stocks	**Buffering**	**Storing**	**Keeping**
Functions	**provision**	**keep ready**	**bridge time**
	for consumption production, service,control	of merchandise production factors,finished goods	until production, transport, delivery,sorting, sales, use
Objectives	high utilization	required availability	optimal batches
	interruption protection	minimal costs	minimal costs
	minimal space	optimal availability	maximal
Demand	**permanent**	**permanent**	**temporarily**
Assortment	minimal	broad	small
Stock level	random variation small	random variation	constant
	mean value	sawtooth pattern	in/decreasing
		undetermined	predetermined
Storage time	undetermined short	medium to long	differing
Scheduling	**self-regulating**	**pull-principle**	**push-principle**
	Kanban/FlipFlop	demand determined	plan dependent
Influences on stock level	variance of supply and consumption of supplier reliability	consumption, replenishment, availability process, costs	production plan, sales plan, loading, tours cycle times

Characteristic ABC analysis of inventory

The Pareto principle states that **80% of the overall consumption value** is based on only **20% of total items**. Therefore, it is appropriate to sort items according to the effect on the observed phenomenon and divide them into categories. The ABC analysis provides a mechanism to identify items that will have a significant impact on overall inventory cost, while also providing a mechanism for identifying different categories of stock that will require different management and controls (Vollman, 2011). Here it is recommended to use the ABC analysis, which consists in the allocation of the items into three categories, according to their percentage of the total value of the selected parameter. A general procedure for the classification of the items by ABC method is as follows:

- Choose the option that best captures the essence of the problem.
- Calculate the percentage of each element of the total value of the parameter, and the total number of elements.
- Sort the elements gradually according to the percentage share of the monitored parameter.
- Separate items into groups A, B, C.

In terms of inventory management it is optimal for a company selected as a criterion for the classification of items in the share of the total turnover. This division of the company gets an overview of **the items that contribute most to the economic results of the company and are therefore the most important for a company.**

The ABC approach states that, when reviewing inventory, a company should **rate inventory items from A to C**, basing its ratings on the following rules:

- **A-items** are goods which **annual consumption value** is **the highest**. The top 70-80% of the annual consumption value of the company typically accounts for only 10-20% of total inventory items.
- **B-items** are the interclass items, with a **medium consumption value**. Those 15-25% of annual consumption value typically accounts for 30% of total inventory items
- **C-items** are inventory items with the **lowest consumption value**. The lower 5% of the annual consumption value typically accounts for 50% of total inventory items.

The results of the ABC analysis, however, are not possible to take dogmatically. The important thing is the status of the inventory and progress continuously and regularly checked and updated. This method is computer-aided inventory management system of inventory and divided into three groups and at the same time lays down the size of the shipment and the amount of safety stock. The following table no. 2 characterizes each category.

Table 2: Characteristics of the individual groups of ABC analysis. Source: {Prachař, 2011)

Category A	This category is for the enterprise, the most important and the most costly in financial terms and, therefore, the firm trying accurately to get the norm. It has a small number of items for which consumption is high (about 20% of the items, 80% of consumption).
Category B	It is not expensive as a category A, it is represented by a set of items. There is hereby established as a rule, the minimum limit on hand, in which the store contains the median number of items with an average consumption.
Category C	It is generically the most colorful. Individual products are generally purchased at an operational level to the level of a month set limit. It includes a large number of items with low power consumption.

Application of the ABC analysis of inventory

ABC Analysis Preview

In this article is described the optimization of inventory management solutions for the chosen company, which deals with a construction material as business. From the selling price, and the annual consumption of the selected items there is a calculation of the value of the company's annual turnover. The turnover is expressed as a percentage. One product is selected, which is divided into 16 different dimensions.

The next stage is the gradual alignment of the products, according to the value of the annual turnover in % of the total, from the highest to the lowest. This turnover is calculated cumulatively, which is actually a kind of a control that we have not missed the item, or, conversely, haven´t done it twice. To sort items in descending order, the material and the calculation of the percentages of total and cumulatively, is shown in table no. 3.

Table 3 - The first phase of the ABC analysis. Source: (Prachař, 2011)

The number of items	Annual turnover (czk)	The value of the annual turnover of total (%)	The value of the cumulative annual turnover (%)
10	***1880418***	***36,96***	***36,96***

5	***610515,25***	***12***	***48,96***
11	***568491***	***11,17***	***60,13***
8	***508464***	***9.99***	***70,12***
12	*254135,7*	*5*	*75,12*
2	*225984*	*4.44*	*79,56*
7	*197286,6*	*3.88*	*16,56*
13	*173420,25*	*3.41*	*86,85*
3	*168075,6*	*3.3*	*90,15*
14	*160585,6*	*3.16*	*93,31*
6	145798,2	2.87	96,18
4	119626	2.35	98,53
1	44174,95	0,87	99,4
15	22534,2	.44	99,84
16	5350	0.11	99.95
9	2648,25	0,05	100

The last step is to categorize items into categories A, B, C; in our case to the category A item number 10, 5, 11, 8. These entries comprise 70,12% of turnover of the company.Category B includes item number 12, 2, 7, 13, 3, 14, and their share of the turnover is made up of 23,19%of turnover.In category C are included item numbers 6, 4, 1, 15, 16, 9. This group is made up of 6, 69% of turnover. This classification is shown in the table no. 4.

Table 4: The second phase of the ABC analysis. Source: (Prachař 2011)

Class items	Item numbers	Percentage of the number of items	Percentage of turnover
A	10, 5, 8, 11	25	70,12
B	12, 2, 7, 13, 3, 14	37.5	23, 19
C	6, 4, 1, 9, 15, 16	37.5	6,69

Separate items into categories or groups, of course, can be a lengthy process. The merchant should stick to the Pareto rule, but he should think of the category and to take into account its own sentiment, because the sales has the most extensive overview of the movement of goods.

References

1. Tomek, J. 1999. Moderní řízení nákupu podniku. 1st .edition. Praha: Management Press, 276 p. ISBN 80-859-4373-5.

2. Drahotský, Ivo. 2003. Logistika, procesy a jejich řízení.1st edition. Brno: Computer Press, 334 p. ISBN 80-722-6521-0.

3. Vollmann Thomas E. 2011. Manufacturing planning and control systems for supply chain management.ISBN-10: 0071750312

4. Gudehus T, Kotzab H. 2009. Comprehensive Logistics.Springer Dordrecht Heidelberg London New York, ISBN 978-3-540-30722-8 e-ISBN 978-3-540-68652-1.

5. Prachař, J. 2011. Logistika jako součást vnitropodnikového řízení: Monograph. 1. edition. Kunovice: Evropský polytechnický institut, 208 p. C. H. Beck pro praxi. ISBN 978-80-7314-271-1.

6. Sakál, P., Fidlerová, H. 2013. Strategija ustojčivoj logistiki kak časť biznes-strategii.In: Problemy razvitija territorii. ISSN 2076-8915. 65. No. 3 (2013). P.25-30.