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Selecting KB Villages Using the VIKOR Method: A Case Study DPPKB Labuhanbatu

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Abstract

Technological advancements have taken place in various fields. Health, education, business, and decision-making are no exception. The KB program was created in order to echo the KB program as an effort to strengthen the KKBPK program and span the birth rate. Therefore, a decision support system using the vikor method was created. The research process was carried out at DPPKB Labuhanbatu. Data collection was carried out by conducting direct interviews to the object of research, namely DPPKB Labuhanbatu. The criteria in this study are the number of pre-prosperous households, the number of family planning participants, regional criteria, the existence of family data and maps, the number of elementary school age population, the number of MKJP, the number of unmet needs, family participation in the family resilience development program, family participation in the family economic improvement empowerment program, youth participation in planning generation activities. This research uses the R&D research method and uses the waterfall method in its system development method. The final result of this study found that the selected KB village was Perbaungan village with an index of 0, second place Bandar Kumbul village with index 0.0588 where the alternative with the minimum Q value was the highest rank.

Keywords: Decision Support Systems, Vikor, KB Village.

1. INTRODUCTION

Technological progress, a defining feature of human advancement, continues to develop and reshape the world in profound ways. It serves as a critical driver of societal change, adapting to the evolving needs of individuals and communities over time [1]. The ubiquity of technology in daily life has made it an integral part of human existence, influencing how people live, work, and interact [2]. Information Technology (IT), as a key component of technological progress, has particularly demonstrated its transformative power by streamlining human tasks and enabling the efficient management of processes that were previously time-consuming or complex [3]. The impact of IT is felt across a wide range of fields, including commerce, education, healthcare, and governance, where decision-

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making has been fundamentally reimagined. As technology advances, its applications in decision-making processes have facilitated data-driven solutions, making them more precise, systematic, and scalable, whether in business strategies or scientific explorations. This intersection of IT and decision-making has not only enhanced efficiency but also expanded the scope of possibilities for innovation in tackling pressing societal challenges.

The *Keluarga Berkualitas* (KB) Village Program, initiated by the Indonesian government in 2016, represents a strategic effort to address population challenges while promoting the welfare of families. This initiative was developed to rejuvenate the family planning movement (known as KB) and strengthen the broader *Kependudukan Keluarga Berencana dan Pembangunan Keluarga* (KKBPK) program [4]. The KB Village Program aims to address critical demographic concerns such as birth control and family quality improvement by prioritizing selected villages for targeted interventions. By identifying and supporting these priority areas, the program seeks to elevate community standards of living while fostering sustainable development in related sectors, including health, education, and economic opportunities [5]. Beyond merely reducing population growth rates, the program aspires to realize the vision of small, high-quality families that contribute to the nation's prosperity and resilience [6]. Achieving these goals requires the careful identification of villages most in need of support, underscoring the importance of a well-informed and systematic selection process that aligns with the program's objectives.

In Labuhanbatu Regency, the selection of KB Villages is managed by the local Population and Family Planning Agency (DPPKB). This selection process, conducted annually, plays a critical role in monitoring and supporting family planning and population development initiatives at the grassroots level. Despite the program's importance, the current method for selecting KB Villages is fraught with challenges, primarily due to its reliance on manual, paper-based processes. Such outdated practices are not only time-consuming but also prone to data errors, inefficiencies, and disorganization. Moreover, the selection criteria, which encompass 10 key dimensions and involve 25 candidate villages, lack a robust mechanism for applying weighted importance to these criteria. This absence of systematic weighting and prioritization undermines the accuracy and fairness of the decision-making process, leading to suboptimal outcomes. As the complexity of the selection process increases with the growing number of alternatives and criteria, the limitations of manual methods become even more apparent. These inefficiencies hinder the program's ability to effectively allocate resources and achieve its intended impact.

To overcome these challenges, there is a pressing need for a technological solution that can streamline the KB Village selection process and enhance its effectiveness.

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A Decision Support System (DSS) offers a viable solution by automating the evaluation process and integrating advanced analytical methods to handle complex decision-making tasks. Such a system can address the inefficiencies of manual processes by ensuring accurate data processing, enabling the proper application of criteria weighting, and significantly reducing the time required to complete the selection process. Moreover, a DSS can provide greater transparency and consistency in decision-making, allowing policymakers to allocate resources more effectively and maximize the impact of the KB Village Program. By adopting a DSS, the government can ensure that the selection of KB Villages is aligned with program objectives, ultimately supporting the realization of a high-quality family standard across targeted communities.

Previous research highlights the critical role of precise and methodical KB Village selection in achieving the goals of the government's family planning program [7]. Several studies have explored the potential of DSS tools to facilitate this process, emphasizing their ability to streamline decision-making and improve outcomes. However, many of these studies have been limited in scope, focusing primarily on prototype development without progressing to full implementation. For example, earlier research employing various decision-making methodologies achieved promising results at the design stage but fell short of delivering a functional, deployable system. This limitation creates a significant gap in the literature and underscores the need for further research that moves beyond theoretical development to practical application. To address this gap, the proposed research aims to develop and implement a DSS for KB Village selection using the VIKOR (VIšekriterijumsko KOmpromisno Rangiranje) method. Unlike prior studies, this research seeks to complete the entire development cycle, from design to product implementation, ensuring that the DSS is not only theoretically sound but also operationally effective. By doing so, this study aims to contribute a practical solution to a pressing issue, enhancing the government's capacity to execute the KB Village Program efficiently and effectively.

2. METHODS

In this study, researchers used the Research and Development (R&D) method. The R&D Method is carried out to obtain an efficient result based on several tests that have been carried out [8]. The R&D Method is a research approach to create new products or improve existing products existing products. The product that results from this approach can be in the form of software, such as applications for data processing [9]. Figure 1 is the steps of the R&D method.

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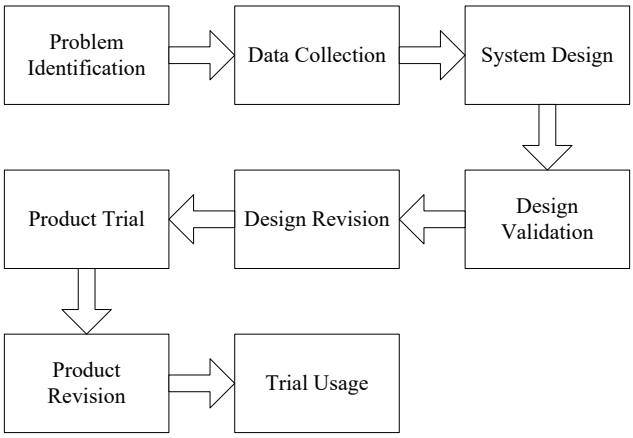

Figure 1. R&D Method

The steps in this method begin with problem identification is carried out by observing the problems that DPPKB Labuhanbatu has regarding the selection of KB villages, namely the determination of KB villages which are carried out manually. the researcher gathers data by conducting interviews to the object of research DPPKB Labuhanbatu. Furthermore, the system design stage is carried out and design validation to design revisions so that the product design is in accordance with what is needed. After completing the product design, the next step is to test the product that has been made. Then if there is a product revision, a product revision will be carried out, so that it reaches the stage of trial use of the product.

System development is carried out using a system development process known as Waterfall. The initial stage in the waterfall method is Requirements Analysis the initial stage in a system application development by determining the features, constraints and objectives of the system determined after consulting with users on the selection of KB villages, then detailed and used as system specifications[10]. the next stage System Design, namely This phase of system design allocates the software also hardware needs of the system by building the overall system architecture. Software design deals with the description and creation of sketches of the abstract system that underlies the software and its relationships [11]. after that is Implementation, The system is initially created as units, which are discrete programs that are then combined in the following phase. Each unit will be tested whether it meets the specifications needed in the selection of KB villages. Then the Integration and Testing stage, system testing is the system that is tested as complete systems to verify that they fulfill software specifications. After testing, the software can be tested to coordinate the selection of KB villages[12]. and the final stage is Operation and Maintenance In this process the system is installed and

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used for the selection of KB villages[13]. This research employs the vikor approach for decision-making. The research stages will be explained in the figure below.

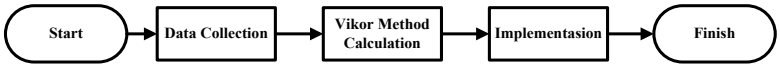

Figure 2. Research Stages

2.1. Data Collection

At this step, the researcher gathers data by conducting interviews to the object of research DPPKB Labuhanbatu for data from alternatives, criteria and weights are determined directly by DPPKB Labuhanbatu. The following is a table of alternatives

Table 1. Alternatives

No.	Alternative/Village	Alternative Code
1	Bandar Kumbul	D1
2	Tanjung Sarang Elang	D2
3	Sibargot	D3
4	Meranti	D4
5	Bandar Tinggi	D5
6	Tanjung Siram	D6
7	Gunung Selamat	D7
8	Lingga Tiga	D8
9	Kampung Dalam	D9
10	Perbaungan	D10
11	Emplasmen	D11
12	Sidorukun	D12
13	Kampung Padang	D13
14	Sei Tampang	D14
15	Tanjung Haloban	D15
16	Negeri Lama	D16
17	Sei Kasih	D17
18	Cinta Makmur	D18
19	Sei Jawi Jawi	D19
20	Pasar Tiga	D20
21	Telaga Suka	D21
22	Sei Sakat	D22
23	Sei Sanggul	D23
24	Sei Penggantungan	D24
25	Sei Lumut	D25

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2.2. Vikor Method Calculation

The Vikor method is a method that concentrates on collecting and selecting a set of alternatives, and finding a compromise solution to a conflicting problem of the criteria[14]. The basic concept of VIKOR is to determine the ranking of existing samples by looking at the utility value and regret results of each sample[15]. One benefit of the VIKOR approach is its ability to rate alternatives based on the closest to the PIS (Positive Ideal Solution) and the farthest from the NIS (Negative Ideal Solution) and the best alternative is chosen from the maximum utility group and the minimum regret group[16].

1) Normalization Matrix
Create a Normalization Matrix (N) by finding the maximum and minimum values to get the ideal solution of each criterion[17].

$$R_{ij} \frac{(f_i^*)-(f_{ij})}{(f_i^*)-(f_i)} \quad (1)$$

2) Weight Normalization
Weight Normalization is done by multiplying the weight of the criteria (W) by the normalized data value (N)[18].

$$(W_j \times R_{ij}) \quad (2)$$

3) Calculating Regret Measure (R) and Utility Measure (S)
The best alternative is selected from the maximum utility group and minimum regret group[19].

$$R_j = max\left[W_i \left(\frac{(f_i^*)-(f_{ij})}{(f_i^*)-(f_i)}\right)\right] \quad (3)$$

$$S_j = \sum_{i=1}^{n} W_i \left(\frac{(f_i^*)-(f_{ij})}{(f_i^*)-(f_i)}\right) \quad (4)$$

4) Calculating the Victor Index

$$Q_j = \left[\frac{S_j - S^-}{S^+ - S^-}\right] \times v + \left[\frac{R_j - R^-}{R^+ - R^-}\right] \times (1-v) \quad (5)$$

Where, S^- is the smallest Utility Measure, S^+ is the largest Utility Measure, R^- is the smallest Regret Measure, R^+ is the largest Regret Measure, v is the maximum weight of group utility, and (1-*v*) is the

minimum weight of individual regret. The commonly used value of v is 0.5. The value of $v = 0.5$ is intended to maximize the group of benefits and minimize the individual regret value[20].

5) Ranking
After getting the results of the vikor index, the next step is to sort the alternatives so that the ranking can be determined.

2.3. Implementation

After doing the calculation, the next stage is the implementation of the system that has been made by entering criteria and weights. After that the system will calculate automatically and produce a decision.

3. RESULTS AND DISCUSSION

3.1 Data Collection

Considering the outcomes of the data collecting that has been carried out at DPPKB Labuhanbatu, alternatives, criteria and weights are obtained. The following is an alternative table with criteria values. The weight table for the criteria for selecting KB villages using the VIKOR method is as follows.

Table 2. Criteria Weight

No.	Criteria Code	Name Criteria	Weight
1.	C1	Number of Pre-Prosperous Households	0,14
2.	C2	Number of KB participants	0,14
3.	C3	Area Criteria (choose one or more)	0,09
4.	C4	Family data and maps	0,12
5.	C5	Number of primary school-age population attending primary school	0,09
6.	C6	Number of MKJP (Metode Kontrasepsi Jangka Panjang) users	0,12
7.	C7	Number of Unmet Need (women who want to delay or stop giving birth and are not using contraceptives)	0,09
8.	C8	Family participation in the family resilience development program	0,07
9.	C9	Family participation in the empowerment program Family economic improvement	0,07
10.	C10	Adolescent participation in Generasi Rerencana (GenRe) activities through Pusat Informasi Konseling (PIK-R)	0,07

The weight distribution of each criterion aimed at normalizing the assessment value of the KB Village explained as follow.

1.) Determining the criterion value of the Number of Pre-Prosperous Households. The criteria table for the Number of Pre-Prosperous Households is as follows.

Table 3. Criterion Value of Number of Pre-Prosperous Households

Number of Pre-Prosperous Households	Value
1/5 Number of KK	5
1/4 Number of KK	4
1/3 Number of KK	3
1/2 Number of KK	2
1/1 Number of KK	1

2.) Determining the criterion value for the number of family planning participants. The table is as follows.

Table 4. Criteria Value for Number of KB Participants

Number of KB Participants	Value
1/1 PUS (Pasangan Usia Subur)	5
1/2 PUS (Pasangan Usia Subur)	4
1/3 PUS (Pasangan Usia Subur)	3
1/4 PUS (Pasangan Usia Subur)	2
1/5 PUS (Pasangan Usia Subur)	1

3.) Determine the value of the Region Criteria. In the region criteria, one or more of the 10 regions is selected. The table is as follows.

Table 5. Area Criteria Score

Area Criteria	Value
1-2 Area	3
3-4 Area	2
5 Area	1

4.) Determine the value of the Family Data and Map criteria. Family data and maps are data and maps that produce an overview of the distribution of families based on KB participation. The table is as follows.

Table 6. Family Data and Map Criteria

Family Maps and Data	Value
Available	2
None	1

5.) Determine the criterion value for the quantity of primary school-age population attending primary school. The table is as follows.

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Table 7. Criteria Value Number of primary school age population

Number of Primary School Population	Value
1/1 Quantity of primary school-age children	5
1/2 Quantity of primary school-age children	4
1/3 Quantity of primary school-age children	3
1/4 Quantity of primary school-age children	2
1/5 Quantity of primary school-age children	1

6.) Determine the criterion value for the number of MKJP users. MKJP is a contraceptive that can be used to delay, space pregnancy, and stop fertility. The table is as follows.

Table 8. Criterion Value for Number of MKJP Users

Number of MKJP users	Value
1/1 PUS	5
1/2 PUS	4
1/3 PUS	3
1/4 PUS	2
1/5 PUS	1

7.) Determine the criterion value for Total Unmet Need. Unmet need is the percentage of married women who do not want to have more children or want to spacing births but are not using contraception. The table is as follows.

Table 9. Criterion value for Number of Unmet Needs

Number of Unmet Need	Value
1/5 PUS	5
1/4 PUS	4
1/3 PUS	3
1/2 PUS	2
1/1 PUS	1

8.) Determine the criterion value for family participation in the family resilience development program. This program is called Tribina including BKB, BKR, and BKL, the table is as follows.

Table 10. Value of family participation in the family resilience development program

Family participation in the family resilience development program	Value
2-3 Program	3
1 Program	2
0 Program	1

9.) Determine the criterion value of family participation in the family economic improvement empowerment program. The family economic empowerment

program is increasing family income with micro enterprises, and training. The table is as follows.

Table 11. Value of family participation in the family economic improvement empowerment program

Family participation in the family economic improvement empowerment program	Value
2 Program	3
1 Program	2
0 Program	1

10.) Determine the criterion value of adolescent participation in generation planning activities, namely the *Pusat Informasi Konseling-Remaja* (PIK R). PIK-R is an information and counseling service on reproductive health, Planning for family life, and healthy living for adolescents. The table is as follows.

Table 12. Participation rate of adolescents in gender planning activities through the Counseling Information Center

Adolescent participation in gender planning activities through the Information Counseling Center	Value
1 Program	2
0 Program	1

The table of criteria weight values in the VIKOR method is as follows.

Table 13. Weighted value of 5 assessment criteria

Description	Integers
Very good	5
Good	4
Enough	3
Bad	2
Very Bad	1

Table 14. Weighted value of criteria 3 assessment

Description	Integers
Good	3
Enough	2
Bad	1

Table 15. Weighted value of Criterion 2 assessment

Description	Integers
Good	2
Bad	1

The alternatives in this study are villages that will be assessed for their eligibility to be used as KB villages with B1 to B25 according to the number of alternatives. The following is alternative data for each criterion.

Table 16. Criteria values

Alternative	Criteria Value									
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
D1	5	5	3	2	5	5	5	2	2	2
D5	4	4	2	2	5	5	1	2	3	2
D10	5	5	3	2	5	5	5	3	2	2
D15	5	4	3	1	5	5	4	2	2	2
D20	5	4	3	2	5	4	4	3	2	1
D25	5	5	2	2	5	4	5	3	2	2

3.2 Vikor Method Calculation

1) Normalization Matrix

The normalization process is calculated using Equation (1). After calculating the normalization matrix. The following is the calculation of the normalization matrix.

$$R_{ij}\frac{(f_i^*)-(f_{ij})}{(f_i^*)-(f_i)}=R_{11}=\frac{5-5}{5-4}=0$$

And so on until the value (R) is obtained as follows.

Table 17. Normalization Matrix

Alternative	Criteria Value									
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
D1	0	0	0	0	0	0	0	1	1	0
D5	1	0,5	0,5	0	0	0	1	1	0	0
D10	0	0	0	0	0	0	0	0	1	0
D15	0	0,5	0	1	0	0	0,25	1	1	0
D20	0	0,5	0	0	0	0,333	0,25	0	1	1
D25	0	0	0,5	0	0	0,333	0	0	1	0

2) Weight normalization

Weight normalization is done using equation (2) where multiplication is done between the alternative normalization value multiplied by the weight value of the criteria. The following is the calculation of weight normalization.

$$(W_j \times R_{ij})$$
$$R_{11}= (0,14 \times 0) = 0$$

And so on until the value (R) is obtained as follows.

Table 18. Weight Normalization

Alternative	Criteria Value									
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**
D1	0	0	0	0	0	0	0	0,05	0,05	0
D5	0,14	0,07	0,055	0	0	0	0,14	0,05	0	0
D10	0	0	0	0	0	0	0	0	0,05	0
D15	0	0,07	0	0,07	0	0	0,35	0,5	0,5	0
D20	0	0,07	0	0	0	0,0466	0,035	0	0,05	0,05
D25	0	0	0,055	0	0	0,0466	0	0	0,05	0

3) Calculating Regret Measure (R) and Utility Measure (S)

Calculating Regret Measure (Rj) is done using equation (3). In the calculation of Regret Measure (Rj) is the maximum normalized value of the pre-calculated weights of each alternative. alculated weights of each alternative. In the calculation of Regret Measure (Rj) is the maximum normalized value of the pre calculated weights of each alternative. Then to calculate the Utility Measure (Sj) value using Equation (4) which is a calculation by summing up all normalized weight values in each alternative. The following is the calculation of Regret.

$$R_j = max\left[W_i\left(\frac{(f_i^*)-(f_{ij})}{(f_i^*)-(f_i^-)}\right)\right]$$

$R_1 = \max(0, 0, 0, 0, 0, 0, 0, 0.05, 0.05, 0) = 0.05$

$$S_j = \sum_{i=1}^{n} W_i\left(\frac{(f_i^*)-(f_{ij})}{(f_i^*)-(f_i^-)}\right)$$

$S_1 = 0+0+0+0+0+0+0+0+0,05+0,05+0=0,1$

And so on until all (R) values are obtained. The calculated values of Rj and Sj can be seen in Table 19.

Table 19. Regret Measure (R) and Utility Measure (S) Values

Alternative	S Value	R Value
D1	0,1	0,05
D5	0,455	0,14
D10	0,05	0,05
D15	0,275	0,07
D20	0,2516	0,07
D25	0,1516	0,055
Max	**0,475**	**0,14**
Min	**0,05**	**0,05**

4) Calculating the Vikor Index

Calculating the Vikor index Q value is the final calculation of the VIKOR method using equation (5). The maximum value of Rj and the lowest value of S*j* must be determined by this computation.

$$Q_j = \left[\frac{S_j - S^-}{S^+ - S^-}\right] \times v + \left[\frac{R_j - R^-}{R^+ - R^-}\right] \times (1-v)$$

$$Q_j = \left[\frac{0.1-0.05}{0.475-0.05}\right] \times 0{,}5 + \left[\frac{0.05-0.05}{0.14-0.05}\right] \times (1-0{,}5)$$

$$Q_j = 0{,}0588 + 0$$

$$Q_j = 0{,}0588$$

And so on until all the vicor index values are obtained as follows.

Table 20. Vikor Index Value

Alternative	Index
D1	0,0588
D5	0, 9765
D10	0
D15	0, 3758
D20	0,3483
D25	0,1473

5) Ranking

The last stage of the vikor calculation is the ranking stage. After getting the index result (Q) from the previous calculation, the next step is to determine the ranking. The alternative with the minimum Q value is the highest rank. The ranking results can be seen in Table 21.

Table 21. Ranking

Code	Alternative	Index	Ranking
D10	Perbaungan	0	1
D1	Bandar Kumbul	0.0588	2
D7	Gunung Selamat	0.0588	3
D9	Kampung Dalam	0.0588	4
D22	Sei Sakat	0.0925	5
D19	Sei Jawi Jawi	0.0925	6
D2	Tanjung Sarang Elang	0.1	7
D25	Sei Lumut	0.1473	8
D12	Sidorukun	0.1513	9
D16	Negeri Lama	0.2346	10

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Code	Alternative	Index	Ranking
D13	Kampung Padang	0.2993	11
D20	Pasar Tiga	0.3483	12
D15	Tanjung Haloban	0.3758	13
D6	Tanjung Siram	0.4157	14
D24	Sei Penggantungan	0.4627	15
D4	Meranti	0.4745	16
D18	Cinta Makmur	0.5333	17
D23	Sei Sanggul	0.5392	18
D21	Telaga Suka	0.5863	19
D17	Sei Kasih	0.5863	20
D8	Lingga Tiga	0.8607	21
D14	Sei Tampang	0.8765	22
D5	Bandar Tinggi	0.9765	23
D3	Sibargot	0.9941	24
B11	Emplasmen	1	25

3.3 Implementation

System implementation is the application of a system that has been designed into software so that it can be tested. This is done to find out whether the system is operating as planned. The application of a decision support system for identifying KB villages using the Vikor approach is shown as follow.

1) Login Page

Before entering the main page, the user must log in first. Here is a view of the login page.

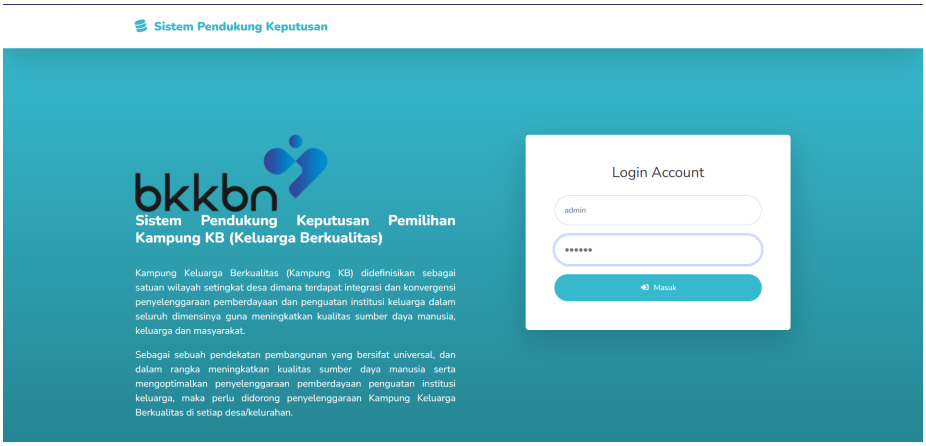

Figure 3. Login Page

2) Dashboard Page

After logging in by the user, it will enter the dashboard page. The dashboard page consists of several menus including the menu of criteria data, data of sub criteria, data of alternative, data of assessment, data of calculation, and data of final result. The following is a view of the Dashboard page.

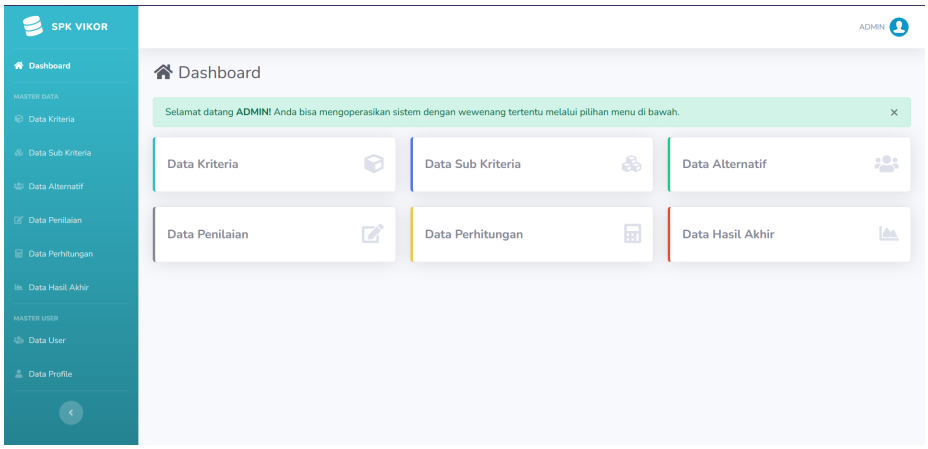

Figure 4. Dashboard page

3) Final Result Page

The ranking results page will display the ranking results after entering several alternative villages. The following is a view of the final result page as shown in Figure 5.

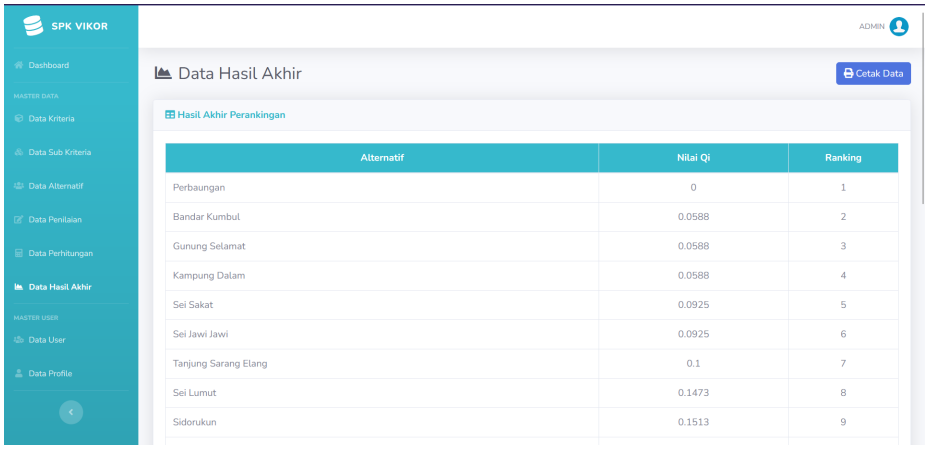

Figure 5. Final Results Page

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3.4 Discussion

Research using the Vikor method focuses on identifying the optimal compromise solution considering multiple conflicting criteria. In this case, VIKOR is very useful when the decision-making objectives involve several criteria. Therefore, the selection of KB villages is very suitable to be done using the vikor method. Unlike other MCDM methods such as AHP, which is more often used to determine the weights and ranks of criteria, or other MCDM methods such as Moora, which is more linear and may not be flexible enough to handle situations that require more in-depth analysis of interactions between criteria, the VIKOR method focuses on selecting the best solution by taking the composite distance to the ideal and anti-ideal solutions.

Vikor is particularly effective in situations where criteria have conflicting trade-offs, as it seeks the option that comes closest to the ideal solution of the various criteria involved. Applications using the vikor method are designed to consider more criteria and alternatives simultaneously, providing a more balanced solution. This helps in making more informed decisions by considering alternatives that are closest to the desired outcome.

The application of the vikor decision support system application in the selection of KB villages has a dependence on the determination of weight parameters. The selection of inappropriate weight values can be challenging and affect the final result, so that it can produce a non-optimal solution. VIKOR works well when all criteria can be clearly quantified. In this system, criteria that are not directly measurable or qualitative in nature are difficult to quantify and can therefore be less accurate.

After implementing this decision support system, which initially the government had to make elections manually. Now DPPKB Labuhanbatu can use this system in an efficient and effective way. By using the system that has been used, the government can be more efficient in making decisions on the selection of KB villages. The existence of this system makes the government more practical in data processing so as to minimize the occurrence of data errors. This system also makes it easier to make elections where many alternatives and criteria are used.

4. CONCLUSION

The application of the Vikor Method in the Selection of Quality Family Villages can provide rankings in the selection of KB villages. The data used in this study amounted to 25 alternative village data, 10 criteria taken from the KB village selection guidebook and for the weight value itself determined by the DPPKB Labuhanbatu where the data was taken. From the results of the calculation of the

25 data, it was found that the first rank was Perbaungan village with a Vikor Index of 0 and the last rank was Emplasmen village with a vikor index of 1. This study shows that the vikor method can rank in the selection of KB villages. The application of the vikor method can be used for various decision support systems that have many criteria. Applications using the vikor method are designed to consider more criteria and alternatives simultaneously, providing a more balanced solution. This helps in making more informed decisions by considering alternatives that are closest to the desired outcome. In this system, criteria that are not directly measurable or qualitative in nature are difficult to quantify and can therefore be less accurate. suggestions for future research are to add criteria used for the KB Village decision support system. using other MCDC techniques that can apply criteria that are not directly measurable or qualitative in nature or even be carried out using MDCD combination techniques.

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