



## ABC-XYZ Analysis as a Key Tool for Optimizing Public Procurement Planning

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**ABSTRACT:** This article describes the planning of public procurement (for example, the material and technical department of the center to ensure the activities of the Treasury). The necessity of its improvement was justified due to the high share of budget expenditures on the procurement of goods, works and services. As the main method of optimizing planning activities, it is proposed to use ABC and XYZ-analysis adapted to the needs of public procurement. The main criterion for the choice of these methods was the ease of use and clarity of the results of his research. In this case, the combination of methods gives a synergistic effect, increasing the accuracy of determining the desired categories of goods, works or services. Based on analyzes of the 2018 contracts, measures were proposed to optimize public procurement planning for 2019. Part of the procurement could be enlarged, ABC-XYZ-analysis showed exactly what position will give the greatest economic effect. The preliminary results of the activities demonstrated the effectiveness of the proposed measures.

**Keywords:** government procurement; planning; ABC-XYZ analysis; state budget; contract sphere.

### I. INTRODUCTION

The key direction of increasing the efficiency of budget expenditures is the improvement of the procurement system of goods, works and services for state needs. They now account for up to 40% of the expenditure side of the budget. In a mixed economy, the state acts as the largest customer and consumer of products from a number of industries, turning government demand into a powerful tool for regulating the economy, influencing its dynamics and structure [1].

Procurement management for state and municipal organizations is a strategically important task requiring the processing of large amounts of information. ABC-XYZ procurement analysis can significantly improve the efficiency of the planning process by concentrating, in accordance with the Pareto law, on managing precisely those procurement categories that are of greatest importance to an organization.

The article discusses the methodology and the main problems of the use of ABC-XYZ analysis in the framework of the procurement of inventory for state needs [2, 3].

The results of a successful analysis and subsequent classification of inventory can be used in the process of public procurement planning by the Federal Treasury. The solution of these tasks will allow to harmoniously enter the procurement management into the organization's management accounting system, making it an effective means in achieving the strategic goals of public procurement [7].

### II. MATERIALS AND METHODS

One way or another, public procurement planning actually plays a decisive role, as the correct determination of planned indicators of state and municipal procurement has a direct impact on the efficiency of the use of budgetary funds. In modern conditions of reforming the public procurement system, along with improving budget planning methods, approaches to determining the volume of public

procurement within the planning stage are being improved.

Systematization, realism and forecasting should be considered as the basic planning categories that will allow building a sustainable system of state economic policy, including in the field of public procurement. The practical significance of the implementation of the procurement planning stage is determined by the occurrence of the corruption potential at this stage, namely: justification of inflated budget requests, preparation of the terms of reference corresponding to a particular supplier, the establishment of unrealistic dates for the order [4, 5].

ABC analysis is a very simple and effective method of splitting all products by importance. The use of these tools does not require significant labor costs or attract highly paid experts. At the same time, the wide dissemination of this type of analysis indicates the practical significance of these tools.

In ABC analysis, the group A includes those goods that make up only 20% of the nomenclature, and their volume in total demand is 80% in both physical and monetary terms. Group B gets 30% of the range of all products, but they make up only 15% of the volume of purchases. Group C gets 50% of the goods, which make up only 5% of the volume. Thus, this analysis allows to determine the degree of importance of each category of goods [6, 8].

With XYZ analysis, all products are broken down by consistency of consumption and accuracy in predicting changes in consumption. The group X includes goods that are consumed stably, while the group Y includes goods that do not have a certain stability. For group Z, there is stochasticity and inconsistency of consumption. If there are a number of statistical data on sales, then the criterion for the separation of groups is the coefficient of variation. From 5% to 15% are categories that are steadily bought by consumers, from 15% to 50% is group Y, all that is higher is category Z [9, 10].

Combined ABC-XYZ analysis is widely popular, which results in a matrix of 9 subgroups (Table 1).

**Table 1. ABC-XYZ analysis matrix.**

Material group	A - high cost of consumption - 80%	B - cost value of consumption volume - 15%	C - low cost of consumption - 5%
X - regular consumption	AX	BX	CX
Y - fluctuating consumption	AY	BY	CY
Z - irregular consumption	AZ	BZ	CZ

The combination of the two types of analysis allows to determine the unconditional leaders (product group AH), which bring consistently high income, and outsiders (group CZ), which are practically not in demand. The ideological continuation of this analysis is the addition of another criterion, for example, profit from sales. In this article we will focus on two parameters.

**III. RESULTS AND DISCUSSIONS**

As noted above, one of the promising areas of public procurement is to improve the planning mechanism. The baseline data for the ABC-XYZ analysis was data on government procurement of the material and technical support department of the Interregional Branch of the Federal State Institution "Center for the Support of the Treasury of Russia". Classification by ABC and XYZ-methods allowed to evaluate and identify the correct procurement management strategy for each type of inventory of this department.

Let us consider in more detail the range of goods purchased in the logistics department and the cost of government contracts concluded for them in order to identify what actions can be additionally taken to optimize the procurement planning process.

At the first stage it is necessary to decide on what products we will explore. Some commodity and material values of the application are received quite rarely, and

their total value does not even reach 0.5% of the total amount of purchases made. Such products include mosquito nets, mats, dirt, gauges, key tags, etc. As at the same time, other products have a more significant role.

Of the 84 types of goods purchased by the logistics department for 2018 to meet the needs of the territorial bodies of the Federal Treasury and for the branch's own needs, 17 types were selected (table 1) for the following characteristics: their total value is more than 100 thousand rubles, or of the concluded contracts are more than 4. It is also worth noting that each application for a product has its own specifics, for example, the category of door fittings may contain such goods as a door handle, door lock etc. Specificity of the ordered inventory items is signed in the technical specifications of the application.

ABC analysis allows you to identify which products are required in the largest amounts (Table 2). Category A includes goods that occupy up to 80% of the total value of purchases, that is, goods with the largest share in the total volume. The following category B includes goods whose contract value is 15% and the remaining goods belong to category C. If we considered the entire range of goods purchased, the most numerous categories would be goods C, but at the same time, visibility is lost analysis.

**Table 2: Baseline Data.**

No.	Product	Total purchases for 2018, rub.	The number of contracts concluded
1	Paper	6 713 883.06	7
2	Camcorders	463 740.53	9
3	Water heaters	213 353.28	6
4	Signboards signs	146 117.04	7
5	Mattazapasy for civil defense needs	3 183 771.23	5
6	Door furniture	227 048.67	20
7	Diesel fuel	142 931.36	8
8	Stationery	1 959 799.98	18
9	Air conditioners	1 344 410.64	12
10	Office chair	597 222.26	12
11	Furniture	823 908.44	11
12	Seals stamps	163 747.44	12
13	Consumables for repairs	207 907.95	14
14	Repair kits for office chairs	243 196.27	6
15	Counters	135 189.70	14
16	Household goods	534 664.73	6
17	Electrical goods	511 454.53	15
	TOTAL	17612347,11	

In the analysis it is advisable to use in table 15-20 positions, only in this case, the logic of reasoning becomes as simple as possible to understand. To carry out this kind of analysis when planning in real conditions, it is recommended to do all the calculations in the

application package created for working with tables, in particular, MS Excel is a convenient means of processing large amounts of information.

Before the analysis, all types of purchased inventory items were sorted so that the goods with the highest

specific weight were at the beginning, and the goods with the lowest weight were at the bottom of the list.

**Table 3: ABC Analysis.**

Nomenclature of inventory items	Specific gravity in total purchases	Specific gravity cumulative total purchases	ABC Group - analysis
Paper	38,12%	38,12%	A
Mattazapasy for civil defense needs	18,08%	56,20%	A
Stationery	11,13%	67,32%	A
Air conditioners	7,63%	74,96%	A
Furniture	4,68%	79,64%	A
Office chair	3,39%	83,03%	B
Household goods	3,04%	86,06%	B
Electrical goods	2,90%	88,97%	B
Camcorders	2,63%	91,60%	B
Repair kits for office chairs	1,38%	92,98%	B
Door furniture	1,29%	94,27%	B
Water heaters	1,21%	95,48%	C
Consumables for repairs	1,18%	96,66%	C
Seals stamps	0,93%	97,59%	C
Signboards signs	0,83%	98,42%	C
Diesel fuel	0,81%	99,23%	C
Counters	0,77%	100,00%	C
TOTAL	100,0%	-	

As can be seen from the table, paper is the most demanded product category - it takes 38.12% of the value of all selected contracts. It is required in the preparation of any documentation, to spend money when drawing up contracts, signing contracts, accounts, acts, etc. With the current workflow system, this item of expenditure is very difficult to optimize. Even if all unnecessary duplication of documents is removed, the question of the human factor remains. If any of the clauses is incorrectly indicated in the contract, then it will have to be reprinted, which additionally spends this type of material resource. When drafting an application and documentation for the purchase of securities, special attention should be paid to the correctness of their preparation, since even a small inaccuracy in the contract can lead to large losses since the volume of purchases reaches 6 million rubles.

The next item is inventory for civil defense needs. The weight of this position is almost three times lower - 18.08% or about 3 million rubles. This resource concerns the safety of the civilian population, to which our state is very responsible. When purchasing this product item, a negligent attitude is unacceptable when drafting purchase order, as this may cost the life of a citizen.

Office supplies, like paper, are necessary for the stable functioning of the offices of the territorial offices of the Federal Treasury and the Branch. The amounts of their purchases also require increased attention.

Products in categories B and C operate with smaller amounts, so novice professionals can be allowed to organize their purchases.

An interesting point in the purchase of goods is the organization of the procurement campaign. At the moment, the whole process is optimized specifically for products of category A. That is, the supplier, when planning expenses, initially expects that after delivery of the goods, money will be transferred to him. But when delivering goods to the territorial bodies of the Federal Treasury, he needs to send additional documents to the

Branch Office, sign payment documents, and only then will the money be transferred to his account. In addition, due to the remoteness of the supplier and the customer approval, the correction of errors in the documents may take considerable time from both sides. With deliveries in the amount of less than 10 thousand, this form of organization of work with the state will remain with the beginning entrepreneurs as a negative experience. We consider it expedient to simplify payment categories for category C.

The next stage of the study is XYZ analysis (Table 3).

In the standard version of this analysis it is proposed to use the coefficient of variation, which is impractical in the implementation of public procurement. If we applied the coefficient of variation, then all the goods would belong to the category Z due to large price fluctuations and the rarity of contracting. For example, paper can be purchased in large quantities at the beginning of the fiscal year, and then purchased in much smaller quantities a couple of times for current needs. Therefore, this type of analysis was modified for the needs of public procurement.

Category X will include goods that were purchased 13 or more times. To category Y - from 12 to 6, and to category Z up to 5 times. In this way we will be able to analyze how often there is a need to purchase a particular product. At the moment, the main budget savings come from the consolidation of purchases, as the positive economies of scale come into play, and suppliers can offer goods at a lower price. Unlike the traditional XYZ analysis, in the modified most important category is the Z group. This means that the goods have been enlarged to a reasonable limit, their further merging is not required. This category brings the greatest budget savings. As for category X, the planning of the purchase of these goods needs to be optimized. Contracts for identical positions may be enlarged if the difference between them is less than a month. Category Y in this respect requires some more attention.

**Table 4: XYZ analysis.**

Nomenclature of inventory items	Procurement frequency	XYZ Group - analysis
Door furniture	20	X
Stationery	18	X
Electrical goods	15	X
Consumables for repairs	14	Y
Counters	14	Y
Air conditioners	12	Y
Office chair	12	Y
Seals stamps	12	Y
Furniture	11	Y
Camcorders	9	Y
Diesel fuel	8	Y
Paper	7	Y
Signboards signs	7	Y
Water heaters	6	Y
Repair kits for office chairs	6	Y
Household goods	6	Y
Mattazapasy for civil defense nee	5	Z

An unexpected leader in XYZ analysis was the category of door furniture. Mostly in this category include door handles, door locks. As practice shows, this type of materials is very much in demand in the territorial bodies of the Federal Treasury, which indicates the need to have a small margin for prompt repair of a failed door.

Electric goods are deservedly categorized as X. Batteries lose their charge during long-term storage, and it is difficult to predict the failure of a particular video surveillance camera. This means that the high frequency of their purchases is fully justified and there is no point in consolidation.

The need for procurement of air conditioners, which, based on the conditions imposed, falls under the category Y, is difficult to analyze for specialists of non-technical profiles. Sometimes it is enough to carry out maintenance of existing equipment, replace the reagent, so that the air conditioner can work again. Therefore, this category requires further research, perhaps in the context of a specific building, or even a specific air conditioner. Since about the old equipment requires more frequent repairs and perhaps more appropriate is the purchase of new equipment.

The only category that was categorized as Z is inventory for civil defense. Planning in this category does not need any refinement.

**IV. SUMMARY**

The article is about methods to optimize planning in public procurement. Some advantages of ABC-XYZ analysis are presented on example of "Center for the

Support of the Treasury of Russia". As a result of plan improvement, budget of organization was saved.

**V. CONCLUSIONS**

Thus, at the moment there is only one category of goods, the number of contracts of which is a substantial amount (category A), the number of purchases is unreasonably high (X) - stationery.

Separately, I want to highlight the category of securities, since the value of their contracts is equal to about one third of all expenses. As an experiment, in 2019 an attempt was made to consolidate the contract. Instead of three small purchases of paper, one auction was held for the total amount. Compare the savings factors that have been achieved. This coefficient will be calculated by the formula:

$Ke = 1 - (\text{actual contract amount} / \text{initial maximum contract price})$

In 2018:

$$1 - \frac{2\,606\,159,97 + 2\,294\,797,34 + 1\,238\,328,00}{2\,700\,683,91 + 2\,468\,783,98 + 1\,238\,328,00} = 0,04$$

In 2019:

$$1 - \frac{7\,504\,818,20}{8\,528\,202,44} = 0,12$$

Based on the data obtained, it is possible to conclude that it is expedient to further develop procurement consolidation.

For the material and technical department of the CSTR grading is presented in the table below.

**Table 5: ABC-XYZ analysis matrix.**

	A	B	C
X	Stationery	Electrical goods	Consumables for repairs
		Door furniture	Counters
Y	Paper	Camcorders	Seals and stamps
	Air conditioners	Repair kits for office chairs	Signs and signs
	Furniture	Water heaters	Diesel fuel
	Office chair		
	Household goods		
Z	Inventory for civil defense		

Consolidation is recommended to start with category A, since the economic effect of this will be most noticeable, gradually moving to B and C. As can be seen from the table, it is possible to optimize the planning of procurement activities, transferring most of the goods to category Z.

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