

USE OF ABC ANALYSIS AS MANAGEMENT METHOD IN THE RATIONALIZATION OF LOGISTIC WAREHOUSING PROCESSES: A CASE STUDY

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Abstract

Logistics especially warehousing is a part of processes that take place in every manufacturing and trading company. This is a fairly young scientific discipline, but it has been growing fast in recent years and its importance is growing. The issue of logistics is paid considerable attention at present time. This is mainly due to the development of the market environment, which increases the competition, but also provided the higher demands of the customers on the quality of the services. Due to the proper implementation and operation of logistics processes, the company can achieve competitive advantage. Logistics processes need to be mutually supportive to act synergistically to achieve the set goals. The aim of this article is to use ABC analysis as a management method in the rationalization of selected logistic warehousing processes in the two chosen companies. The ABC analysis method is a well-established categorization scientific method based on the Pareto principle for determining items that should be prioritized in company inventory management. The article uses also a case study as one of the qualitative research methods.

Key words: ABC analysis, logistic warehousing processes, inventory management

JEL Code: M11, M21

Introduction

Issue of logistics and its processes have been given considerable attention in recent years. Logistics processes need to be mutually supportive to act synergistically to achieve the set goals. Inventory and warehousing logistics is a very actual topic that has been much talked about in recent years. It is possible to meet its different concepts, but it remains a fact that logistics records a huge boom in the world and applies in many practical areas. A logistic chain is a set of elements arranged to generate a flow of material and information. The logistic chain is made up of a tangible and intangible page. The material aspect is the relocation of

raw materials, materials, parts, incomplete and finished products, packaging, waste, energy, people, and the intangible aspect of relocating conditional information and finance.

Logistics coordination and synchronization of material, information and financial flow hit the company at a conflict of partial goals that are monitored by individual organizational units and are very diverse and often contradictory.

On the one hand by aligning logistics to the factual, spatial and time differentiation of production and consumption, it leads to cost savings, reduced inventory, capital liberation, and thus increases profitability on the other hand.

The main aim of this article is to use and application ABC analysis as the management method in the rationalization of selected logistic warehousing processes in the two chosen companies as the case study.

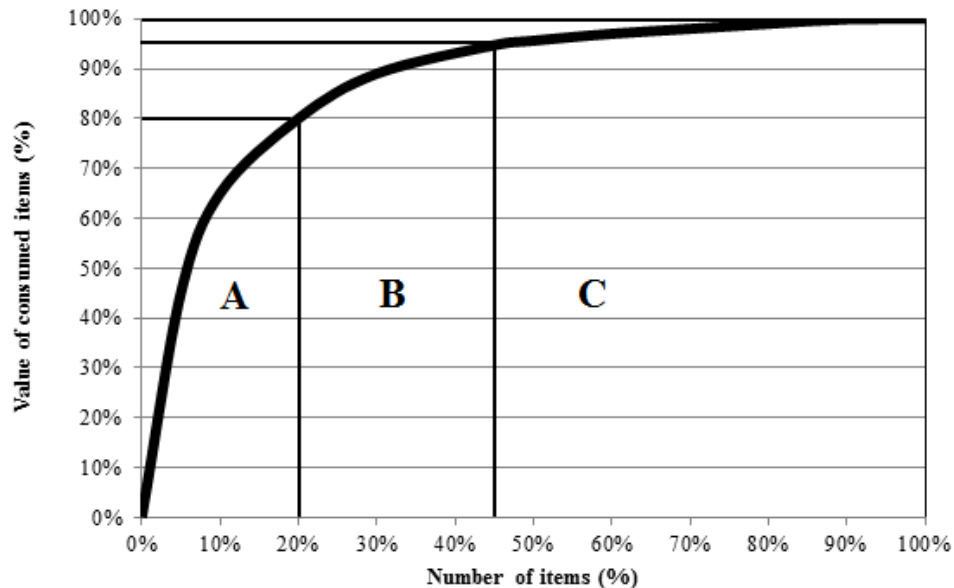
1 Theoretical Background and Methodology

Liu, Liao, Zhao and Yang (2016) emphasize that the ABC analysis has been a hot topic of numerous studies on inventory management. ABC analysis is widely used to manage a number of inventory items in organizations. Stojanovic and Regodic (2017) state that inventory optimization in the supply chain is one of the most important goal in logistical business operations. Rodriguez, Corsano, Vecchietti and Montagna (2018) report that inventory management represents effective handling, warehouse management and the use of all the reserves that exist in this area. Stojanovic and Regodic (2017) maintain that inventory management represents a whole complex of activities consisting of planning, analyses, forecasting, control operations, both within the groups of warehouses and warehouse as a whole.

ABC analysis is a well-established categorization technique based on the Pareto principle for determining items that should take precedence over inventory management (Handanhal and Misra, 2014; Liu, Liao, Zhao and Yang, 2016; Jemelka, Chramcov and Kříž, 2016). According to Gastwirth (1971), Gastwirth and Glauberman (1976), Krause (2014) and Meunier, Ferreira and da Silva (2015) this assumption assumes that approximately 80% of the consequences result are from about 20% of the number of possible causes, as shown graphically in the Lorenz curve (see Figure 1). Sixta and Žižka (2009) point out that management means that even a small part of the items may represent most of the value of the consumption or that a large part of the total purchase volume is taken from a relatively small number of suppliers. It is necessary to concentrate their attention on

a limited number of stock items or suppliers, which ultimately have a decisive influence on the overall result.

Fig. 1: ABC Analysis – Graphical Representation



Source: Authors based on: Gastwirth (1971), Gastwirth and Glauberman (1976) and Krause (2014)

According to Liu, Liao, Zhao and Yang (2016) the ABC analysis is based on a set of inventory items classified into the three categories (ABC) according to the value of the monitored statistical character in the analysed period. Sixta and Žižka (2009) further recommend that the length of the reference period be 12 to 24 months, as shorter periods may be distorted, for example, by seasonal demand, or if there is a change in the company's production program in the longer term and the data may lose its reporting ability.

According to Kastanioti, Mavridoglou, Karanikas and Polyzos (2016); Konikov and Konikov (2016) individual items are categorized into three categories as follows:

- Category A – this category includes very important inventory items that make up 80% of the value of consumption or sales. These items of warehousing should be given permanent attention.
- Category B – this category includes medium-sized inventory items. They can account for up to 15% of the value of consumption or sales. These items are often ordered aggregated with other items. Their supplies are less common compared to category A.
- Category C – there are few important inventory items and represent only 5% of consumption or sales. This category includes, for example, standard consumables.

The aim of this article is to use ABC analysis as the management method in the rationalization of selected logistic warehousing processes as the case study in the two chosen companies. The ABC analysis method is a well-established categorization scientific method based on the Pareto principle for determining items that should be prioritized in company inventory management (Ultsch and Lötsch, 2015; Pareto, 1909).

The article uses the case study as one of the qualitative research methods. Case study is one of the most commonly used methods of research aimed at implementing different managerial approaches to practice (Nielsen, Mitchell and Nørreklit, 2015).

2 Results and Discussion

The first company, where has been applied the ABC analysis method, deals with the production and distribution of cardboard. The company's main business and production is focused on production of three-layer, five-layer, seven-layer, microwave and smooth cardboard packages. This is the production of shaped cuts and transport packages such as:

- flap boxes,
- lid boxes.

But also for the manufacture of inner equipment of boxes, which are for example:

- interlaces,
- leakage,
- grids.

The selected company buys the production material on the basis of a specific customer order. This is mainly because individual product orders are almost always specified vary in size, or different requirements for material quality. If this is possible, the company buys production material of such a size that the production waste is as small as possible.

The production material, which is stored in warehouse, accounts for only 10-15% of the total production. These are just the basic items of material that the company has stored in its main warehouse. The necessary quantities of material are released from production of these materials in the course of the year. The amount of material that is stored is recorded in InfoWin, which monitors the minimum quantity that must be available in the warehouse.

Tab. 1 Basic Items of the Material

Kind of Material	Material Dimensions (mm)
3VVL HH Fc 22B	800 x 2,400
	900 x 2,400
	1,000 x 2,400
	1,200 x 2,400
5VVL HH Fc 32BC	800 x 2,400
	900 x 2,400
	1,000 x 2,400
	1,200 x 2,400
3VLL HH Fc 23E	900 x 1,200
	1,200 x 1,000

Source: Internal company materials and authors

Table 1 shows which types of production material are in the company among the basic and are stored in warehouse. It is further evident from Table 1 that each type of material has its own internal designation that determines the quality of the product (the basic material). "3VLL HH Fc 22B" means that it is a basic three-walled brown-brown cardboard whose height is 3 mm, in the case of "3VVL HH Fc 23E" it is the same board as before, with the difference that this board has a height wool only 1 mm, it is a very weak material. The last type of material mentioned in Table 1 is "5VVL HH Fc 32BC". This is a basic five-walled brown-brown cardboard consisting of two waves, one wave having a height of 3 mm and a second one of 4 mm.

ABC analysis was done for perfect inventory management. The data needed to complete this analysis was found using InfoWin and was surveyed over the reference period of 2017.

The consumption of individual items that the selected company stored in the reference period was calculated as a first step. Items were sorted in descending order of consumption (expressed in Czech crowns) from highest to lowest. The total consumption of individual items during the reference period, i.e. 2017, was 887,960 CZK.

Cumulative consumption of items was calculated in the second step and individual items were allocated to individual groups A, B and C according to the maximum percentage range based on the theoretical part of the article.

Tab. 2 ABC Analysis of Consumption of Basic Items of cardboard company

Item	Consumption in CZK	Σ Accumulated Consumption in CZK	Splitting Items into Groups
5VVL HH Fc 32BC	144,000	144,000	A
5VVL HH Fc 32BC	142,560	286,560	A
5VVL HH Fc 32BC	138,240	424,800	A
5VVL HH Fc 32BC	138,240	563,040	A
3VVL HH Fc 22B	86,400	649,440	B
3VVL HH Fc 22B	80,640	730,080	B
3VVL HH Fc 22B	77,760	807,840	B
3VVL HH Fc 22B	69,120	876,960	B
3VVL HH Fc 23E	6,000	882,960	C
3VVL HH Fc 23E	5,000	887,960	C
Total CZK	887,960		

Source: Internal company materials and authors

First of all, it is important to note that all the items in Table 2 are important for the company and therefore cannot be said that some of them are unnecessary since they are basic material items. Group A is the most important group. After the ABC analysis, the group included items that make up maximum 80% of the total consumption. During the monitored period, the consumption of items in this group was 563,040 CZK. Table 2 shows that this group includes items of all dimensions that are labelled "5VVL HH Fc 32BC". Group B includes items representing 15% of the total consumption, which is 313,920 CZK in the monitored period. They are less important for the company compared to group A items. Four items with the designation "3VVL HH Fc 22B" are included in this group and their dimensions are: 1,000 x 2,400 mm, 800 x 2,400 mm, 900 x 2,400 mm, 1,200 x 2,400 mm.

Group C represents the items that are the least significant compared to the previous items for the company. This is mainly due to the fact that it is made up of two items which account for only 5% of total consumption during the reference period, which is only

11,000 CZK. These are two items marked "3VVL HH Fc 23E", the dimensions of which are: 1,200 x 1,000 mm, 900 x 1,200 mm. It is clear from Table 2 that consumption of these two items was the smallest in the monitored period.

The second selected company is focuses on the purchase of goods for resale and sale within the wholesale and retail business. The company is engaged in the purchase and supply of detergents, soaps, toilet paper, brushes, brooms, garden substrates, thinners and other items.

Inventory management was also carried out in the second company using ABC analysis. Data generation was obtained from the company information system for the reference period of 2017. The basis for the ABC analysis was to follow the following steps. It was necessary to add a number of purchased items in the first place so that each of them appeared on the list only once. The next step was to calculate the consumption of individual items over the reference period and to sort them downwards into a table according to the amount of consumption from the highest to the lowest value expressed in Czech crowns. The penultimate step was then to calculate cumulative consumption. The breakdown of items by maximum percentage range was A 80%, B 15%, C 5% in conclusion.

Tab. 3: ABC Analysis of Consumption of Basic Items of the Drugstore

Item	Consumption in thousands of CZK	Σ Accumulated Consumption in thousands of CZK	Splitting Items into Groups
Jar	16,650	16,650	A
Savo	15,782	32,432	A
Mr Proper	14,326	46,758	A
Domestos	10,630	57,388	A
Lanza	10,322	67,710	A
Clin	8,120	75,830	A
Cif	4,100	79,930	B
Bonux	3,450	83,380	B
Ariel	2,854	86,234	B
Solvina	2,232	88,466	B
Real	1,420	89,886	B
Total thousands of CZK	89,886		

Source: Internal company materials and authors

Table 3 shows that group A is the most important group for the drugstore. These are brands of products provided by leading suppliers Procter & Gamble, Unilever and Clin. Consumption of items was 75,830,000 CZK of group A for the period under review (year 2017). These items account for 80% of the total consumption.

The second group consists of items with 15% of the total consumption. Group B reached 14,056,000 CZK in the monitored consumption period. This group is less important than group A for drugstore. Group B is represented by Cif, followed by Bonux washing powder from Reckitt Benckiser, Solvina, Real and Ariel products.

The last group is group C with items representing 5% of total consumption and it is not used in this period in drugstore.

All two of these groups are important for the drugstore because all the items contained in the groups regularly make up the warehouse of the resort.

Conclusion

The implementation and shaping of the structure of individual logistics processes is becoming increasingly important as it is series of interdependent and successive cycles, whose proper functioning is a prerequisite for a prosperous business. Increased pressure is being put on manufacturing and trading companies in optimizing logistics processing in recent years. Since the individual logistics processes are interlinked and interact with each other, it is very important that the entire cycle works properly from the purchase to the final distribution to the customer. The aim of this article was to use and application ABC analysis as the management method in the two chosen companies as the case study. The results of the ABC analysis are apparent from two specific case studies. ABC analysis could be used in other world scientific researches and it is a very practical method for production and logistics companies. The ABC analysis can be designed as a mathematically valid substitute for traditional limits to maximize the information obtained from multivariate research data.

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