

INTEGRATION OF ABC/XYZ ANALYSIS INTO THE INVENTORY MANAGEMENT ACCOUNTING SYSTEM

ИНТЕГРАЦИЯ МЕТОДОВ ABC/XYZ-АНАЛИЗА В СИСТЕМУ УПРАВЛЕНЧЕСКОГО УЧЕТА ЗАПАСОВ

STERBET Anastasia, studentă, specialitatea: Contabilitate
Academia de Studii Economice din Moldova, Republica Moldova
Chișinău, str. Bănulescu-Bodoni 61, www.ase.md
Telefon: + 373 60 19 12 35
e-mail autor: sterbet.anastasia@ase.md

Abstract: *В исследовании рассматривается применение ABC/XYZ-анализа в управлении запасами и интеграция данных методов в систему управленческого учета. Классификация запасов по уровню экономической значимости, вкладу в финансовый результат и вариативности спроса позволяет использовать адаптированные процедуры контроля, планирования и учета для различных категорий запасов. Это способствует более рациональному распределению ресурсов, повышению обоснованности управленческих решений, снижению операционных рисков и улучшению финансовой устойчивости предприятия. Методы учета затрат, бюджетирования и управленческой отчетности рассматриваются с позиций дифференцированных инструментов учета, соответствующих характеристикам конкретной группы запасов, а также обеспечивающих оперативный и стратегический анализ эффективности их управления.*

Key words: *устойчивое развитие, запасы, управленческий учет, экономико-математическое моделирование, ABC/XYZ-анализ*

JEL CLASSIFICATION: M41, C38, C44

INTRODUCTION

Nowadays, when the majority of enterprises are targeted at the sustainable development, managerial accounting goes beyond simple recording of information by maintaining administrative decisions based on a system analysis. In this regard, effective resource allocation becomes crucial as it falls to a significant share of circulating assets of the plant and directly impacts on its sustainability. The constraints of traditional methods of managerial accounting, such as quantitative-oriented analysis, do not fully account for heterogeneous nature of inventories as well as the diversity in their consumption patterns. So, the application of modern analytical tools, which allow not only ranging resources based on their importance, but also by predictability of their demand, has gained particular relevance. One of the methods, mentioned above, is ABC/XYZ-analysis, which allows ranging inventories by their importance (ABC part) as well as consumption stability (XYZ-part).

This scientific paper is aimed to develop an approach so as to integrate ABC/XYZ-analysis into the managerial accounting system in order to increase the validity of taken decisions and maintain sustainable development of the enterprise.

MAIN CONTENT

Managerial accounting ensures data collection, processing and systematisation by providing information on inventory volume, flow and price. However, it does not highlight priority positions that require forms of specific control. It inevitably leads to either excess or shortage of resources, financial losses and failure to apply the going concern assumption in inventory valuation. In the context of transition to effective resource allocation, the application of quantitative assessment methods allows the inventories to be ranked based on their importance and demand, leading to reduction of excessive resource consumption and financial losses (Venkatesh P., 2024). Thus, managerial accounting serves as a tool for analysis, control and justification of management decisions aimed at resource optimisation and creating conditions for steady enterprise operation. The information framework for the application of ABC/XYZ analysis comprises the balance sheet, which

provides a value-based assessment of inventories; the profit and loss statement, enabling the evaluation of their contribution to the company's profitability on the basis of marginal income; as well as inventory count results and analytical accounting data, which together establish a qualitative foundation for subsequent quantitative analysis.

First and foremost, ABC analysis works based on a concept "vital few and trivial many" that means that few amounts of items provide main cumulative consumption share (Mihaila S., Badicu G., 2014). Groups ABC include:

Group A that contains of most valuable assets, that form minimal amount of nomenclature, but at the same time form the major share of budgeting (no more than 75%). This group requires strict form of control and accurate planning for procurement.

Group B contains of medium-value inventories that demand occasional analysis and moderate control (cumulative share 75%-95%).

Group C contains of negligible items that occupy major volume of nomenclature, though their price is rather low (cumulative share 96%-100%). This group can have simplified forms of management and control.

Despite all the advantages, ABC analysis can not fully justify taken managerial decisions under unstable economic conditions, as it is predominantly based on statistical data over previous periods and does not take into account external factors such as seasonality and demand variability. To tackle these constraints, there can be applied XYZ-analysis, that is based on the calculation of the coefficient variation that is defined as a ratio of standard deviation to average demand of an item.

$$V = \frac{\sigma}{\bar{x}} \times 100\%, \text{ where: (1)}$$

V – coefficient Variation;

σ – standard deviation of the actual demand for the selected item over the analyzed period;

$\bar{x}$ – average demand for this item.

As a result, there are formed three groups of products: X, Y, Z. They are characterised by low, medium and high demand volatility respectively. (Suryaputri Z. 2022)

Group X contains items with a high usage rate: $V < 10\%$

Group Y contains items with an average usage rate: $10\% < V < 25\%$

Group Z contains items with a low usage rate: $V > 25\%$

ABC/XYZ-analysis of pharmaceutical and medical products has been conducted to evaluate the effectiveness of these modern methods based on provided accounting data.

Table 1. Results of ABC/XYZ-analysis of the inventories

Items	Annual consumption value ($P \times x \times 12$)	Share (%)	Cumulative share (%)	Category by ABC	Coefficient Variation	Category by XYZ
Disinfectants	252 000	33.23%	33.23%	A	1.26%	X
Antibiotics	216 000	28.48%	61.71%	A	56.26%	Z
Reagent	86 400	11.39%	73.10%	A	43.8%	Z
Subtotal A			73.10%			
Medical gowns	45 000	5.93%	79.03%	B	2.36%	X
Salt solution	36 000	4.75%	83.78%	B	4.1%	X
Bandages	35 700	4.71%	88.49%	B	0.37%	X
Catheters	30 720	4.05%	92.54%	B	22.02%	Y
Subtotal B			92.54%			
Scalpels	22 752	3%	95.54%	C	21%	Y
Gloves	12 480	1.65%	97.19%	C	8.56%	X
Masks	8 650	1.14%	98.33%	C	5.7%	X
Syringes	6 804	0.9%	99.23%	C	24%	Y
Adhesive plasters	5 904	0.77%	100%	C	7.88%	X
Subtotal C			100%			
Total amount	758 410	100%				

Source: calculated by author based on Formula 1 and Suryaputri Z. (2022)

Integrated application of ABC and XYZ analysis allows gaining more accurate information on available inventories, as it accounts for both demand predictability and economic significance. As a result, an ABC/XYZ matrix is formed, in which each item is categorised into one of nine groups. The use of this matrix provides a basis for a differentiated approach to inventory management, enabling the development of various control, replenishment, and planning strategies depending on the characteristics of each group (Suryaputri Z. 2022).

Table 2. The results of ABC/XYZ integration of inventories

	X	Y	Z
A	Disinfectants	-	Antibiotics, reagent
B	Medical gowns, bandages, salt solution	Catheters	-
C	Gloves, masks, adhesive plasters	Syringes, scalpels	-

Source: calculated by author based on Table 1

ABC/XYZ matrix shows how conducted analysis helps classify resources: (Venkatesh P., 2024):

Group AX: products with stable demand and minimal risk; they generate the primary income with minimal demand fluctuations, and safety stocks are not obligatory.

Group AZ: A high-risk zone, as the high inventory price and unstable demand requires the creation of safety stocks and tight control.

Groups BX and BY: the ordering process can be optimized, and the control can be passive due to low demand variation.

Groups CX and CY: A zone of simplified control, as the cost of these stocks is minimal and demand is constant; therefore, it is advisable to purchase in large batches for a long period.

The application of this matrix accounts for different strategies for inventory management and creates a basis for making effective managerial decisions that aimed at optimising working capital and reduction of operational risks (Макаренко И.В., 2014). Mainly this strategy is related to integration of various methods of calculation for different categories. Standard-costing should be applied to group AX, that is characterised by high value and stable demand. It maintains strict variance control, since any small deviation indicates potential supply or logistics disruptions. Since group AZ is a risky zone due to its high price and extremely unstable demand, it requires prioritised focus. Considering the fact of limited shelf life of some medical products, such as reagents and antibiotics, there should be implemented an analytical accounting by expiry date. It would limit any more purchases if there are some outstanding products that can be either used or redistributed among other departments.

Inventories in groups BX and BY can be monitored periodically with order planning for some months in advance. For groups CX and CY, characterized by low cost and relatively stable demand, direct costing can be applied without the allocation of indirect manufacturing costs. Also, there can be used simplified value-based accounting as detailed control is not economically feasible. Furthermore, implementing various budgeting methods contributes to more effective working capital management. For groups AX and BX, it is highly beneficial to use tight budgets with minimal deviations, whereas for group AZ should be used flexible budgeting with regular adjustment and reserve funds for covering possible demand and price fluctuations. Such policy can help maintain business continuity without the need of external financing. Low-value and quite stable positions from groups CX and CY can be bought in bulk once in several months so as to receive special offers or discounts from wholesaler.

Considering conditions of low paying capacity, the risk of taking ineffective solutions reduces, so the significance of developing optimal managerial decisions is of a particular importance. (Соколова А.П., Морозов Д.С., Есеккуева А.А., 2022). In this regard, internal reporting, that is formed based on groups from ABC/XYZ-matrix, plays a crucial role in the enterprise functioning.

Particularly, as for group AZ, which is the most capital-intensive, it is recommended to create a variance report so as to ensure timely identification of variance between actual and factual data. Moreover, report based on expiration dates for products from groups A and B can reduce purchasing excessive inventory and contributes to timely realisation of resources with limited shelf life.

CONCLUSION

The integration of ABC/XYZ analysis into managerial accounting of inventory establishes a basis for control and planning, improves controllability of the working capital and reduces operational risks. Also, internal reports help reveal variances, adjust purchasing plans, lower the risk of stockouts or storing their excess inventory in order to support the effectiveness of enterprise activity. As a result, these integrated methods are on the forefront of the transparent managerial system and optimal resource allocation, as well as improving forecasting accuracy. This means that company executives are provided with reliable information for making more reasonable operational and strategic managerial decisions.

It is essential to emphasise that the application of ABC/XYZ-analysis is not confined to inly pharmaceutical area. Thus, commercial organisations can adapt this method to highlight the most important positions with the highest revenue contribution rate and to take into account demand predictability at the same time. As for manufacturing plants, prioritisation of raw materials and components contributes to the reduction of equipment downtime and more accurate production planning. The universality of this method lies in the analysis of such basic economic indicators like inventory price and its demand, so it is applicable particularly in any realm. Moreover, the integration of ABC/XYZ-analysis does not require state-of-the-art technological equipment, as the reports can be formed from the data available on existing software of the enterprise. It significantly reduces implementation costs and ensures the rapid integration of the method into the existing managerial accounting system, enhancing its analytical value.

REFERENCES

1. Venkatesh P., Sowmiya P. (2024). ABC-XYZ Classification and Forecasting for Inventory Optimization, *International Journal of Research Publication and Reviews* Vol 5, no 12, pp 5348-5357. Available at: https://www.researchgate.net/publication/388161710_ABC-XYZ_Classification_and_Forecasting_for_Inventory_Optimization
2. Mihaela S., Badicu G. (2014). Adoptarea deciziilor manageriale privind optimizarea stocurilor și eficiența utilizării acestora. *Soluții și oportunități în dezvoltarea durabilă a profesiei contabile: conf. șt. intern.* (pp.161-164). https://ibn.idsi.md/sites/default/files/imag_file/161-164_31.pdf
3. Suryaputri Z., Nurcahyo R. (2022) Integration of ABC-XYZ Analysis in Inventory Management Optimization: A Case Study in the Health Industry. *Proceedings of the International Conference on Industrial Engineering and Operations Management* (pp. 351-361). https://www.researchgate.net/publication/373154338_Integration_of_ABC-XYZ_Analysis_in_Inventory_Management_Optimization_A_Case_Study_in_the_Health_Industry_2
4. Макаренко И.В. (2014). ABC-XYZ как инструмент оптимизации производственных запасов в организации. *Труды БГТУ. Серия 5: Экономика и управление*, №7, С.178-181 <https://elibrary.ru/bitstream/123456789/12253/1/47.pdf>
5. Соколова А.П., Морозов Д.С., Есеккуева А.А. (2022). ABC-XYZ как аналитический инструмент обоснования управленческих решений. *Вестник Академии знаний №50* (С.307-312). <https://cyberleninka.ru/article/n/abc-xyz-kak-analiticheskiy-instrument-obosnovaniya-upravlencheskih-resheniy/viewer>

Coordonator științific: GRABAROVSKI Ludmila, dr., conf. univ.,
Academia de Studii Economice din Moldova,
Republica Moldova, Chișinău, str. Bănulescu-Bodoni 61, www.ase.md
Telefon: +373 69 16 16 97
e-mail: grabarovski.ludmila@ase.md