## Metode SAW

Metode SAW dikenal juga dengan metode penjumlahan terbobot. Konsep dasar metode SAW adalah mencari penjumlahan terbobot dari rating kinerja pada setiap alternatif pada semua atribut. Metode SAW membutuhkan proses normaslisasi matriks keputusan (X) ke suatu skala yang dapat diperbandingkan dengan semua rating alternatif yang ada. Metode SAW harus memiliki beberapa alternatif (A), Kriteria (C), dan berat (*Weight*) yang mempunyai bobot ketentuan.

Berikut langkah-langkah pada metode SAW:

1. Pengambilan keputusan memberikan bobot preferensi yang akan diproses dalam perankingan dengan matriks yang telah ternormalisasi



W = {W1, W2,.....,Wn}

1. Matriks dibentuk dari tabel kecocokan Alternatif (A) dan Kriteria (C)
2. Setelah mendapatkan nilai matriks X, maka dilakukan normalisasi matriks berdasarkan persamaan berikut:

(1)

Jika j adalah atribut biaya *(cost)*

Jika j adalah atribut keuntungan *(benefit)*

Keterangan :

= nilai rating kinerja alternatif

= nilai atribut yang dimiliki dari setiap kriteria

= nilai terbesar sari setiap kriteria

= nilai terkecil dari setiap kriteria

Dimana adalah rating kinerja ternormalisasi dari alternatif Ai pada atribut Cj: i = 1, 2,.....,m dan j = 1,2,....,n.

1. Setelah diperoleh matriks ternormalisasi (R), maka dibuat proses perankingan dengan nilai preferensi untuk setiap alternatif (Vi) diberikan sebagai berikut:

(2)

Keterangan :

Vi = rangking untuk setiap alternatif

Wj = nilai bobot dari setiap kriteria

rij = nilai rating kinerja ternormalisasi

Nilai Vi yang paling besar mengindikasi bahwa alternatif Ai lebih terpilih sebagai alternatif terbaik, sehingga alternatif (Ai) yang memiliki nilai Vi terbesar yang terpilih.

Nile tilapia data was obtained from a nile tilapia fish farm in Samarinda City, East Kalimantan, Indonesia. The data was obtained in the form of criteria, criteria weights and sub-criteria values, and some nile tilapia data. The criteria weight data can be seen in Table 1, and the subcriteria data can be seen in Table 2.

**TABLE 1**. Criteria weight

|  |  |  |  |
| --- | --- | --- | --- |
| **Code** | **Criteria** | **Weight** | **Description** |
| C1 | Fish weight | 4 | Benefits |
| C2 | Fish length | 5 | Benefits |
| C3 | Fish move | 3 | Benefits |
| C4 | Physical disability | 3 | Benefits |
| C5 | Fish color | 3 | Benefits |
| C6 | Stomach condition | 4 | Benefits |

**TABLE 2**. Subcriteria value

|  |  |  |
| --- | --- | --- |
| **Criteria** | **Subcriteria** | **Value** |
| Fish weight (C1) | 250 – 500 g | 1 |
|  | 501 – 750 g | 2 |
|  | 751 – 1000 g | 3 |
| Fish length (C2) | 10 – 15 cm | 1 |
|  | 16 – 20 cm | 2 |
|  | 21 – 25 cm | 3 |
| Fish move (C3) | Not agile | 1 |
|  | Agile | 2 |
|  | Very agile | 3 |
| Physical disability (C4) | Yes | 1 |
|  | No | 2 |
| Fish color (C5) | Dark | 1 |
|  | Light | 2 |
| Stomach condition (C6) | Fluid | 1 |
|  | No fluid | 2 |

**TABLE 3**. Nile nile tilapia data

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **No** | **Code** | **Fish weight (gr)**  **(C1)** | **Fish length (cm)**  **(C2)** | **Fish movement**  **(C3)** | **Physical disability (C4)** | **Fish color (C5)** | **Stomach condition (C6)** |
| 1 | IK01 | 605 | 20 | Agile | No | Light | No fluid |
| 2 | IK02 | 650 | 23 | Very agile | No | Light | No fluid |
| 3 | IK03 | 740 | 23 | Very agile | No | Light | No fluid |
| 4 | IK04 | 655 | 22 | Very agile | No | Light | No fluid |
| 5 | IK05 | 600 | 21 | Agile | No | Light | No fluid |
| 6 | IK06 | 650 | 22 | Agile | No | Light | No fluid |
| 7 | IK07 | 635 | 21 | Very agile | No | Light | No fluid |
| 8 | IK08 | 700 | 23 | Agile | No | Light | No fluid |
| 9 | IK09 | 715 | 23 | Not agile | No | Light | No fluid |
| 10 | IK10 | 580 | 19 | Not agile | No | Light | No fluid |
| 11 | IK11 | 750 | 23 | Very agile | No | Light | No fluid |
| 12 | IK12 | 725 | 23 | Agile | No | Light | No fluid |
| 13 | IK13 | 680 | 22 | Very agile | No | Light | No fluid |
| 14 | IK14 | 630 | 23 | Very agile | No | Light | No fluid |
| 15 | IK15 | 805 | 24 | Agile | No | Light | No fluid |

Fish data obtained from nile tilapia cultivation in Samarinda City, East Kalimantan, Indonesia based on criteria, namely fish weight, fish length, fish movement, physical disability, fish color, stomach condition as shown in table 1. Nile tilapia data was obtained as in table 3, then changed according to table 2 so that it can be input data to the system. The converted data can be seen in table 4.

**TABLE 4**. Nile nile tilapia fish data conversion results

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **No** | **Code** | **Fish weight (gr)**  **(C1)** | **Fish length (cm)**  **(C2)** | **Fish movement**  **(C3)** | **Physical disability (C4)** | **Fish color (C5)** | **Stomach condition (C6)** |
| 1 | IK01 | 2 | 2 | 2 | 2 | 2 | 2 |
| 2 | IK02 | 2 | 3 | 3 | 2 | 2 | 2 |
| 3 | IK03 | 2 | 3 | 3 | 2 | 2 | 2 |
| 4 | IK04 | 2 | 3 | 3 | 2 | 2 | 2 |
| 5 | IK05 | 2 | 3 | 2 | 2 | 2 | 2 |
| 6 | IK06 | 2 | 3 | 2 | 2 | 2 | 2 |
| 7 | IK07 | 2 | 3 | 3 | 2 | 2 | 2 |
| 8 | IK08 | 2 | 3 | 2 | 2 | 2 | 2 |
| 9 | IK09 | 2 | 3 | 1 | 2 | 2 | 2 |
| 10 | IK10 | 2 | 2 | 1 | 2 | 2 | 2 |
| 11 | IK11 | 2 | 3 | 3 | 2 | 2 | 2 |
| 12 | IK12 | 2 | 3 | 2 | 2 | 2 | 2 |
| 13 | IK13 | 2 | 3 | 3 | 2 | 2 | 2 |
| 14 | IK14 | 2 | 3 | 3 | 2 | 2 | 2 |
| 15 | IK15 | 3 | 3 | 2 | 2 | 2 | 2 |

The first step making the decision matrix in the SAW method based on table 4 as follows:



With W = {4, 5, 3, 3, 3, 4} based table 1.

Normalisasi matrik X menggunakan Persamaan 1 dengan nilai semua kriteria adalah cost.

|C1| max = 3 from {2; 2; 2; 2; 2; 2; 2; 2; 2; 2; 2; 2; 2; 2; 3}

R11 = 2/3 = 0,67

R21 = 2/3 = 0,67

R31 = 2/3 = 0,67

R41= 2/3 = 0,67

R51= 2/3 = 0,67

R61= 2/3 = 0,67

R71= 2/3 = 0,67

R81= 2/3 = 0,67

R91= 2/3 = 0,67

R101= 2/3 = 0,67

R111= 2/3 = 0,67

R121= 2/3 = 0,67

R131= 2/3 = 0,67

R141= 2/3 = 0,67

R151= 3/3 = 1

.

.

.

|C6| max = 2 from {2; 2; 2; 2; 2; 2; 2; 2; 2; 2; 2; 2; 2; 2; 2}

R16 = 2/2 = 1

R26 = 2/2 = 1

R36 = 2/2 = 1

R46= 2/2 = 1

R56= 2/2 = 1

R66= 2/2 = 1

R76= 2/2 = 1

R86= 2/2 = 1

R96= 2/2 = 1

R106= 2/2 = 1

R116= 2/2 = 1

R126= 2/2 = 1

R136= 2/2 = 1

R146= 2/2 = 1

R156= 2/2 = 1

Dari perhitungan normalisasi didapatkan matriks ternormalisasi R sebagai berikut:

Mencari alternatif terbaik menggunakan Persamaan 2 berdasarkan nilai W dan R.

V1 = (0,67 x 4) + (0,67 x 5) + (0,67 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 18,04

V2 = (0,67 x 4) + (1 x 5) + (1 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 20,68

V3 = (0,67 x 4) + (1 x 5) + (1 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 20,68

V4 = (0,67 x 4) + (1 x 5) + (1 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 20,68

V5 = (0,67 x 4) + (1 x 5) + (0,67 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 19,69

V6 = (0,67 x 4) + (1 x 5) + (0,67 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 19,69

V7 = (0,67 x 4) + (1 x 5) + (1 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 20,68

V8 = (0,67 x 4) + (1 x 5) + (0,67 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 19,69

V9 = (0,67 x 4) + (1 x 5) + (0,33 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 18,67

V10 = (0,67 x 4) + (0,67 x 5) + (0,33 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 17,02

V11 = (0,67 x 4) + (1 x 5) + (1 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 20,68

V12 = (0,67 x 4) + (1 x 5) + (0,67 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 19,69

V13 = (0,67 x 4) + (1 x 5) + (1 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 20,68

V14 = (0,67 x 4) + (1 x 5) + (1 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 20,68

V15 = (1 x 4) + (1 x 5) + (0,67 x 3) + (1 x 3) + (1 x 3) + (1 x 4) = 21,01

Berdasarkan nilai Vi yang dihasilkan dengan persamaan 2, it was found that the superior fish seeds with the highest relative preference value were in V15 with a value of 21,01, namely nile tilapia with code IK15. Then followed by nile tilapia with codes IK02, IK03, IK04, IK07, IK11, IK13, and IK14 with a relative preference value of 20,68. The results nilai Vi will be sorted from the largest value to the smallest to get a recommendation for superior nile tilapia seeds. First, the minimum value of preference obtained to be selected as the superior fish seed is determined, which is 19,69. this value was obtained after consulting with fish farmers in Samarinda City, East Kalimantan, Indonesia.

**TABLE 7**. Result comparison

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **No** | **Alternative** | **Vi** | **Code** | **SAW method result** | **Farm result** | **Description** |
| 1 | V15 | 21,01 | IK15 | Selected | Selected | Same |
| 2 | V2 | 20,68 | IK02 | Selected | Selected | Same |
| 3 | V3 | 20,68 | IK03 | Selected | Selected | Same |
| 4 | V4 | 20,68 | IK04 | Selected | Selected | Same |
| 5 | V7 | 20,68 | IK07 | Selected | Not elected | Not same |
| 6 | V11 | 20,68 | IK11 | Selected | Selected | Same |
| 7 | V13 | 20,68 | IK13 | Selected | Selected | Same |
| 8 | V14 | 20,68 | IK14 | Selected | Not elected | Not same |
| 9 | V5 | 19,69 | IK05 | Not elected | Not elected | Same |
| 10 | V6 | 19,69 | IK06 | Not elected | Not elected | Same |
| 11 | V8 | 19,69 | IK08 | Not elected | Not elected | Same |
| 12 | V12 | 19,69 | IK12 | Not elected | Not elected | Same |
| 13 | V9 | 18,67 | IK09 | Not elected | Not elected | Same |
| 14 | V1 | 18,04 | IK01 | Not elected | Not elected | Same |
| 15 | V10 | 17,02 | IK10 | Not elected | Not elected | Same |

The results of superior fish seeds, the value obtained from the SAW will be compared with the results in fish farms. In 15 nile tilapia data, there are 13 nile tilapia data whose results are the same as fish farms and produce an accuracy value of 86.6%, which can be seen in table 7. In 15 data there are 2 different data results, namely, in IK07 and IK14, this difference in data is confirmed again to fish farmers.