

THE PROPOSAL OF ABC ZONING IN THE WAREHOUSE

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Abstract

This article describes one of the possibilities ways of rationalization of goods allocation in the wholesale warehouse. The proposal of new goods allocation was provided by the ABC analysis of goods assortment. The goods were allocated into the three groups - items of high turnover, average turnover items and item of low turnover. Consequently the physical checking of actual allocation of goods in the warehouse was done. There is the proposal of new allocation of goods for each type of group of items in the conclusion of this article.

Keywords: Warehouse, ABC analysis, ABC zoning

1. INTRODUCTION

Wholesale is an independent business (not a manufacturer) making the business operations and organizing of supply lines. The majority of customers in Slovakia imagine that the wholesales are the distribution warehouses of foods or drugstore which own and supply network of retails. Wholesale fulfill functions of a broker to support the flow of goods from different producers to the final consumer [1].

In practice, the wholesale represents a wholesale warehouse in many cases, where there are goods flows connected with purchase, transportation, warehousing, sorting and picking and selling of goods. The flow of goods, information and finance is described in **Fig. 1**. The wholesale warehouse operates on the principle of a distribution warehouse [1, 2]. Goods are stored here only for a short time necessarily related to distribution to customers.

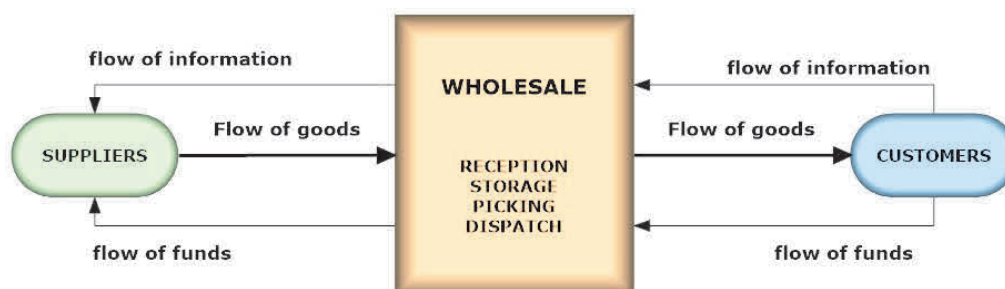


Fig. 1 The flow of goods, information and finance

In these warehouses there is great product diversity and it requires short response times of goods, resulting in targeted distribution of goods in the warehouse space and efficient logistic operations. These two facts play an important role in determining the competitiveness of firms and they impact on logistics costs resulting to the overall profit of the company [3, 4].

Problems from goods allocation in the warehouse are defined already in the design phase of the warehouse, and they are influenced by several factors such as: the location of income and dispatch gates, the size of

storage areas, their location and dividing, picking method, the method of searching items, the technical equipment, the incompatibility of goods, etc. [3, 4, 5].

There are currently several methods of allocations of goods in a storage area. There are given two basic ways listed in the literature:

1. Stable (dedicated) allocation, each item has predetermined place (address of allocation).
2. Random allocation, place for storing goods is chosen at random, e.g.: goods is located to the nearest empty place in a warehouse (it requires good information system), the advantage is better utilisation of storing capacity.

In practice, the distribution of the goods is carried also by the turnover rates of the product - so called ABC zoning [3, 5].

2. FORMATION OF THE ABC ZONING

ABC allocation is made by dividing of the storage areas into zones in which there are stored corresponding goods. For this type of storage it is necessary to sort the stored goods to A, B and C group by application of ABC analysis [6, 7, 8].

Application of the method consists in the classification of purchased goods according to their share of the total value of turnover. Characteristics of individual items are in **Table 1**. Experience shows, as seen in the Table 1, Group A represents approximately 70 - 80% of the total value of sales, on the other hand, the share of this group in the total number of items is only 10 - 20%. Group B represents 15 - 20% of the total value of turnover and 20 to 40% share of the number of the items. Group C represents a significant share of the total number of items, and it is 50 - 70% but currently it represents only 5 - 15% of the total value of turnover [6].

Table 1 Characteristics of A, B and C groups

Characteristics	A High turnover	B Average turnover	C Low turnover
Percentage share to total turnover	70 - 80 %	15 - 20 %	5 - 15 %
Percentage share to total number of items	10 - 20 %	20 - 40 %	50 - 70 %
Storage in the warehouse	The most closest to expedition area	Middle part of the warehouse	The most far from the expedition area
Access to stock management	Minimum stocks	Optimal stocks	Sufficient stocks

If the amount of stored goods is wider, the categorized group can be divided into other groups or subgroups.

The advantage of ABC zoning is more efficient use of storage space, and the better organization of the store performance, reducing of the times of particular activities and distances, i.e. the more effective flow of goods in the warehouse, finally it has a positive impact on the storage logistics costs.

3. THE METHODOLOGY FOR THE IMPLEMENTATION OF ABC ZONING IN THE WAREHOUSE

The basis for the methodology consists of the main inputs:

- Statistics from the available evidence of operative records of items in stock.
- Existing storage areas.
- The existing places of reception and shipment in the warehouse.

The methodology is composed of two parts: an assessment of the current state and design solution.

The first part is created by these steps:

- Classification of goods in the warehouse into representing groups based on selected criteria.
- The division of product groups into categories A, B and C by applying ABC analysis.

- Physical control of storage of goods groups in the space of the warehouse.
- Assessment of existing state of items storage.

The second part is created by these steps:

- ABC zoning proposal.
- The evaluation of the proposal.

4. THE APPLICATION OF THE PROPOSED METHODOLOGY

This methodology was applied to food wholesale store. The wholesale collects a broad range of goods from various manufacturers. It provides the distribution of goods according to customers' orders. The wholesale also works on the principle of cash & carry. For this reason, it has decided to revise the existing allocation status of goods in the warehouse and it proposed a method that would get the process of picking more effective.

4.1. Analysis of stored goods ABC analysis application.

It has been coming out of statistics of goods sold during the year while executing of the analysis. At first, it was made the division of stocks into product groups on the basis of pre-selected criteria. Groups were formed after a consulting with the warehouse management. There was determined the percentage share on the annual turnover in EUR for each group, see **Fig. 2**.

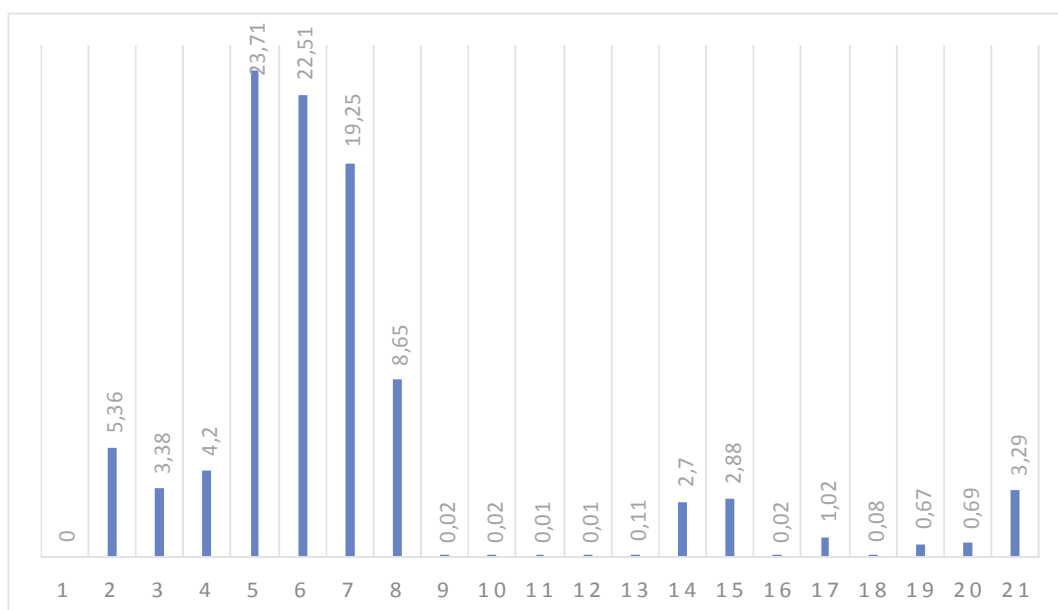


Fig. 2 The percentage share of groups to total annual turnover

Subsequently, the groups were listed in descending order of the percentage share of turnover. The classification of the various groups into categories ABC was done on the basis of cumulative annual turnover, according to the Table 1, section 2. The results of the analysis are summarized in Table 2 and Figure 3.

Table 2 Results of ABC analysis

Group of goods	Percentage share of the turnover value	The share of number of items %
A	74.82	20
B	21.81	30
C	3.37	50

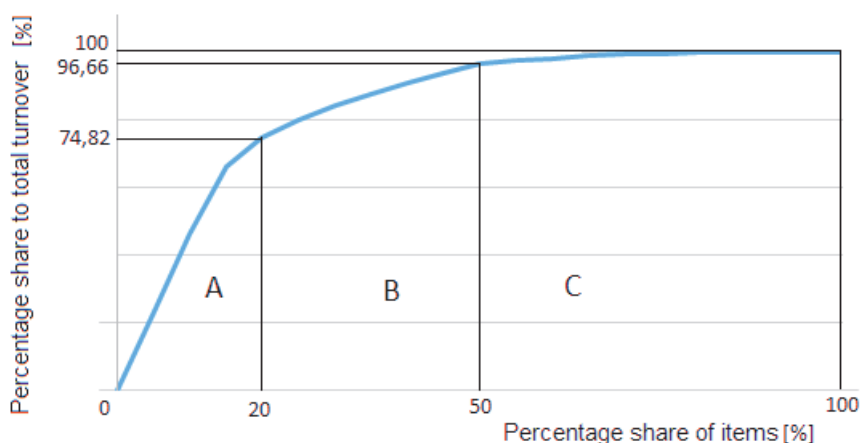


Fig. 3 The Lorentz diagram - interpretation of the results from the analysis

4.2. The current state of groups of goods allocation in the warehouse.

After the groups division into particular category the physical inspection of reception position of the various items in the warehouse was carried out. Useful storage area is divided into 6 sectors. Goods reception is carried out at three entrance ramps. The Table 3 shows the results of control found in the warehouse.

Table 3 The results of the warehouse control

Sector of the warehouse	Percentage share of the storage area	Ramp	Stored groups	Category A,B,C
B	6%	1	15, 7	C, A
C	8.6 %	1	4, 5, 6, 3	A, B
D	18 %	1	12, 16, 17, 18, 19	C
E	9.42 %	1	1	B
H	22 %	2	2, 13, 14, 20	B
G	36 %	3	1, 8, 9, 10, 11	B, C

There are shown the relationships between the parameters in the **Fig. 4**.

It was concluded the following from the carried out analysis and a physical inspection of the goods groups:

- ✓ Groups of goods from **A** category are located in the sector C and B. Their reception to the warehouse is realized through the ramp 1 or 3.
- ✓ Groups of goods from **B** category are located in the sector E and H. Their reception to the warehouse is realized through the ramp 1 and 2. As it can be seen from Table 3, some of the goods in category B are also located in sector G and C. Their reception is realized through the ramp 3.
- ✓ Groups of goods from **C** category are located in sectors B, D and G. Their reception is realized through the ramp 1 (sector B and D) and ramp 3 sector G.
- ✓ It was found out from the physical check that various sectors still have a spare capacity for the position of other stocks.

4.3. Proposal of the ABC zoning

Based on the results from the analysis, from the physical stock control and mutual communications with management, there was created a new proposal of arrangement groups of goods by categories A, B and C. The proposal has brought division of the storage area into 3 zones, zones were assigned to the corresponding

sectors and groups of goods. The proposal of zones came out from the location of the entrance ramps, from the location of the expedition area and from storage sectors equipment. The new relations in **Fig. 5**.

Zone A: G sector of the goods of category A. This sector has its own ramp for goods reception and it is also the closest to the expedition. The storage area represents 36% of the total area of the warehouse. Relocation to the sector G will have a positive impact on the quality of picking (reducing handling times and routes) the particular goods. The assigned group are groups 4, 5, 6 and 7.

Zone B: Sector B, C, D for the group of goods from category B. Reception will be realized through the ramp 1 and 3 (in case of being free), according to groups of goods. The allocation of group to sectors is as follows: Sector B → group 20, area C → group 1 and 2, Sector D - group 13 and 14. The storage area represents 32.6% of the total area.

Zone C: Sectors E and H for the group of goods from category C. Reception will be realized through the ramp 1 and 2, according to groups of goods. The allocation group to sectors is as follows: H → areas 15, 16, 17, 18 and 19, the sector E → 8, 9, 10 and 11 (if necessary, the sector E can be used also for groups from category B). The storage area represents 31.4%.

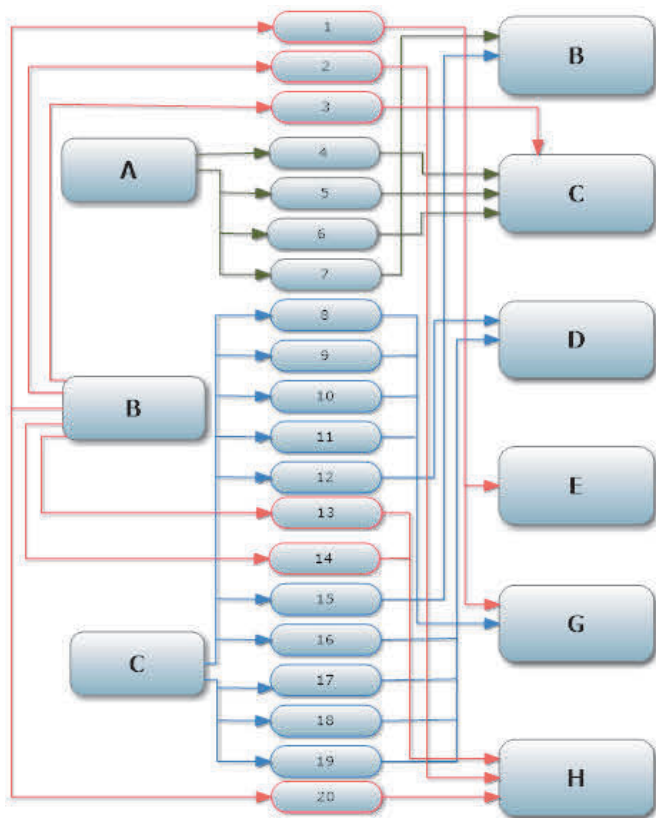


Fig. 4 Actual relationships

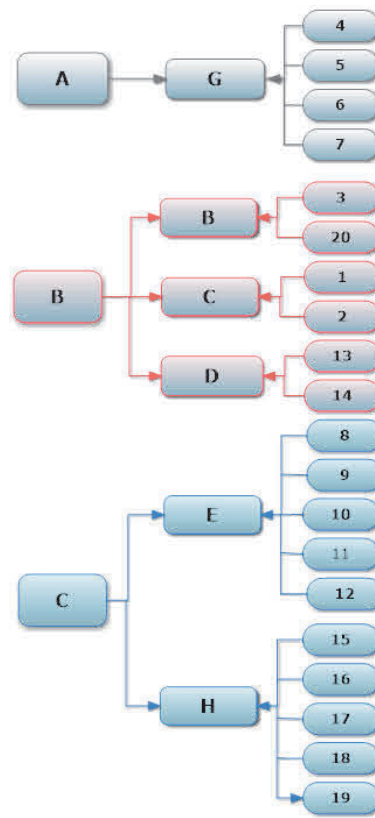


Fig. 5 Reorganization relationships

5. CONCLUSION

The paper describes one of the possible approaches for rationalization of the allocation of goods in the warehouse by introducing the ABC zoning. The introduction of ABC zoning the role of rationalization of whole storage activities does not finish. Consequently, it is necessary to solve other partial problems, such as particular allocation of specific groups of goods in each sectors of the warehouse, evaluation of logistic activities carried out in warehouses, regular monitoring of the capacity usage of storage positions and

warehouse operations performance by using selected indicators, such as indicators of productivity, efficiency, quality, etc. Finally, it is necessary to monitor and evaluate the costs in relation to the volume of outputs realized in warehouses [4, 6].

The benefits for economic operation of the warehouse would also be applying the XYZ analysis to determine the regularity of consumption of particular product groups. The results of this analysis could form the basis for the evaluation of inventory control policy or for the reduction of selected types of stocks [6].

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REFERENCES

- [1] ŠADEROVÁ J. Flow of goods wholesale logistics chain. TRANSPORT & LOGISTICS International Journal, Vol.10, No.18, 2010, pp. 29-39.
- [2] STRAKA M. Logistics of distribution: How effectively to get product into the market. EPOS: Bratislava, 2013.
- [3] ROUWENHORST B., REUTER B., STOCKRAHM V., van HOUTUM G.J., MANTEL R.J., ZIJM W.H.M. Warehouse design and control: Framework and literature review. European Journal of Operational Research, No. 122, 2000, pp. 515-533.
- [4] ROSOVÁ A. Logistics costs of the enterprise. Acta Montanistica Slovaca. Vol. 12, No. 2, 2007, pp. 121-127.
- [5] BINDZÁR P., STRAKA M., THATE T., BALOG M. Aviator system as an alternative to warehouse handling devices. Applied Mechanics and Materials, Vol. 683, 2014, pp. 15-21.
- [6] ŠADEROVÁ J. Warehouse logistics. ES Fakulta BERG: Košice, 2014.
- [7] SEDLIAK M., ŠULGAN M. Methods Supporting making of decisions about way of incoming materials procurement in manufacturing companies. Perner's Contacts Vol. 5, No. 3, 2010, pp. 282-287.
- [8] STRAKA M., MIKUŠOVÁ Z., LENORT R., Analysis and assessment of warehouse stock. Hutnické listy, Vol. 66, No. 3, 2013, 44-48.