

A Preliminary Stage of Supply Chain Strategy: Selection Qualified Catfish Seed

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Abstract— Catfish is one of the freshwater fish that can be maintained in the pond yard of the house or in the field. The growth of catfish is quite fast with high durability and easy to breed in various maintenance locations. This fish is one type of fish consumption that is enough in the know and in the interest in Indonesia. A lot of people who want to cultivate these fish and want to get qualified catfish seed. For that in deciding determination of qualified catfish seed is needed for the continuity of breeding, to select the qualified catfish seed is needed some methods, one of the decision support system in selecting qualified catfish seed use SAW (simple additive weighting) method and efficient in the problems faced in this case study in order to obtain the high weight of various criteria that have been determined on the design process of decision support system. Benefits that can be obtained from using SAW method is to select and to decide for obtaining qualified fish seed without using too complicated ways.

Keywords— supply chain, catfish, decision support system, SAW.

1. Introduction

1.1 Background

In general, catfish has round body shape and elongated. The skin is slippery, slimy, but not scaly. The body has a different color for each type of catfish. Each catfish has a unique color that wraps the body. The catfish has a relatively wide mouth size and almost splitting half of the width of its head. Catfish has a mustache located in the area around his mouth. This mustache also causes this fish is often called catfish. This mustache has a function as a tool to feel at the time of looking for food or usual moving. As a tool for swimming, catfish also has 3 pieces of single fin namely the anal fin, tail fin, and dorsal fin. This fish also has a pair of fin, namely abdomen fin and pectoral fin.

Besides being used as a swimming aids, fins as well has a function to keep the body's balance of catfish when still piping down or not moving. On the pectoral fin has a pointed and hard fins called patil which is used as a gun. Besides that, patil is also used as a tool to walk on land without water in a long time span and with a considerable distance traveled. In addition to local consumption, the catfish market has started in exporting and the demand is quite large. The rate of increase in the production of catfish consumption nationally is 18.3% per year. In 1999 catfish production amounted to 24,991 tons. In 2003 catfish production amounted to 57,740 tons. Rivalry of catfish until the end of 2009 was estimated to reach 175,000 tons of production or an average increase of 21.64% per year. Level of catfish seed need was also increasing rapidly. In 1999 it required 156 million catfish, in 2003 it needed 360 million heads, while by the end of 2009 it is estimated that 1.9 billion will be needed or increased 46% per year [5-11].

In this case the cultivators of catfish there is little problem encountered, that is to determine the quality of catfish seed. In this case catfish farmers should be thorough and be precise in searching for superior and qualified catfish seed, it needs perseverance and patience to be able to choose good quality catfish seed. To get the desired fish seed then required a system and method, namely decision support system and SAW method that will help the selection of qualified catfish seed. Benefits obtained with this existence methods is catfish farmers will feel very profitable and consumers are more confident with the existing systems and methods and have no doubt to get qualified catfish seed [12-15].

1.2 Problem Formulation

By looking at the above background it can be formulated an issue to be solved namely :

1. How to determine the quality of qualified catfish seed with decision support system with SAW method?

1.3 Problem Limitation

Based on the above problems, catfish farmers located in Wates village will conduct research for this purpose can be achieved that is the selection of high quality catfish seed using SAW method (simple additive weighting).

1.4 Research Purpose

The purpose of this research was to Build a model system by using SAW method to determine the quality of catfish seed to get the seed as desired so that the results obtained is very objective.

1.5 Research benefit

With the existence of decision support system using SAW method, it can facilitate the cultivation of catfish seed get qualified seeds and increase the yield.

2. Literature Review

2.1 Decision Support System

DSS is a computer-based approach or methodology for supporting decision making. The most important part of a typical DSS is a data warehouse, which is a subject-oriented, integrated, time-variant, non-normalization, non-volatile collection of data that allow analyzing large amounts of data from multiple sources with fast results [1].

Decision Support System is a computer-based information system that produces various alternative decisions to assist management in handling various problems that are structured or unstructured using data and model [2]. DSS is built certainly has a goal to be achieved by a decision maker. the purpose of DSS is as "Second opinion" or "information 3 sources" as a consideration of a manager before deciding a particular policy [3].

2.2 Catfish

According to Kordi [4], Catfish is a type of fish that has many different name and nickname in some countries, even in Indonesia, catfish has different name in some areas, this is because catfish including fish species that have many species, however, scientifically catfish is better known as clarias, derived from the word chlaros in greek language which means strong or agile, as in fact in the wild, catfish is famous frisky and able to survive even in conditions of minium level of water and oxygen, because catfish has additional

breathing apparatus in the form of labyrinth. Fish type of clarias including catfish has the characteristics of the body is elongated or oval, the skin of his body is not scaly and slippery because it is protected by a kind of protective fluid, dorsal fin elongate on the back and sometimes together with the tail, while at the bottom of the abdomen there is also an anal fin that extends to the tail, unlike his oval body, the head of the catfish tend to be more flattened and protected

by a very hard bone, its eyes look black and small on the left side and right head, behind the mustache or often referred to as tentacles touch of eight, four on the left side and the other four on the right, on the chest, catfish has two patil fruit, which is the fin that comes from hard and pointed bones.

Catfish is one of the leading commodities. Business development can be done from seed to consumption size.

An example of creating a qualified catfish seed:

1. Form the Pool on 1-2 weeks with width 50 cm and length 200 cm, and height 50cm. Pool wall made upright, smooth, and slippery, so if rubbing against to the catfish seed body will not hurt. The floor surface is rather tilt to the water disposal.

2. The tilt is made 3 cm apart between the two ends of the floor, at which is near the place of higher water intake. On floor mounted pralon with a diameter of 3-5 cm and 10 m length.

3. Approximately 10cm from water disposal mounted filter which is clamped with 2 timber of frames right with inner wall surfaces pool. Between 2 frames mounted a mosquito net of plastic-sized mess material 0.5-0.7 mm, then nailed.

4. Every nursery pool fitted input pipe and water pipe for drying pool. Disposal Pipe connected with plastic pipe that can work to set the height of the pond water. The plastic pipe is attached with a hook as hanger

5. The third week, the seeds are moved to another nursery pool. It should not be taken use the net, however by adjusting the height of the plastic pipe Simple Additive Weighting (SAW)

Simple Additive Method Weighting (SAW) is often known as a terms of addition method

The basic concept of SAW is look for total weight from performance rating on each alternative

on all attributes. Simple Method Additive Weighting (SAW) requires a normalization process of decision matrix (X) to a scale which can be compared to all exist alternative ratings [2]. The Formula to normalize

Is as follows:

Where r_{ij} is a normalize performance rating from A_i alternative on C_j attribute : $i = 1, 2, \dots, m$ and $j = 1, 2, \dots, n$. The preference value for each alternative (V_i) is given as ::

Description :

V_i = ranking for each alternative

W_j = the weight score for each criterion

F_{ij} = normalized performance rating
The greater V_i score indicates A alternative is selected.

2.4 In Wates Village

Wates is a village located in Gading Rejo district Pringsewu regency Lampung province. Viewed from the geographical location, the village is located in the highlands where if viewed in terms of irrigation, the village has adequate irrigation and its strategic location for farmers and fish breeders. Because the water always flows from the nearby mountains. So village wates is very good for cultivation of catfish, and in wates village there are a lot of qualified catfish seeds.

2.5 Decision Support System Selection of Qualified Catfish Seed using SAW (Simple Additive Weighting) Method In Wates Village

In a system there is a processing of a decision, the stage is called the decision support system, The selection of Qualified Catfish Fishing Is a system used for the processing of fish seed where it can produce the output of catfish seed where the resulting information is displayed detailed as well as in its processing using SAW method to reduce error in the selection of catfish seed.

2.6 FMADM Algoritm

FMADM Algoritm is :

1. Provide the score of each alternative (A_i) in each criterion (C_j) that has been determined, Where the data obtained by the value of crisp; $i = 1, 2, \dots, m$ and $j = 1, 2, \dots, n$.
2. Give a weight score (W) which is also obtained based on crisp score.
3. Perform normalized matrix by calculating the normalized performance rating value (r_{ij}) from the alternative of A_i at C_j attribute based on the equation that's compatible with the attribute (attribute benefit = MAXIMUM or cost attribute / cost = MINIMUM). If it is a profit meaning then the crisp (X_{ij}) value of each attribute column is divided by the crisp MAX (MAX X_{ij}) value of each column, while for the cost attribute, the crisp value MIN (MIN X_{ij})
From each attributecolumn divided with X_{ij} crisp from each column.
4. Perform ranking process by multiplying the normalized matrix (R) with the weight value (W).
5. Determine the preference value for each alternative (V_i) by summing the product of the normalized (R) matrix with the weight score (W). Greater V_i score indicates that A_i alternative is more elected, in the journal [1].

2.7 Finishing Stage

In this research using FMADM Method of Simple Additive Weighting (SAW). The steps are:

1. Deciding criteria that will be used as a reference in decision making, namely C_i .
2. Deciding the compatible rating of each alternative to each criterion.
3. Make the decision matrix based on the criteria (C_i), then perform the normalized matrix based on their respects with the type of attribute (attribute gain or cost attribute) so as to obtain a normalized R matrix.
4. The final result is obtained from the ranking process that is the sum of the normalized matrix multiplication R with the weight vector to obtain the largest value chosen as the best alternative (A_i) as the solution.

3. Research Method

3.1 Data Collection

1. Observation Method

Observation is a method of data collection by direct observation of the object under study by analyzing the system that was running in the study area in the village of wates in the selection of catfish seed as well as providing opinion or suggestions in the determination of qualified catfish seed. The results obtained are able to know the catfish seed of good quality or not with this research.

2. Interview Method

Interview method is a method of data collection by doing direct interview with the owner of catfish seed cultivation business in place of study, for designing materials and the construction of a model system of decision-making of qualified catfish seed selection. The results can be obtained is to know the beginning of cultivation in the village so that consumers get the wanted catfish seed.

3. Literature Method

Data collection technique by referencing in the form of files, through the internet, research journals and so on. Literature study conducted in accordance with the potential processing in the Wates village. The literature study is also done to determine the information system to be applied.

3.2 Designing Method

Simple Additive Weighting (SAW) is often also known as the weighted summing method. The basic concept of SAW is to find the weighted sum of performance ratings on each alternative on all attributes. Simple Additive Weighting (SAW) method requires the process of normalizing the decision matrix (X) to a comparable scale to all existing alternative ratings, [2].

The steps of finishing SAW were as follow :

1. Deciding the criteria that will be used as a reference in decision making, namely C_i .
2. Deciding compatibility rating for each alternative in each criterion
3. Creating a decision matrix based on criteria (C_i), then normalizing matrix based on equations that were adjusted to the type of attribute (attribute gain or cost attribute) to obtain a normalized R matrix.
4. The final result is obtained from the ranking process that is the sum of the normalized R matrix multiplication with the weight vector to obtain the largest value chosen as the best alternative (A_i) as the solution.

Dalampenyeleksianbibitikan dengan menggunakan model *Fuzzy Multiple Attribute Decision Making* (FMADM) dengan metode *Simple Additive Weighting* (SAW) diperlukan kriteria-kriteria dan bobot untuk melakukan perhitungannya sehingga inggakandidapatalternatif terbaik, dalam hal ini alternatif yang dimaksud adalah yang berhabibitikanlele yang berkualitas berdasarkan kriteria-kriteria yang ditentukan. In the selection of catfish seed using the Fuzzy Multiple Attribute Decision Making (FMADM) model with the Simple Additive Weighting (SAW) method, we needed criteria and weight to do the calculation, so the best seed can be found, in which the alternative was the terminology of qualified species based on the specified criteria.

3.3 Data Analysis

Data analysis method used was descriptive, therefore the descriptions were :

1. Benefit Analysis

In the analysis phase in determination of qualified catfish seed using SAW (Simple Additive Weighting) method to facilitate the cultivators in obtaining qualified catfish seed in addition it can also reduce the failure rate in the maintenance process.

2. Calculation Analysis

The author designed decision support system using algorithm calculation method. To input the criteria that have been determined.

3. Device Analysis

The design of decision support system was not apart from the use of hardware. Hardware used was computer device and peripheral device that connect to the application of Wates village to the internet so that it can be accessed by people or who need.

4. Designing and Implementation

4.1 Designing

1. Weight

In this research method there were weight and criteria needed to determine quality of catfish seed. Therefore the criteria were :

- C_1 = Size
- C_2 = Seed age
- C_3 = Health

From each of the criteria provisions, then made variables . Where from a variable will be converted into its fuzzy number.

Therefore the fuzzy numbers from the weight were

1. Very low (SR) = 0
2. low (R) = 0.2
3. medium (S) = 0.4
4. Middle (T1) = 0.6
5. High (ST) = 0.8
6. Very High (B) = 1

To get the variable must be made in a graph to be more clear on

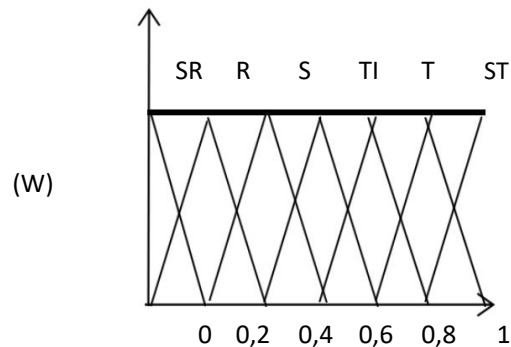


Figure 1. Fuzzy number for the weight

Description :

- SR = very low
- R = low
- S = medium
- T1 = middle
- T = high
- ST = very high

2. Calculation of Qualified Seed Selection gave the score of each alternative (A_i) on each criterion (C_j) that had been determined.

a. The higher (C_1) score the higher the rate then the more it can be the choice.

Table 1. Size Criteria

Size	Variable	Score
$C_1=2-3$ cm size	Medium	0.2
$C_1= 3-4$ cm size	Middle	0.6
$C_1= 4-5$ cm size	High	0.8
$C_1= 5-7$ cm size	Very high	1

b. Age (C_2) the higher the number of age then it can be more the choice

Table 2. Age of Seed Criteria

Age	Variable	Score
C ₂ =1week	medium	0.2
C ₂ =2 weeks	middle	0.6
C ₂ =3 weeks	High	0.8
C ₂ =4 weeks	Very high	1

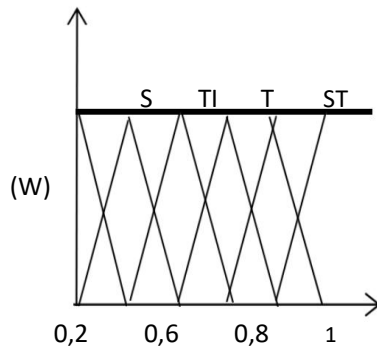


Figure 2 fuzzy number for seed age criteria

c. The higher (C₃) score the more it can be the choice

Table 3. Health Criteria

Health	Variable	Score
C ₃ = non contagious disease	Medium	0.2
C ₃ = contagious disease	Middle	0.6
C ₃ =common disease	High	0.8
C ₃ = no disease	Very High	1

4.2 Implementation

The score of each attribute that is the result of data input process from catfish seed that have been conformed based on the determined weight of criteria through the calculation process

Table 4. The score of each alternative to each attribute after it is consolidated based on the weight criteria.

Speices	Attribute (Criteria)		
	C1	C2	C3
Dumbo catfish	0.8	1	0.6
Sangkuriang catfish	0.8	0.6	0.8
Local catfish	1	0.8	1

4.3 Selection Result

Showing alternatives of catfish seeds ranging from highest to lowest result. Calculation of the final result by taking sample attribute score of three types of catfish.

$X = [\quad]$

1. Decision making gives weight value (W) based on the importance of each criteria needed as follows:

Weight Vector :

$W = [30\% 20\% 20\% 20\% 10\%]$ atau $W = [0.3 0.2 0.2 0.2 0.1]$

1. Normalization of X matrix becomes R matrix based on equation (1) _____

x_{ij}

R. r_{ij} Normalization = $\frac{\text{Max}x_{ij}}{\text{Benefit } i}$

Min x_{ij}

R. r_{ij} Normalization = $\frac{i}{\text{Cost}}$

x_{ij}

$\frac{0,8}{0,8}$

A1). $R11 = \frac{0,8}{\text{Max}(0,8 0,8 1)} = \frac{0,8}{0,64} = 1,25$

Min (1 0,60 0,8) 0,48

R12 = $\frac{0,6}{\text{Max}(0,8 0,8)} = \frac{0,6}{0,8} = 0,6$

R13 = $\frac{0,6}{\text{Max}(0,6 0,8 1)} = \frac{0,6}{0,8} = 0,75$

R13 = $\frac{0,8}{\text{Max}(0,6 0,8 1)} = \frac{0,8}{0,8} = 1,0$

A2). R14 = $\frac{0,8}{\text{Max}(0,8 0,8 1)} = \frac{0,8}{0,64} = 1,25$

Min (1 0,6 0,8) 0,48

R15 = $\frac{0,6}{\text{Max}(0,6 0,6)} = \frac{0,6}{0,6} = 1,0$

$\frac{0,8}{0,8}$

R16 = $\frac{0,8}{\text{Max}(0,6 0,8 1)} = \frac{0,8}{0,8} = 1,0$

$\frac{1}{1}$

A3). R17 = $\frac{0,8}{\text{Max}(0,8 0,8 1)} = \frac{0,8}{0,64} = 1,25$

Min (1 0,6 0,8) 0,48

R18 = $\frac{0,8}{\text{Max}(0,8 0,8 1)} = \frac{0,8}{0,64} = 1,25$

$\frac{1}{1}$

$$R19 = \frac{0,6 \quad 0,8 \quad 1}{0,48} = 2,08$$

From the existing information, then made a matrix of R result normalization from X matrix based on equation (2.1).

$$R = [\quad]$$

The final result obtained from the matrix multiplication by equation (2.2).

$$\begin{aligned} V_1 &= (1,25*0,3) + (0,6*0,2) + (1,25*0,2) = \\ &= 0,375 + 0,12 + 0,25 \\ &= 0,745 \end{aligned}$$

$$\begin{aligned} V_2 &= (1,25*0,3) + (0,8*0,2) + (1,66*0,2) \\ &= 0,375 + 0,16 + 0,332 \\ &= 0,867 \end{aligned}$$

$$\begin{aligned} V_3 &= (1,5*0,3) + (0,6*0,2) + (2,08*0,2) \\ &= 0,45 + 0,12 + 0,416 \\ &= 1,166 \end{aligned}$$

The last step was the ranking process. Ranking results obtained: V1,0,745; V2,0,867; V3 1.166

So qualified catfish seed was qualified local catfish seed that has maximum result based on existing criteria. In this case V3 had the greatest score, so catfish seed with the name of local catfish was a qualified catfish seed.

5. Conclusion and Suggestion

5.1 Conclusion

1. This decision support system is built to help determine good quality catfish seed to be cultivated using FMADM logic using SAW (Simple Additive Weighting) method.
2. The more sample data that used then the higher the validity of the calculation result.
3. Conversion scaling and preference weighting of each criteria weight affects the assessment and result of SAW (Simple Additive Weighting) calculation.

5.2 Suggestion

For the next built the application of decision support system for the calculation of FMADM method with SAW (Simple Additive Weighting, not only on catfish seed but also in other fish seeds as well as goldfish and others. In determining qualified catfish seed is expected to not only use one method, but also can use two comparison methods of SAW (Simple Additive Weighting) and AHP (Analytica Hierarchy Proses), to get precise and accurate results.

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