Article

Economic Analysis of Production in The Economic Entities

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Abstract: The article observes the possibilities of rational use of working capital through the proper organization of production in economic entities. The theoretical and practical aspects of determining the working capital that can be saved by determining the optimal volume of product production are highlighted. There are theoretically considered the problems of increasing the efficiency of working capital by attracting free working capital to re-circulation. Therefore, this article discusses the procedure for determining the optimal production volume and practical aspects of determining the amount of working capital that can be saved by establishing the optimal production volume.

Keywords optimal volume of ptoduction , working capitals, to reduce the remains of products

1. Introduction

As a result of our research on analyzing production volumes, we have substantiated the appropriateness of expressing the production volume using indicators such as "minimum volume," "optimal volume," and "maximum volume" (Baxtiyor Qlichev, & Sardor Xoldorov, (2024)). The optimal volume production is the production volume specified in the production program or business plan for each year. When developing a business plan for each upcoming year, it is important for enterprises to determine the production volume based on the possibilities of selling the products. Enterprises are recommended to produce only the volume of products that are either guaranteed to be sold or likely to be sold, and this volume is referred to as the optimal volume.

Why is it important to correctly determine the optimal volume? The main issue in analytical work related to production and sales volumes is preventing the accumulation of finished product inventory. In modern business terminology, this situation is referre d to as a "Overstock warehouse" which not only implies excess finished product inventory but also, more importantly, indicates a slowdown or complete halt in the circulation of funds directed towards production (Pardayevich, K. B. (2024)). Additionally, initially produced finished products may become outdated and lose their value, making it even more difficult to sell them.

Therefore, the goal of this research is to determine the optimal production volume and, as a result, calculate the amount of working capital that can be freed up from circulation. The foundation of our ongoing research is the determination of a production volume aimed at minimizing products remainders through analytical work in all the areas mentioned above, achieving effective use of economic resources involved in production, and accelerating the circulation of funds (Pardayevich, Q. B. (2024)).

2. Materials and Methods

Literature Review

A lot of research has been done to produce the optimal size product. In these studies, the issues of determining the optimal volumes of product production in enterprises under the influence of various factors were analyzed. The economic-mathematical model developed by V.A. Kucher (Kucher V.A (2005)) describes the issues of determining the optimal production volume of the product based on the price of the product, production

potential and the operating cycle of the product. O. Yu. In the model proposed by Sergeeva and G.R. Guzairova (Sergeeva Olesya Yuryevna, & Guzairova Guzel Rinatovna, (2014)), they suggested determining the optimal volume of product production based on the volume of product sales in the short and long term.

The theoretical and practical aspects of determining the volume of production through optimal, minimum and maximum volumes and economic analysis are also reflected in our research (Pardayevich, K. B. (2023)).

Methodology of the research

The research used the descriptive analytical method, which is based on describing the phenomenon accurately quantitatively or qualitatively, and aims to collect sufficient data on the social phenomenon and then study and analyze it and reach conclusions and recommendations to develop and improve reality.

Through observation, the indicators of expenses, income and profit related to the activities of the enterprise are studied and their continuity is determined.

In the research work, the data of Ohangaroncement JSC, the leading enterprise in the field of cement production in the Republic of Uzbekistan, was used.

Methods such as quantitative and qualitative, cause and effect, statistical and economic analysis, data grouping, logical analysis, comparative analysis, small numbers and index were used in the research process.

3. Results

Table 1 provides data on the products manufactured by "Ohangaroncement" JSC during the years 2018-2023, which have been designated as the research object.

Table 1. Analysis of production by product types at "Ohangaroncement" JSC during 2018-2023

№	Product types	Measurment	Years					
			2018	**2019**	**2020**	**2021**	**2022**	**2023**
1.	Clinker	tons	464517	453126	566475	399725,4	806360	814812
2.	Cement	tons	1675482	1603970	1620669	1332648	1671857	1936944
3.	Bricks	tons	1287,484	1159,869	954,0	1026,792	680,180	734,7
4.	Concrete solution	$м^3$	38985	28970,5	26770,4	7091,15	5002,8	8154,7

Based on the data from Table 1, it can be observed that during 2018 -2021, the production dynamics of clinker, cement, bricks, and concrete at "Ohangaroncement" JSC experienced relative instability. Specifically, in 2019, production of all the mentioned product types decreased compared to 2018, while in 2020, more products were produced across the main categories compared to 2019. The sharp decline in production volumes in 2021 compared to 2020 can likely be attributed to the COVID-19 pandemic. Although "Ohangaroncement" JSC achieved a growing trend in production volumes across all product categories in 2022-2023, a closer look at the product mix reveals a sharp decline in the share of fire-resistant bricks and concrete products compared to previous years.

When determining the optimal production volume, calculations are made not only based on the production volume but also on the sales volume of the products. Additionally, when evaluating the operational efficiency of economic entities, it is essential to aggregate data on product sales along with the production volume (see Table 2).

Table 2. Analysis of sales by product types at "Ohangaroncement" JSC during 2018-2023

№	Product types	Measurment	Years					
			2018	**2019**	**2020**	**2021**	**2022**	**2023**
1.	Clinker	tons	434718	443624	558670	372845	765468	784110
2.	Cement	tons	1577451	1591265	1616548	1329652	1639594	1892685

| 3. | Bricks | tons | 1198,2 | 1146,4 | 932,4 | 987,6 | 647,2 | 678,7 |
| 4. | Concrete solution | м³ | 36471,4 | 24548,1 | 14788,2 | 6811,2 | 4879,1 | 7645,1 |

Based on the data from Table 2, we can conclude that the sales volume at "Ohangaroncement" JSC during 2018-2023 was as unstable as the production volume. Specifically, we can observe that the COVID-19 pandemic negatively impacted not only the production volume but also the sales volume at "Ohangaroncement" JSC.

The difference between the production volume and sales volume results in the accumulation of products remainders within the company (Qlichev Baxtiyor Pardayevich, (2023)). In Figure 1 illustrate the changes in production and sales of cement at "Ohangaroncement" JSC during 2018-2023.
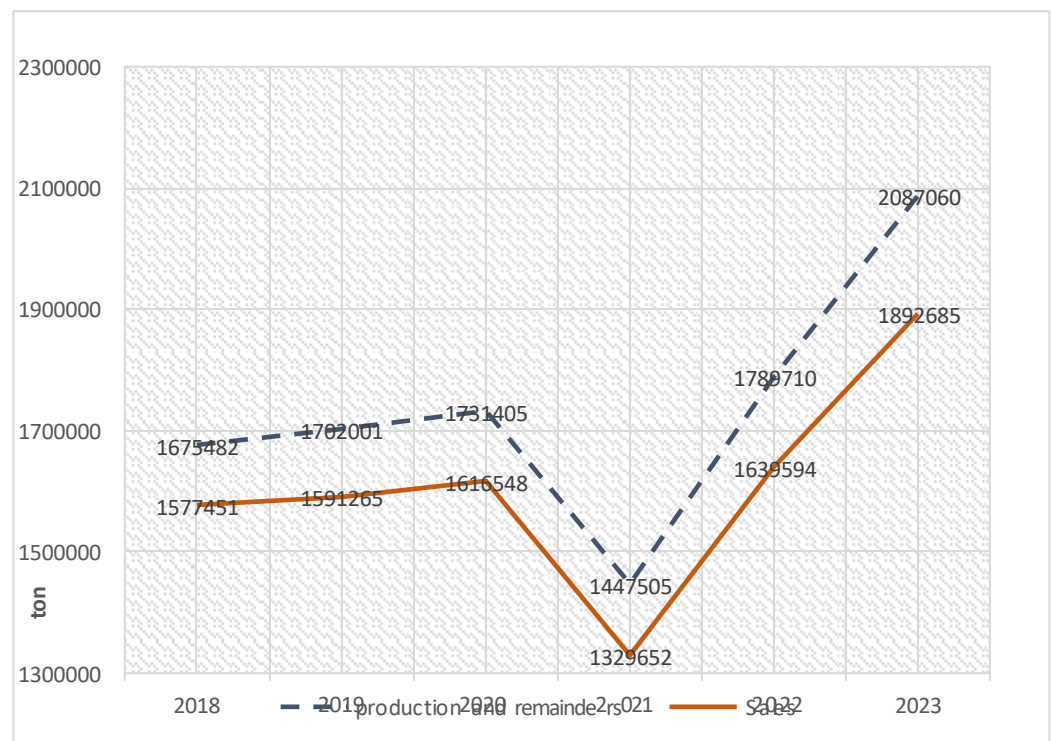

Figure 1. Analysis of changes in production and sales of cement products at "Ohangaroncement" JSC during 2017-2022

From Figure 1, it is evident that the inventory of cement products showed variable changes over the years. In 2018 and 2019, the finished product inventory was relatively lower, whereas in 2020 and 2021, it was higher. The decline in both production and sales volumes in 2021 can be linked to the impact of the COVID-19 pandemic, as mentioned earlier.

In the years following the pandemic, although there was a stable increase in both production and sales volumes, there was also a noticeable increase in the finished product inventory.

According to Table 3, in the initial years of the period under study, the finished product inventory of cement was about 6-7% of the produced volume. In 2019-2022, this percentage increased to 8-9%, and in 2023, it reached the highest level of 10.1%.

Table 3. Changes in finished product inventory of cement products at "Ohangaroncement" JSC during 2018-2023

№	Indicators	Unit of Measurement	Йиллар					
			2018	2019	2020	2021	2022	2023

1.	Production	Tons.	1675482	1603970	1620669	1332648	1671857	1936944
2.	Sales	Tons.	1577451	1591265	1616548	1329652	1639594	1892685
3.	Finished product inventory	Tons.	98031	110736	114857	117853	150116	194375
4.	Share relative to production volume	%	5,8	6,9	7,1	8,8	9	10,1

At "Ohangaroncement" JSC, the accumulation of finished product inventory from 2018 to 2023 reflects a slowdown or complete halt in the circulation of company funds within the cost structure. Additionally, stagnant finished products may become outdated in terms of technical and quality parameters, leading to difficulties in selling these products (Klichev Bakhtiyor Pardayevich. (2022)).

Therefore, we propose that the optimal production volume for economic entities be determined based on minimizing the difference between production and sales volumes.

Based on this proposal, the optimal production volume is calculated using the following formula:

$Vopt. = V_{\text{см}} * K_{\text{тм}}$

here:

$Vopt.$ – Optimal volume of production;

$V_{\text{см}}$ – Products sold in the most recent period;

$K_{\text{тм}}$ – Recommended remains of products coefficient.

Given that, like all manufacturing enterprises, "Ohangaroncement" JSC operates in a continuous production process and therefore always maintains a certain level of finished product inventory, the formula for calculating the optimal production volume can be adjusted as follows:

$Vopt. = V_{\text{см}} * K_{\text{тм}}$ **- R**

In this formula:

R- remains of products

Based on this proposal, achieving optimal production and sales volumes would allow for additional capital to be attracted to turnover compared to the previous period. This additional capital can be determined as follows:

$$Soqj = \sum_{i=1}^{n} (Vj_i - Vopt_i) * P_i + \cdots + \sum_{i=1}^{n} (Vj_n - Vopt_n) * P_n ;$$

$Soqj$ – the additional capital that can be attracted to turnover or the freed-up funds compared to the previous period;

Vj – the volume of products produced in the previous period;

P – the own turnover funds allocated for producing one unit of product in the current period;

i – the time unit (e.g., month, day, hour);

n – the number of time units in the current period.

To perform the calculations based on the proposed formulas, we will use the practical data from the company. Specifically, according to **Table 4**, the minimum difference between production and sales volumes is approximately 6%, so we set the finished product inventory ratio ($K_{\text{тм}}$) to 1,06.

To determine the amount that can be attracted to turnover in the first quarter of 2024 by applying this proposal, we will examine the volume of products produced and sold in the last quarter of 2023 (refer to **Table 4**).

By applying these steps, you will calculate the amount of additional capital that can be mobilized for turnover in the first quarter of 2024 based on the data from the last quarter of 2023.

Table 4. Changes in cement production and sales volumes at "Ohangaroncement" JSC by quarters in 2023

№	Indicators	Unit of measurment	Total	Quarters			
				1	2	3	4
1.	Finished product inventory per quarter	Tons.	x	150116	167587	171898	185805
2.	Production volume	Tons.	1936944	462158	537563	487511	449712
3.	Sales volume	Tons.	1892685	444687	533252	473604	441142
4.	Finished product inventory at the end of the quarter	Tons.	x	167587	171898	185805	194375

Using the data from Table 4, we will determine the optimal production volume for the first quarter of 2024.

$Vopt. = V_{см} * K_{тм} - R$ = 444687 *1,06 - 194375= 276993

According to the financial report data provided by "Ohangaroncement" JSC for 2023, the company's working capitals (Own capitals + Long-Term Liabilities – Long-Term Assets) amounted to 589,401,413,000 UZS (166,654,010,900 + 33,620,252,700 – 141,334,122,300).

Based on the data from Table 8, we determine that the own turnover funds per ton of cement and clinker produced in 2023 amount to 214,190 UZS (589,401,413,000 / (1,936,944 + 814,812)).

4. **Discussion**

The analysis of production and sales data from "Ohangaroncement" JSC between 2018 and 2023 provides valuable insights into the relationship between production volumes, sales performance, and working capital efficiency. The study reveals that fluctuations in production and sales volumes significantly impacted the company's operational efficiency, particularly in the context of working capital utilization.

One of the key findings of this study is the identification of the optimal production volume as a critical factor for minimizing finished product inventory and enhancing the circulation of funds. The data shows that during the COVID-19 pandemic, both production and sales volumes experienced a substantial decline, leading to increased inventory levels. This situation not only tied up working capital but also raised the risk of product obsolescence, thereby affecting the company's profitability.

Post-pandemic recovery saw an uptick in both production and sales volumes; however, the accumulation of finished product inventory remained a concern. This indicates that while demand rebounded, production planning did not fully align with sales forecasts, resulting in excess inventory. The study highlights that maintaining inventory levels around 6-7% of production volume is optimal, whereas levels exceeding 9-10% indicate inefficiencies.

The proposed model for determining the optimal production volume, which considers sales volume and recommended inventory levels, proves effective in optimizing working capital. By applying this model, "Ohangaroncement" JSC could potentially reduce inventory levels by 4%, thus freeing up approximately 37 billion UZS for turnover. This improvement in capital efficiency can significantly reduce the company's reliance on external financing, lower interest expenses, and enhance overall financial stability.

Furthermore, the research emphasizes the importance of continuous monitoring and adjustment of production plans based on real-time sales data and market conditions. Enterprises should adopt dynamic production planning strategies that are responsive to fluctuations in demand to avoid overproduction and underutilization of resources.

In conclusion, the findings underscore the critical role of optimal production planning in improving working capital efficiency and financial performance. Future research should explore the application of advanced predictive analytics and machine learning models to enhance the accuracy of sales forecasts and production planning, thereby further optimizing resource utilization and financial outcomes in manufacturing enterprises.

5. Conclusion

Therefore, the additional capital that can be attracted to turnover as a result of achieving the optimal production volume in the first quarter of 2023 is calculated as follows:

$Soqj$ = (449736 − 276993) * 214190 = 172743 * 214190 = 36 999 823 170.

Based on this proposal, by achieving the optimal production volume in the first quarter of 2023 at "Ohangaroncement" JSC, it is possible to reduce the average finished product inventory by approximately 4%, thereby accelerating the turnover of finished products and attracting an additional 37 billion UZS to turnover.

By correctly determining the optimal production volume according to the recommended model and applying it in practice, it is possible to effectively control the balance of finished products and rationally use working capital at enterprises. In future studies on the economic analysis of enterprise activities, it is advisable to conduct more in-depth research on the effective use of working capital. Because if enterprises do not use working capital effectively to ensure business continuity, the need to attract additional funds for turnover will increase, and this need will lead to an increase in the demand for bank loans. In the economy of societies which dominated by market relations, the increase in the demand for loans leads to an increase in average interest rates on bank loans.

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