

**Yermak S.A., Cand. Sci.
(Ekon.)**

Donetsk National University of Economics and
Trade named after Mykhaylo Tugan-
Baranovsky, Donetsk, Ukraine, e-mail:
svetlanaermak@mail.ru

OPTIMIZATION OF COMMODITY SUPPLIES OF TRADE ENTERPRISES ON BASE OF INTEGRATED ABC-XYZ-QRS ANALYSIS

Objective. *The purpose of article is to establish a goods stock system management based on integrated ABC-XYZ-QRS analysis on the example of the retail trade enterprise «Teplolux-7».*

Methods. *The study used the method of turnover cost(ABC)analysis, variational (XYZ) analysis, QRS analysis also groups and integration methods.*

Results. *Based on the analysis of the proposed scientific and methodical approach to the analysis of goods stock of trade enterprises that provides the following benefits: the ability to accurately calculate the necessary amount of purchases for the various groups of goods, improving the coordination of marketing and financial departments, with the exception of the range of illiquid positions, the allocation of investment resources , which can be embedded in products with high profitability, the inclusion in the product range of new positions to fund certain time.*

Academic novelty. *Improved scientific and methodical approach to the analysis of goods stock of trade enterprises, which unlike the other allows you to release the key, the most important resources of the company and set priorities in structuring business processes.*

Practical importance. *The practical application of the integrated ABC-XYZ-QRS analysis allows management to make informed decisions on the formation of goods stock of trade enterprises.*

Key words: *trade enterprise, goods stock, turnover cost (ABC) analysis, variational (XYZ) analysis, QRS analysis.*

The main text

Statement of the problem. Improving the efficiency of working capital management of the retail trade enterprises is due to the need for continued monitoring and analysis of commodity stocks, because in the structure of the active working capital, these assets have a significant share. Commodity stocks are a major focus of monetary investments for trade enterprises and the main source of income, and as a consequence - the main object of constant control. Therefore, the allocation of the most influential factors that determine the optimal amount of commodity stocks and its condition is all-important.

Analysis of recent research and publications. Commodity stocks management aspects of retail trade enterprises are studied in the works of such domestic scientists as I.I. Korolkov, M.D. Vinogradsky, P.Y. Balaban, I.A. Blanc, A.A. Mazaraki, L.A. Lihonenko, L.V. Frolova and foreign - J. Bukan, E. Konigsberg, P. Zermati,

P.Milhroma, J.Roberts, M.Darbinyanaetc. Techniques of ABC and XYZ-analysis are sufficiently developed and tested as described in many scientific and educational works on commodity logistics [1] - [5]. Methods of QRS-analysis isdetailed byR.Bodryakov [6]. However, many problems of theoretical and methodical nature of the problem need further in-depth research.

Formulation of the problem. The purpose of the study is to rationale management system of commodity stocksbased on the integrated ABC-XYZ-QRS analysis on the example of the retail trade enterpriseLtd."Teplolux-7."

The main material of the research.Based on the nature of each type of analysis of commodity stocks and features of commercial and industrial businesses that sell household equipment and perform work on their installation, adjustment and bringing it to the state in which it can be used by consumers, for a more complete analysis of product lines such enterprises should develop and conduct a comprehensive ABC-XYZ-QRS-analysis.

For thispurpose will analyze commodity stocks, which also stipulates: turnover value analysis ABC,variational analysis XYZ, QRS-analysis of working capital and commodity resources.

The essence of the ABC-analysis is the grouping of positions of the product range according to the degree of their impact on overall sales [8].The classification feature - turnover of each product is chosen for the purpose of analysis, and then the proportion of each product in the chosen basis in the total volume isdetermined.

Then a ranking in order of decreasing of the particle of classification features is realized a number of groups and positions criterion referring to a particular group areselected. In practice, the entire set is divided into three groups (A, B, C) (Table 1).

Table 2 shows the ABC-group nomenclature of goods of the trade enterprise "Teplolux-7".

The effect of ABC-analysis is: the ability to accurately calculate the necessary amount of purchases by various commodity groups, exclusion from the range of illiquid positions, which can free up cash frozen in these goods, reduce storage costs, increase commodity stocks turnover, increase sales.

Table 1 - Grouping products into groups according to the results of ABC analysis

Group	Group's share in total turnover	Cumulative share of trade groups	Characteristics of products of the group
A	50-80%	50-80%	Goods leaders that define commercial and financial condition, its status in the market, the most important
B	10-20%	70-90%	Related products and goods that have been recently introduced to the range, products that have lost status of leaders; intermediate values
C	5-10%	100%	Goods that without risk can be derived from the range, products that have just entered the range

Table 2 - ABC analysis of product development of the company Ltd. "Teplolux-7"

Nomenclature group	Price	Sales	Commodity turnover	Share in the turnover	Cumulative share in the turnover	
Gas convectors	1800	80	144000	12,13	12,13	80% A
Electric storage water heaters	4030	35	141050	11,88	24,01	
Instantaneous water heaters	4120	32	131840	11,10	35,11	
Auto transformers	1200	96	115200	9,70	44,81	
Boilers	4250	19	80750	6,80	51,61	
Gas Water Heaters	1060	65	68900	5,80	57,42	
Electric convectors	780	87	67860	5,72	63,13	
Electric boilers	1820	33	60060	5,06	68,19	
Boilers for solid fuel	2120	25	53000	4,46	72,65	
Radiators	320	156	49920	4,20	76,86	
Tubes	50	980	49000	4,13	80,98	90% B
Electric water heaters	740	59	43660	3,68	84,66	
Electric heaters	820	49	40180	3,38	88,05	100% C
Filters	350	113	39550	3,33	91,38	
Boilers, gas storage	2560	15	38400	3,23	94,61	
Components	30	630	18900	1,59	96,20	
Devices for magnetic water treatment	260	69	17940	1,51	97,71	
Pumping stations	790	19	15010	1,26	98,98	
Heating pumps	400	13	5200	0,44	99,42	
Thermometers	50	86	4300	0,36	99,78	
Gauges	30	88	2640	0,22	100,00	

Besides ABC-analysis frequency (variational) XYZ-analysis is used, which allows to determine the stocks, which may not bring large profits and/or are not among the most expensive, but the need for which may be small in size, but frequent [9]. Grouping range position of products is the degree of fluctuation in demand for them in order of increasing coefficient of variation for the groups, that are presented in Table 3.

Table 3 - Grouping products into groups according to the results of XYZ-analysis

Group	Characteristics of products of the group
X	Goods with stable value consumption and high accuracy of prediction
Y	Products meeting the need for which is characterized by prominent trends (including seasonal fluctuations) and the average of their forecasting capabilities
Z	Goods that are consumed regularly, their prediction accuracy is low

Results of joint ABC and XYZ analyzing (Table 4) is the allocation of the key, the most important range positions and establishment of the basis of priorities and structuring business processes.

Table 4 - Combination analysis of ABC and XYZ of product development of the company Ltd. "Teplolux-7"

Name of nomenclature	Coefficient of variation	Cumulative share in turnover
Gasconvectors	37,91438	12,13
Electric storage water heaters	80,82904	24,01
Instantaneous water heaters	27,95085	35,11
Autotransformers	16,55661	44,81
Boilers	41,2393	51,61
Gas Water Heaters	47,34364	57,42
Electric convectors	31,91596	63,13
Electric boilers	44,84439	68,19
Boilers for solid fuel	63,37192	72,65
Radiators	22,42674	76,86
Tubes	20,44894	80,98
Electric water heaters	45,0669	84,66
Electric heaters	29,07716	88,05
Filters	39,84267	91,38
Boilers, gas storage	53,22267	94,61
Components	37,48318	96,2
Devices for magnetic water treatment	35,58849	97,71
Pumping stations	79,29747	98,98
Heating pumps	109,5985	99,42
Thermometers	35,49846	99,78
Gauges	49,58506	100

Superimposition results of ABC and XYZ analysis gives up 9 position nomenclature groups, each of which have their own management techniques. Thus, the groups AX, AY, AZ require the most attention from the logistics point of view, they require careful planning of needs, rationing spending, a permanent record of the analysis and control of deviations from the planned performance.

Categories BX, BY, BZ can have both common (term planning) and different (delivery methods) controlling methods.

For resources of categories CX, CY, CZ consolidated planning methods are applied and control function is usually delegated to lower levels of management. For the average enterprise planning such stocks is long-term with a monthly check of stock availability.

For the QRS-analysis for each position nomenclature should calculate the rate of profitability of investment resources (PIR) by the formula (1) [6]:

$$PIR = \frac{\text{Profit}}{IR} \times 100\% \quad (1)$$

where IR is investment resource of each nomenclature position, which is calculated as the total cost:

goods in transit (cargo not yet cashed in stock and does not get to report on commodity stocks , but which are commitments to supplier (billed to pay or have paid);

commodity stocks in stock;

receivables are not paid by the client;

sum of money in transit, the buyer listed but not available for products vendor deducting the amount payable under this nomenclature position.

Grouping of product development of the company Ltd. "Teplolux-7" the most important indicator of investment resources is given in Table 5.

Table 5 - QRS-analysis of product development of the company
Ltd. "Teplolux-7"

Name of nomenclature	Investment resource	
Gasconvectors	20,3	Q
Electric storage water heaters	16	
Instantaneous water heaters	15,4	
Autotransformers	12,3	
Boilers	12,2	
Gas Water Heaters	10,7	
Electric convectors	7,8	R
Electric boilers	7	
Boilers for solid fuel	6,9	
Radiators	4,1	
Tubes	3,2	
Electric water heaters	1,6	
Electric heaters	0,7	
Filters	0,6	
Boilers, gas storage	-0,3	
Components	-5	
Devices for magnetic water treatment	-5,1	
Pumping stations	-9,2	
Heating pumps	-15,7	S
Thermometers	-25	
Gauges	-25,1	

The group Q contains evident donors, these are those products that invest in turnover more than 10% of their monthly sales, i.e. those that provide credit to a greater extent than it is necessary for filling commodity logistics system of the organization that buys goods.

Group R consist of implicit donors or implicit acceptors, these are goods of credit that are sufficient to support resource logistics system.

The group S has distinct acceptors, namely goods for the maintenance of which the company itself has to invest in excess of 10% of monthly sales.

The results of the integrated ABC-XYZ-QRS-analysis of product development of the company Ltd. "Teplolux-7" are presented in Table 6.

As a result of falling nomenclature position to integrated groups are subgroups

of products are distinguished (Table 7) [10]:

I - goods leaders with high yield, good predictability that require investment as accounts payable is higher than the debtor;

II - stable products, the overall performance of which is slightly lower than in the first group, but they form the basis of business;

III - problematic products with very low rates;

IV - goods-outsiders that consume a lot of resources, hardly predicted and almost non profitable.

Table 6 - Results of the integrated ABC-XYZ-QRS-analysis of product development of the company Ltd. "Teplolux-7"

Name of nomenclature	ABC	XYZ	QRS
Convectors gas	12,13	37,91438	15,4
Electric storage water heaters	24,01	80,82904	20,3
Instantaneous water heaters	35,11	27,95085	7,8
Autotransformers	44,81	16,55661	3,2
Boilers	51,61	41,2393	4,1
Gas Water Heaters	57,42	47,34364	0,7
Electric convectors	63,13	31,91596	-0,3
Electric boilers	68,19	44,84439	-5,1
Boilers for solid fuel	72,65	63,37192	-15,7
Radiators	76,86	22,42674	-25,1
Tubes	80,98	20,44894	12,2
Electric water heaters	84,66	45,0669	1,6
Electric heaters	88,05	29,07716	6,9
Filters	91,38	39,84267	7
Boilers, gas storage	94,61	53,22267	-25
Components	96,2	37,48318	-9,2
Devices for magnetic water treatment	97,71	35,58849	-5
Pumping stations	98,98	79,29747	0,6
Heating pumps	99,42	109,5985	10,7
Thermometers	99,78	35,49846	12,3
Gauges	100	49,58506	16

The last integrated group of products at the analyzed company is not represented.

Table 7 - Results of the integrated ABC-XYZ-QRS-analysis of product development of the company Ltd. "Teplolux-7" (grouping items)

Name of nomenclature	Cumulative proportion in turnover (ABC)	Coefficient of variation (XYZ)	Investment resource (QRS)
Convectors gas		I	
Electric storage water heaters			
Instantaneous water heaters			
Autotransformers			
Boilers			
Gas Water Heaters			
Electric convectors			
Electric boilers			
Boilers for solid fuel		II	
Radiators			
Tubes			
Electric water heaters			
Electric heaters			
Filters		III	
Boilers, gas storage			
Components			
Devices for magnetic water treatment			
Pumping stations			
Heating pumps			
Thermometers			
Gauges			

Conclusions from this study.

The analysis suggests that the proposed method of the integrated analysis will allow commercial enterprises to make more informed management decisions regarding the formation of inventories, and receive the following effect:

- the ability to accurately calculate the necessary amount of purchases for different groups of products;
- improved coordination of marketing and financial departments;
- exclusion from the range of illiquid positions, which can free up cash, reduce storage costs by increasing commodity stocks turnover;
- the allocation of investment resources, which can be invested in products with high yield;
- including in the product range new positions that will need to be financed for some time.

References:

1. Jeleznyak, V.Yu. (2005), "Logistic approach is in control of inventories on a machine-building enterprise", Abstract of Cand. Econ. Sci., Donetsk, Ukraine.
2. Lifar, V.V. (2003), "Development of the logistic control purchases and division system is on a large industrial enterprise", Abstract of Cand. Econ. Sci., National metallurgical academy of Ukraine.

3. Klimova, I.G. (2008), "Management of enterprises of engineer logistic activity", Abstract of Cand. Econ. Sci., Priazovskiy State Technical University, Ukraine.

4. Smirichinskii, V.V. (2009), *Logistuka: navchalno-metoduchnyi posibnyk dlia stud. vysch. navch. zakl.* [Logistic: scientifically methodical a manual is for studients], TNEU, Ternopil, Ukraine.

5. Chuhrai, N. and Patora, R. (2001), *Innovatsii ta logistika tovariv* [Innovations and logistic of commodities], National university «Lviv politekhnika», Lviv, Ukraine.

6. Bodryakov, R. (2005), "QRS-analysis of circulating assets and resources of commodities", *Logistika&sistema*, no. 3, pp. 10-15.

7. Kalmykov, Z. (2005), "By a circulating-cost and variation analyses as instrument of management an assortment", *Torgovoe delo*, no. 6, pp. 8-13.

8. Stepanov, V.G. (2007), "Structural ABC analysis of assortment", *Audit i finansovyi analiz*, no. 3, pp. 205-214.

9. Kalmykov, Z. (2005), "By a circulating-cost and variation analyses as instrument of management an assortment", *Torgovoe delo*, no. 7, pp. 40-45.

10. Ermak, S.O. (2008), "The ABC-XYZ-QRS-analysis of supplies of commodities of auction enterprise is integrated", *Rozvytok naukovoï dumky 2008*, pp. 105-108.