

## STUDYING THE PROFITABILITY OF THE MINING FARM'S OPERATIONS\*

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### Abstract

**Subject.** The article examines the profitability of the mining farm.

**Objectives.** I determine what aspects the mining farm's profitability should be analyzed, and articulate my own technique for analyzing, untapping the room for the profitability growth on the analyzable mining farm.

**Methods.** To make my suggestions reasonable, reliable and substantiate them, I use the comprehensive approach to studying the profitability of the mining farm, general and special methods of research, such as the retrospective, systems and functional-structural analysis, observation, classification, instrumental techniques for grouping, sampling, comparison and generalization, factor analysis.

**Results.** The study is the first to present the structural-logic model of the factor system of profitability of the mining farm. I assessed factors that influenced the profitability, found bottle necks and aspects to focus on in order to improve the performance of the mining farm.

**Conclusions and Relevance.** Business entities that are residents at the Belarus Part of High Technology and have mining farms can use the proposed technique, which are of applied nature.

### JEL classification:

cryptocurrency, mining,  
profitability, mining farm

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Decree of the President of the Republic of Belarus, On the Development of the Digital Economy<sup>1</sup> (hereinafter referred to as Decree No. 8) came into effect on March 28, 2018 and gave a strong impetus to the development of residents at the Park of High Technology. Almost 50 percent of them acquired the status in 2018. The regulatory document seriously made Belarus more lucrative for investors and contributed to the digitalization of the Belarussian economy. In the Russian Federation, the national government drafted the federal law, *On Digital Financial Assets*<sup>2</sup>. The digital economy

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<sup>1</sup> О развитии цифровой экономики: Декрет Президента Республики Беларусь от 21.12.2017 № 8. URL: [http://president.gov.by/ru/official\\_documents\\_ru/view/dekret-8-ot-21-dekabrja-2017-g-17716/](http://president.gov.by/ru/official_documents_ru/view/dekret-8-ot-21-dekabrja-2017-g-17716/)

<sup>2</sup> О цифровых финансовых активах: проект федерального закона Российской Федерации.  
URL: [https://www.minfin.ru/ru/document/?id\\_4=121810](https://www.minfin.ru/ru/document/?id_4=121810)

brings innovation, thriving by implementing advanced information technology. Decree No. 8 introduced new concepts into the business process, such as cryptocurrency, blockchain, mining, token, bitcoin, etc.

There is no country across the entire post-Soviet area, where the governmental issue of bank-notes could be coupled with the private one. Decree No. 8 laid the basis for doing so, albeit some limitations.

It was the first attempt to develop a technique for analyzing the profitability of a mining farm.

Cryptocurrency is an internal payment unit of any public blockchain, i.e. blockchain based on P-o-W or P-o-S mining. Mining is a crucial and inevitable process of the public blockchain, where cryptocurrency stimulates miners. Furthermore, cryptocurrency serves for transaction fees. It can be sold (exchanged for fiat money).

Therefore, cryptocurrency works as:

- a payment means (unit of value) in the blockchain;
- an incentive for miners;
- a means of exchange for the value (transactions);
- storage of the value.

Cryptocurrency is created first and then distributed among its holders. As per Decree No. 8, holders are agents of the civil law, both individuals and special business entities, which free-hold a digital mark (token) or hold it under other property right. Tokens, which are functional equivalent of cash money issue, are not given as a result of a purchase or any other property deal, but rather a solution to mathematical risks, compensation for the verification of blockchain operations. Therefore, mining is a process of acquiring new cryptocurrency units, with profit being its main purpose [1–18].

I can hardly refer to any sources of business analysis literature, which would focus on aspects I analyze herein. Based on the above concepts, I would measure the cost effectiveness of a mining farm through the profitability:

$$P_M = \frac{Profit}{C(M)} \cdot 100 \quad ,$$

where  $P_M$  is the profitability of mining;

*Profit* is profit from the sale of cryptocurrency;

$C(M)$  stands for costs incurred for mining.

The reduced cost can be expressed as a combination of costs incurred for power supply, depreciation on equipment, repair of equipment, principal and additional salaries, taxes, budgetary and extra-budgetary charges, charges to local authorities.

Hence, the profitability of mining can be expressed as follows:

$$P_M = \frac{\text{Profit}}{M} = \frac{SP_{Crpt} - (E + D_{Eqpt} + R_{Eqpt} + S_{Prin} + S_{Add} + T)}{E + D_{Eqpt} + R_{Eqpt} + S_{Prin} + S_{Add} + T} 100,$$

where  $SP_{Crpt}$  is the selling price for cryptocurrency sold, net of taxes and payments made from revenue;

$E$  means power supply costs;

$D_{Eqpt}$  means the depreciation on equipment;

$R_{Eqpt}$  means costs for the repair of equipment;

$S_{Prin}$  means the principal salary;

$S_{Add}$  means the additional salary;

$T$  means taxes, budgetary and extra-budgetary charges, charges to local authorities.

Having this in mind, I devised the first structural-logical model of the factor-based profitability of the mining farm's operations (*Fig. 1*).

So, we get a multiple type of the factor-based system. To assess the impact of the factors, I use the chain substitution method. *Table 1* shows a range of the indicators.

The impact of the factors is assessed as follows:

$$Profit^I - Profit_0 = \Delta Profit_{SP_{Crpt}};$$

$$Profit^{II} - Profit^I = \Delta Profit_E;$$

$$Profit^{III} - Profit^{II} = \Delta Profit_{D_{Eqpt}};$$

$$Profit^{IV} - Profit^{III} = \Delta Profit_{R_{Eqpt}};$$

$$Profit^V - Profit^{IV} = \Delta Profit_{S_{Prin}};$$

$$Profit^{VI} - Profit^V = \Delta Profit_{S_{Add}};$$

$$Profit_1 - Profit^{VI} = \Delta Profit_T;$$

$$Profit_1 - Profit_0 = \Delta Profit.$$

*Table 2* contain available data on the analyzable mining farm. As the data show, RUB 16.8 thousand was saved for the reporting period, that is 2.6 percent of the target amount. Costs for the repair of equipment increased by RUB 12 thousand, or 30 percent. This is due to the fact that the expensive equipment broke down unexpectedly, thereby hampering the mining process for some time. Electricity was not consumed, so saving RUB 22 thousand, or 4.23 percent of the target amount. There were some vacant positions on the staff for some period of time, thus economizing RUB 6 thousand in salaries, that is 12.5 percent of the budget.

The selling price for cryptocurrency sold (provided general costs and expenditures for distribution are directly posted to Account 90-5 *Income and Expenses for Current Operations – Administrative Expenses* and Account 90-6 *Income and Expenses for Current Operations – Selling Expenses* respectively) was planned to be about RUB 740.6 thousand, while the factual selling price turned to be RUB 784 thousand.

*Table 3* presents indices for analyzing the profitability of the mining farm. *Table 4* helps assess factors that influenced the profitability.

*Table 4* clearly illustrates the extent to which all the factors have an impact and their structure. As the assessment proves, a growth of the selling price for the cryptocurrency sold by RUB 43.4 thousand was proved to have the greatest effect on the profitability of the mining farm, which resulted in 6.74-percent growth in profitability, or 67.4 percent of changes in the resultant index. As electricity bills reduced by RUB 22 thousand, the profitability grew by 4.36 percent, or 43.6 percent of total changes in the resultant index. In the mean time, as the repair of equipment now cost by RUB 12 thousand more, the profitability dropped by 2.44 percent, or 24.4 percent of changes in the resultant index. The preventative maintenance of the functioning equipment should be scheduled appropriately.

I herein presented the technique for studying the profitability of the mining farm and devised the structural-logic model of the factor-based system of the mining farm's profitability.

The use of the technique will help businesses residing in the Belarusian Part of High Technology and having mining farms promptly locate bottlenecks in the mining process and make appropriate administrative decisions, if needed. The technique will be helpful for respective business entities of the Russian Federation and other EEU countries to adopt corresponding regulations and put them into practice.

**Table 1**  
**Levels of indicators**

<b>Profitability Level</b>	<b><math>SP_{Crpt}</math></b>	<b><math>E</math></b>	<b><math>D_{Eqpt}</math></b>	<b><math>R_{Eqpt}</math></b>	<b><math>S_{Prin}</math></b>	<b><math>S_{Add}</math></b>	<b><math>T</math></b>
Plan (baseline) $P_0$	Plan	Plan	Plan	Plan	Plan	Plan	Plan
Substitution 1 $P^I$	Fact	Plan	Plan	Plan	Plan	Plan	Plan
Substitution 2 $P^{II}$	Fact	Fact	Plan	Plan	Plan	Plan	Plan
Substitution 3 $P^{III}$	Fact	Fact	Fact	Plan	Plan	Plan	Plan
Substitution 4 $P^{IV}$	Fact	Fact	Fact	Fact	Plan	Plan	Plan
Substitution 5 $P^V$	Fact	Fact	Fact	Fact	Fact	Plan	Plan
Substitution 6 $P^{VI}$	Fact	Fact	Fact	Fact	Fact	Fact	Plan
Fact $P_1$	Fact	Fact	Fact	Fact	Fact	Fact	Fact

Note. “Fact” is the factual indicator; “Plan” is the planned indicator.

Source: Authoring

**Table 2**  
**Data to analyze the cost-effectiveness of mining, thousand RUB**

<b>Cost Item</b>	<b>Plan</b>	<b>Fact</b>	<b>Variance</b>
Electricity costs	520	498	-22
Depreciation on equipment	24	24	-
Equipment repair costs	40	52	12
Principal salary	48	42	-6
Additional salary	1	1	-1
Taxes, budgetary and extra-budgetary charges, charges to local authorities	11	10.2	-0.8
<b>Total</b>	<b>644</b>	<b>627.2</b>	<b>-16.8</b>

Source: Authoring

**Table 3**  
**Indicators for an analysis of the mining farm profitability**

<b>Indicator</b>	<b>Computation</b>	<b>Profitability, %</b>
Plan (baseline)	$\frac{740.6 - 644}{644} \cdot 100$	15
As planned given the factual selling price for cryptocurrency sold	$\frac{784 - 644}{644} \cdot 100$	21.74
As planned given the factual selling price of cryptocurrency sold and electricity costs	$\frac{784 - (498 + 24 + 40 + 48 + 1 + 11)}{498 + 24 + 40 + 48 + 1 + 11} \cdot 100$	26.1
As planned given the factual selling price for cryptocurrency sold, electricity costs and depreciation on equipment	$\frac{784 - (498 + 24 + 40 + 48 + 1 + 11)}{498 + 24 + 40 + 48 + 1 + 11} \cdot 100$	26.1
As planned given the factual selling price for cryptocurrency sold, electricity costs, depreciation and repair of equipment	$\frac{784 - (498 + 24 + 52 + 48 + 1 + 11)}{498 + 24 + 52 + 48 + 1 + 11} \cdot 100$	23.66
As planned given the factual selling price for cryptocurrency sold, electricity costs, depreciation and repair of equipment, and the principal salary	$\frac{784 - (498 + 24 + 52 + 42 + 1 + 11)}{498 + 24 + 52 + 42 + 1 + 11} \cdot 100$	24.84
As planned given the factual selling price for cryptocurrency sold, electricity costs, depreciation and repair of equipment, the principal and additional salary	$\frac{784 - (498 + 24 + 52 + 42 + 1 + 11)}{498 + 24 + 52 + 42 + 1 + 11} \cdot 100$	24.84
Fact	$\frac{784 - 627.2}{627} \cdot 100$	25

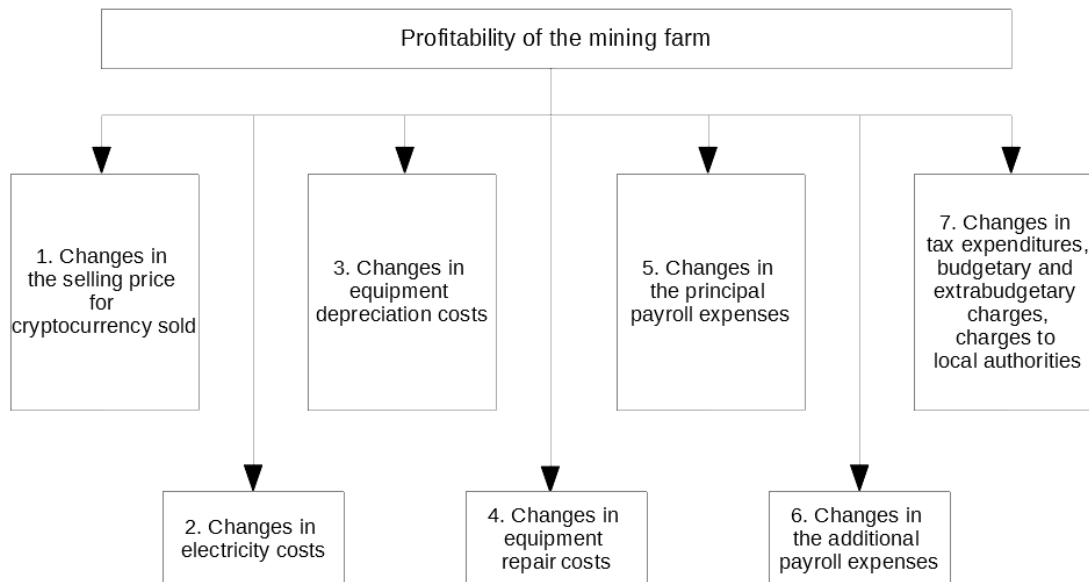
Source: Authoring

**Table 4**  
**Calculation of factors affecting the changes in mining farm profitability**

Factor	Impact Assessment	Impact Assessment, %	Structure of factors, %
Changes in the selling price for cryptocurrency sold	21.74 – 15	6.74	67.4
Changes in electricity costs	26.1 – 21.74	4.36	43.6
Changes in equipment depreciation costs	26.1 – 26.1	0	–
Changes in equipment repair costs	23.66 – 26.1	–2.44	–24.4
Changes in the principal payroll costs	24.84 – 23.66	1.18	11.8
Changes in the additional salary costs	24.84 – 24.84	0	–
Changes in tax expenditures, budgetary and extrabudgetary charges, charges to local authorities	25 – 24.84	0.16	1.6
<b>Total</b>	<b>25 – 15</b>	<b>10</b>	<b>100</b>

Source: Authoring

**Figure 1**  
**Structural and logical model of the factor system of the mining farm profitability**



Source: Authoring

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### **Conflict-of-interest notification**

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