Decision Support System for Selecting the Best Cryptocurrency Mining Machine Using the Multifactor Evaluation Process Method

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Abstract. Cryptocurrency mining is a process carried out using a specialised computer network in order to obtain new crypto assets. The cryptocurrency mining business in today's digital era is increasingly in demand by netizens. Many netizens run cryptocurrency mining businesses to generate new cryptocurrency assets that can be traded on the cryptocurrency market to earn huge profits. In doing cryptocurrency mining itself, it is necessary to be careful in choosing the cryptocurrency mining machine used to get the maximum profit. In this study, researchers proposed the Multifactor Evaluation Process as a decision support system method used to simplify the process of selecting the best cryptocurrency mining machine. The results of this study show that the best cryptocurrency mining machine that is most recommended to use is Cheetah Miner F5I (0.2120), followed by the alternatives iBeLink DSM7T Miner (0.2072), Bitfury RD4 (0.2016), Aladdin T1 16T (0.2016), and Obelisk SC1 Dual (0.1800).

Keywords: Best Cryptocurrency Mining Machine, Multifactor Evaluation Process, Decision Support System

1 Introduction

Cryptocurrency mining is the process of using a specialised computer network to acquire new crypto assets [1]. The cryptocurrency mining business in today's digital era is increasingly in demand by netizens. Many netizens run a cryptocurrency mining business to generate new cryptocurrency assets that can be traded on the cryptocurrency market to earn huge profits [2].

In doing cryptocurrency mining itself, it is necessary to be careful in choosing the best cryptocurrency mining machine that will be used to get maximum profits. Because mistakes in choosing a cryptocurrency mining machine can have a negative impact that causes cryptocurrency miners to experience huge losses [2]. Therefore, a decision support system is needed in selecting the best cryptocurrency mining machine.

A decision support system is a computer-based system that is able to help decision makers to solve semi-structured and unstructured problems using data that has been obtained previously through the process of collecting research data and certain decision support methods [3]. In previous research, decision support systems have been widely used to support decision makers in solving various complex problems [4–9]. In a decision support system, there are many methods that can be used, including the Multifactor Evaluation Process [10], VIKOR [11], AHP [12], MABAC [13], MOORA [14], Dll.

In this study, researchers proposed the Multifactor Evaluation Process as a decision support system method used to simplify the process of selecting the best cryptocurrency mining machine. Multifactor Evaluation Process is a quantitative method that uses a subjective weighting system in making decisions [15]. The reason

researchers chose the proposed method is because the Multifactor Evaluation Process can support the decision-making process subjectively and intuitively by considering various factors that have a significant effect on all alternatives to be selected [16,17]. The use of the Multifactor Evaluation Process in this study is also reinforced by the results of several previous studies which concluded that the method can accurately solve decision-making problems [18–20].

2   Research Method

This research uses Multi Factor Evaluation Process as a decision support method to solve the problem of selecting the best cryptocurrency mining machine. The data collection technique in this study was carried out by a literature study process on several related studies that had been published by previous researchers. The calculation stages using the Multi Factor Evaluation Process method in the process of selecting the best cryptocurrency mining machine, namely by determining the Factor Weight Value whose overall weight value must be equal to 1 (one). Then the calculation process of the Evaluation Weight Value is carried out and finally the calculation process of the Total Evaluation Weight is carried out to obtain alternative ranking results. In the ranking results in the Multi Factor Evaluation Process method, the alternative with the highest value is the alternative chosen as the best cryptocurrency mining machine. The dataset used in this study consists of 4 (four) criteria (Hashrate, Power Consumption, Electricity Costs, and Coin Count) and 5 (five) alternatives (Bitfury RD4, Cheetah Miner F5I, iBeLink DSM7T Miner, Obelisk SC1 Dual, and Aladdin T1 16T). The picture of the research stages used in this study can be seen in Figure 1 below:
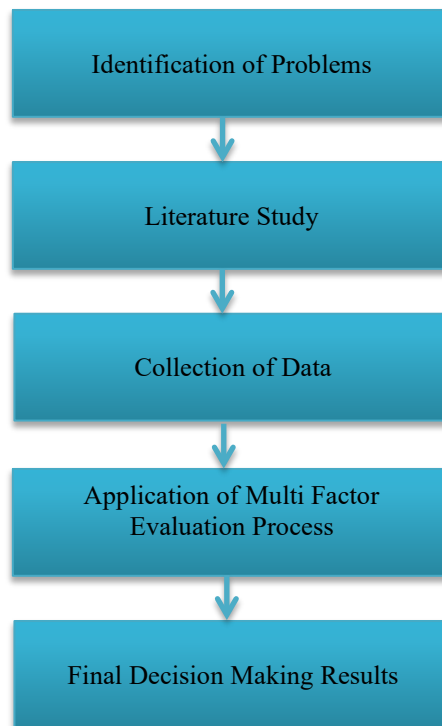

Figure 1. Research Stages

2.1 Cryptocurrency Mining Machine

Cryptocurrency mining machines are tools used by miners to generate new crypto coins that can be traded on the cryptocurrency market [2].

2.2 Multifactor Evaluation Process

Multifactor Evaluation Process is a decision-making method that is appropriate when individuals, groups or organisations are faced with multiple factors in determining the outcome of decision-making [18]. The weight of the factors in the Multifactor Evaluation Process is determined subjectively with the total weight ranging from 0

to 1 [19]. Then on all alternatives, all influential factors are evaluated. The steps taken in the Multifactor Evaluation Process method for the decision-making process, namely [21]:

a. Determine the Weight Value of Factors whose overall weight value must be equal to 1 (one).
b. Calculating the Evaluation Weight Value, the process of calculating the Evaluation Weight Value is carried out using the formula below:

NBE = NBF * NEF $\hspace{4cm}$ (1)

Information:
1. NBF is the Weighted Factor Value
2. NEF is the Factor Evaluation Value

c. Calculating the Total Evaluation Weight, the process of calculating the Total Evaluation Weight is carried out by the formula below:

TBE = ∑ NBE $\hspace{4cm}$ (2)

Information:
1. TBE is Total Evaluation Weight

3 Results and Discussion
3.1 Results

3.1.1 Factor Weight Value

In the process of selecting the best cryptocurrency mining machine using the Multi Factor Evaluation Process method, it is necessary to determine the weight of factors on all criteria and the weight of each alternative as a parameter for calculations carried out so that the best cryptocurrency mining machine alternative can be produced.

A. Best Cryptocurrency Mining Machine Selection Criteria and Factor Weights

Table 1. Best Cryptocurrency Mining Machine Selection Criteria and Factor Weights

Code	Criteria	Weigth
C01	Hashrate	0,28
C02	Power Consumption	0,26
C03	Electricity Costs	0,24
C04	Coin Count	0,22
Total Value Weight		1

Table 2. Best Cryptocurrency Mining Machine Selection Subcriteria and Factor Weights

Code	Criteria	Subriteria	Weigth
C01	Hashrate	0 –1000	0,16
		1001 - 2000	0,18
		2001 – 3000	0,20
		3001 – 4000	0,22
		≥4000	0,24
C02	Power Consumption	0 –1000	0,16
		1001 - 2000	0,18
		2001 – 3000	0,20
		3001 – 4000	0,22
		≥4000	0,24
C03	Electricity Costs	0 – 0.2	0,22
		0.3 – 0.4	0,24
		0.5 – 0.7	0,26
		0.8 – 1	0,28
C04	Coin Count	0 – 10	0,16
		11 – 20	0,18
		21 – 30	0,20
		31 – 40	0,22
		41 - 50	0,24

B. Alternative Weighting of Best Cryptocurrency Mining Machine Selection

Table 3. Initial Data of Best Cryptocurrency Mining Machine Alternatives

No	Alternative	Criteria			
		C01 (TH/s)	C02 (W)	C03 (IDR/kWh)	C04 (C)
1	Bitfury RD4	25	1720	0.1	32
2	Cheetah Miner F5I	60	3480	0.1	32
3	iBeLink DSM7T Miner	6000	2100	0.1	8
4	Obelisk SC1 Dual	1100	900	0.1	5
5	Aladdin T1 16T	16	1400	0.1	32

Table 4. Alternative Weights Best Cryptocurrency Mining Machine

No	Alternative	Criteria			
		C01	C02	C03	C04
1	Bitfury RD4	0,16	0,18	0,22	0,26
2	Cheetah Miner F5I	0,16	0,22	0,22	0,26
3	iBeLink DSM7T Miner	0,24	0,20	0,22	0,16
4	Obelisk SC1 Dual	0,18	0,16	0,22	0,16
5	Aladdin T1 16T	0,16	0,18	0,22	0,26

3.1.2 Evaluation Weight Value

The calculation process of the Evaluation Weight Value is done by multiplying the weight value of each alternative with the weight value of the factors in table 1. The calculation results for the Evaluation Weight Value in this study, namely:

a. Evaluation Weight Value C01
$NBE_{Bitfury\ RD4} = 0,28 * 0,16$ $= 0,0448$
$NBE_{Cheetah\ Miner\ F5I} = 0,28 * 0,16$ $= 0,0448$
$NBE_{iBeLink\ DSM7T\ Miner} = 0,28 * 0,24$ $= 0,0672$
$NBE_{Obelisk\ SC1\ Dual} = 0,28 * 0,18$ $= 0,0504$
$NBE_{Aladdin\ T1\ 16T} = 0,28 * 0,16$ $= 0,0448$

b. Evaluation Weight Value C02
$NBE_{Bitfury\ RD4} = 0,26 * 0,18$ $= 0,0468$
$NBE_{Cheetah\ Miner\ F5I} = 0,26 * 0,22$ $= 0,0572$
$NBE_{iBeLink\ DSM7T\ Miner} = 0,26 * 0,20$ $= 0,0520$
$NBE_{Obelisk\ SC1\ Dual} = 0,26 * 0,16$ $= 0,0416$
$NBE_{Aladdin\ T1\ 16T} = 0,26 * 0,18$ $= 0,0468$

c. Evaluation Weight Value C03
$NBE_{Bitfury\ RD4} = 0,24 * 0,22$ $= 0,0528$
$NBE_{Cheetah\ Miner\ F5I} = 0,24 * 0,22$ $= 0,0528$
$NBE_{iBeLink\ DSM7T\ Miner} = 0,24 * 0,22$ $= 0,0528$
$NBE_{Obelisk\ SC1\ Dual} = 0,24 * 0,22$ $= 0,0528$
$NBE_{Aladdin\ T1\ 16T} = 0,24 * 0,22$ $= 0,0528$

d. Evaluation Weight Value C04
$NBE_{Bitfury\ RD4} = 0,22 * 0,26$ $= 0,0572$
$NBE_{Cheetah\ Miner\ F5I} = 0,22 * 0,26$ $= 0,0572$
$NBE_{iBeLink\ DSM7T\ Miner} = 0,22 * 0,16$ $= 0,0352$
$NBE_{Obelisk\ SC1\ Dual} = 0,22 * 0,16$ $= 0,0352$
$NBE_{Aladdin\ T1\ 16T} = 0,22 * 0,26$ $= 0,0572$

3.1.3 Total Evaluation Weight

The calculation process of the Total Evaluation Weight is carried out by summing up all the Evaluation Weight Values belonging to each alternative that has been obtained previously. The results of the calculation of Total Evaluation Weight for all alternatives that become candidates in the process of selecting the best cryptocurrency mining machine in this study, namely:

a. Bitfury RD4

$$\sum_{i=1}^{n} TBE_{\text{Bitfury RD4}} = 0{,}0448 + 0{,}0468 + 0{,}0528 + 0{,}0572 = 0{,}2016$$

b. Cheetah Miner F5I

$$\sum_{i=1}^{n} TBE_{\text{Cheetah Miner F5I}} = 0{,}0448 + 0{,}0572 + 0{,}0528 + 0{,}0572 = 0{,}2120$$

c. iBeLink DSM7T Miner

$$\sum_{i=1}^{n} TBE_{iBeLink\ DSM7T\ Miner} = 0{,}0672 + 0{,}0520 + 0{,}0528 + 0{,}0352 = 0{,}2072$$

d. Obelisk SC1 Dual

$$\sum_{i=1}^{n} TBE_{Obelisk\ SC1\ Dual} = 0{,}0504 + 0{,}0416 + 0{,}0528 + 0{,}0352 = 0{,}1800$$

e. Aladdin T1 16T

$$\sum_{i=1}^{n} TBE_{Aladdin\ T1\ 16T} = 0{,}0448 + 0{,}0468 + 0{,}0528 + 0{,}0572 = 0{,}2016$$

Table 5. Total Evaluation Weight

Alternative	Value
Bitfury RD4	0,2016
Cheetah Miner F5I	0,2120
iBeLink DSM7T Miner	0,2072
Obelisk SC1 Dual	0,1800
Aladdin T1 16T	0,2016

3.2 Discussion

In this research, the decision-making process for selecting the best cryptocurrency mining machine has been carried out using the calculation of the Multifactor Evaluation Process method. The decision-making process for the selection of cryptocurrency mining machines that have used the Multifactor Evaluation Process method uses a subjective factor weighting system. Then the process of determining the Evaluation Weight Value using the multiplication formula between the weight value of each alternative and the weight value of the factors shown in Table 1. Meanwhile, the process of determining the Total Evaluation Weight of each alternative is calculated by the summation formula of all the values of the Evaluation Weight Value of each alternative so that the final result is obtained for the Total Evaluation Weight as shown in Table 5. Based on the calculation results of the Multifactor Evaluation Process method, the results of alternative rankings in the selection of the best cryptocurrency mining machine are obtained as shown in the table below:

Table 6. Alternative Ranking Best Cryptocurrency Mining Machine Selection

Ranking	Alternative	Value
1	Cheetah Miner F5I	0,2120
2	iBeLink DSM7T Miner	0,2072
3	Bitfury RD4	0,2016
4	Aladdin T1 16T	0,2016
5	Obelisk SC1 Dual	0,1800

4 Conclusion

a. The Multifactor Evaluation Process method can be used as an appropriate method to support decision making in the selection of the best cryptocurrency mining machine.

b. The best cryptocurrency mining machine alternative out of 5 alternatives in this study is Cheetah Miner F5I (0.2120), followed by the alternatives iBeLink DSM7T Miner (0.2072), Bitfury RD4 (0.2016), Aladdin T1 16T (0.2016), and Obelisk SC1 Dual (0.1800).

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