
The Design Of The Spk In Fulfilling The Production Target Of Vegetable Availability In Lut Tawar Sub-District Uses The SAW Method

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Article Info

Article history:

Received September 2 2020

Revised December 28 2020

Accepted January 2 2021

Keywords:

Decision support system,
Production target, Vegetables,
Simple Additive Weighting

ABSTRACT

Efforts to meet the availability of vegetables in fulfilling vegetable intake, especially for people in Lutawar sub-district, Central Aceh district, community agriculture requires a technology development that supports the calculation of production at each harvest and can also determine the fulfillment of community food availability. In this case, the fulfillment of production targets for the availability of vegetables will be very effective if it is calculated using a decision support system application, using the Simple Additive weighting (SAW) method.

The process of collecting and analyzing data is carried out systematically and logically using a survey, which is to collect as much data as possible about the vegetables found in Lut Tawar Subdistrict, which is a decision support for the quality of the research. Then analyze vegetables in meeting production targets and food availability. Application of the Simple Additive Weighting (SAW) method into a decision support system to create a decision support system for food availability that is assessed from its production, including 4 criteria used to make an assessment, C1: Productivity, C2: Harvest Area, C3: Area Planting, C4: Population, then decision making assigns weight to each criterion. The types of vegetables as an alternative in this study are as follows.

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1. INTRODUCTION

Efforts to meet the availability of vegetables in meeting vegetable intake, community agriculture requires the development of technology that supports the calculation of production at each harvest and can also determine the fulfillment of community food availability. In this case, the fulfillment of production targets for the availability of vegetables will be very effective if calculated using a decision support system application.

There are still many people whose vegetable intake is below the recommended amount of 25-30 grams/day. The recommended intake of vegetables is 3-5 servings per day.[1] Indonesians only eat vegetables as much as 40.35 kg / capita / year, compared to the recommendation of the United Nations Agency which deals with food and agricultural matters (FAO), namely the ideal vegetable consumption is 91.25 kg / capita / year. The United Nations Health Organization (WHO) recommends 400 grams of fruit and vegetables per day. The American Heart Association recommends 8 servings / 4.5 bowls of a variety of fruits

and vegetables per day. While Health Law no. 36 of 2009 recommends that people consume 3-5 servings of vegetables and 2-3 servings of fruit per day. [2]

In this case a decision support system will be very helpful in determining the fulfillment of vegetable production targets, to meet the food availability that must be met by every community., with the Simple Additive Weighting (SAW) method, and this method has often been used in terms of decision makers such as: Designing and Making a Decision Support System for Determining the Best Employees Using the Saw Method at Pt Iss Indonesia Medan Branch (Olven Manahan 2016) [3], System Decision Support for Hotel Selection in Palembang City Using the Simple Additive Weighting (SAW) Method (Dwi Citra Hartini, et al., 2013) [4], Decision Support System for Assessment of Orchid Plants in Ud. Sanjiwani Orchid Using the Simple Additive Weighting Method (Erni Dianasari, Taufik Baidawin2015) [5], Determining Superior Craft Products Using Madm-Saw, (Fera Tri Wulandari, Setiya Nugroho, 2015) [6].

1.1 Food Security

The occurrence of food insecurity, caused by not achieving the target of food availability and access to food for the community, [7] The World Health Organization defines three main components of food security, namely food availability, food access and food utilization. Food availability is the ability to have a sufficient amount of food for basic needs. Access to food is the ability to have the resources, both economically and physically, to obtain nutritious food. Utilization of food is the ability to use food ingredients correctly and appropriately proportionally. FAO added a fourth component, namely the stability of the three components over a long period of time.

The Food Law No.7 of 1996 states that the conditions for the fulfillment of food needs for households are reflected in the availability of sufficient food, both in quantity and quality, safe, equitable and affordable. [8] Meanwhile, USAID (1992) states the condition when everyone has physical and economic access at any time to get their consumption needs to live a healthy and productive life. FIVIMS (2005) states the condition when all people at all times physically, socially and economically have access to adequate, safe and adequate food.nutritious to meet consumption needs and according to his taste (food preferences) for an active and healthy life [8]

Vegetables are one of the main sources of micronutrients, a source of vitamins and minerals as regulating substances. Kinds of Super Healthy Vegetables and Their Benefits and Nutritional Content [9]

1.1.1. Chayote

Chayote's nutritional content Pumpkin siem contains several vitamins and other important nutrients. One and a half cup serving provides about 17% of your daily vitamin C needs. In addition, these vegetables also contain vitamin B complex, such as folate at 61 mcg and small amounts of niacin, thiamin, riboflavin, pantothenic acid and vitamin B6. Vitamin B plays an important role in the body's metabolic processes. In addition, this pumpkin fruit also contains minerals such as iron, manganese, phosphorus, zinc and copper.

1.1.2. Bean

Beans are a type of legume that can be eaten either directly or by cooking them first. Both the fruit, seeds, or leaves have been widely used as delicious vegetables. Green beans are very rich in nutrients and nutrients and this type of vegetable is believed to come from the South American region. Beans contain several nutrients that are needed by the human body. Some of the nutritional content in these beans include Vitamin A, Vitamins B1, B2, B3, B6, B11, Vitamin C, Fat, Protein, Ash content, Manganese, Molybdenum, Magnesium, Potassium, Iron, Phosphorus, Calcium, Copper, Carbohydrates , Crude fiber, etc.

1.1.3. Tomato

Tomatoes are known to contain a type of powerful antioxidant called Lycopene in large quantities, Lycopene is a substance that makes this fruit red. Not only that, tomatoes have also been shown to contain a compound called alpha lipoic acid, which helps control blood glucose, increases vasodilation and protects against retinopathy in diabetic patients, and can even help preserve the brain and nervous tissue.

1.1.4. Long beans

Consumption of vegetables is very good for health. There are many vegetables that are very beneficial. One of which is long beans, Long beans are one of the vegetables that are easy to find, besides the relatively cheap price makes this vegetable popular with many people. Usually long beans are used to make various vegetables such as lodeh, pecel, stir-fry long beans and are also used for fresh vegetables. Long beans have many nutrients that are good for the body, such as vitamins B1 and B2. Both vitamins are very good for body health. Especially for those of you who have a body that gets tired easily.

1.1.5. Sawi / Petsai

Sawi is a vegetable that is rich in vitamins, so it is known to be very beneficial for health as well as being able to prevent various diseases. The nutritional content in mustard greens include vitamin A, vitamin K, vitamin C, flavonoids, carotenoids, folate, thiamin, pantothenic acid, phosphorus, potassium to phytonutrients which make the benefits of mustard greens very diverse and varied.

1.1.6. Cauliflower

Nutritional content in Cauliflower Cauliflower is a source of vitamin C (ascorbic acid), folate, vitamin K (phyloquinone) and vitamin B-6. Vitamins B1 (thiamine), B2 (riboflavin), B3 (niacin), and small amounts of vitamin E (alpha-tocopherol). Cauliflower also provides essential minerals like calcium, magnesium, phosphorus, potassium and manganese without the harmful cholesterol. It is a great source of protein, and a very low amount of saturated fat, rather than the beneficial unsaturated fats and omega-3 fatty acids. Cabbage also contains fiber and contains lower natural sugars, when compared to other family members such as broccoli. The cauliflower we are most familiar with is white, but there are actually varieties of cauliflower that are other than white in color: Green: Green cauliflower is also referred to as broccoflower. There are also two known forms here, that is, the normal form and the pointed variant called Romanesco broccoli. Purple: Cauliflower is purple due to its anthocyanins, which are substances known as antioxidants that affect the color of the vegetables. Orange: Orange cauliflower is very nutritious because it contains more vitamin A than the white variety.

2. RESEARCH METHOD

The problem discussed in this study is to create a system for calculating vegetable production in meeting production targets using the SAW method. The research methodology in this study is described as in Figure 1.

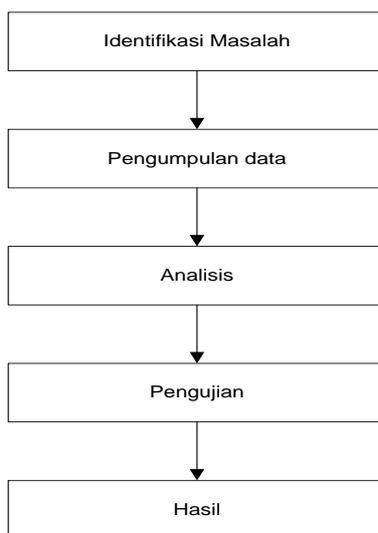


Figure 1. Research methodology

2.1 Data Collection

The data collected in the form of harvest productivity data, harvested area, plant area and population conducted in Lut Tawar District, Central Aceh Regency

2.2. Vegetable Data and Population [10]

Table 1. Planted Area, Harvest Area & Production of Chayote

No.	districts	Large Plant (Ha)	Large Harvest (Ha)	Productivity (kw / ha)
1.	Linge	-	-	-
2.	Atu Lintang	12	3	1,860
3.	Jagong Jeget	6	2	2,880
4.	Star	-	2	
5.	Bargaining Lut	5	2	120
6.	Plumpness	6	6	1,200
7.	Pegasing	-	-	-
8.	Bies	6	3	248
9.	Bebesen	10	20	2,950
10.	Kute Panang	4	34	14,878
11.	Choose Nara	6	10	3,090
12.	Ketol	3	24	939
13.	Celala	1	1	283
14.	Rusip Between	5	12	9,050
	total	64	119	

Planted Area, Harvest Area & Chayote Production in Central Aceh Regency, 2014

Table 2. Planted Area, Harvested Area & Bean Production

No.	districts	Large Plant (Ha)	Large Harvest (Ha)	Productivity (kw / ha)
1.	Linge	2	1	13
2.	Atu Lintang	30	15	2,490
3.	Jagong Jeget	4	1	240
4.	Star	-	2	
5.	Bargaining Lut	8	3	105
6.	Plumpness	-	-	-
7.	Pegasing	6	-	-
8.	Bies	4	1	202
9.	Bebesen	20	12	360
10.	Kute Panang	15	16	440
11.	Choose Nara	-	-	-
12.	Ketol	-	-	-
13.	Celala	1	3	126
14.	Rusip Between	25	14	3,900
	total	115	66	

Planted Area, Harvested Area & Bean Production in Central Aceh District, 2014

Table 3. Planted Area, Harvest Area & Tomato Production

No.	districts	Large Plant (Ha)	Large Harvest (Ha)	Productivity (kw / ha)
1.	Linge	3	2	678
2.	Atu Lintang	57	23	9,430
3.	Jagong Jeget	10	5	3,150
4.	Star	52	18	3,614
5.	Bargaining Lut	60	28	9,070
6.	Plumpness	8	3	1,110
7.	Pegasing	45	29	9,405
8.	Bies	5	8	1,641

9.	Bebesen	41	19	975
10.	Kute Panang	15	18	3,200
11.	Choose Nara	30	14	8,972
12.	Ketol	15	39	3,606
13.	Celala	4	10	4,260
14.	Rusip Between	15	13	3,300
	total	360	219	

Planted Area, Harvested Area & Tomato Production in Central Aceh District, 2014

Table 4. Planted Area, Harvested Area & Long Bean Production

No.	districts	Large Plant (Ha)	Large Harvest (Ha)	Productivity (kw / ha)
1.	Linge	1	2	222
2.	Atu Lintang	6	10	2,590
3.	Jagong Jeget	-	-	-
4.	Star	-	-	-
5.	Bargaining Lut	8	6	390
6.	Plumpness	-	-	-
7.	Pegasing	-	-	-
8.	Bies	2	1	260
9.	Bebesen	10	20	370
10.	Kute Panang	11	10	1,260
11.	Choose Nara	3	3	485
12.	Ketol	-	-	-
13.	Celala	-	-	-
14.	Rusip Between	10	14	3,500
	total	45	54	

Planted Area, Harvested Area & Long Bean Production in Central Aceh District, 2014

Table 5. Planted Area, Harvested Area & Mustard / Petsai Production

No.	districts	Large Plant (Ha)	Large Harvest (Ha)	Productivity (kw / ha)
1.	Linge	-	-	-
2.	Atu Lintang	-	-	-
3.	Jagong Jeget	6	6	260
4.	Star	-	-	-
5.	Bargaining Lut	23	20	540
6.	Plumpness	-	-	-
7.	Pegasing	-	-	-
8.	Bies	-	-	-
9.	Bebesen	9	8	140
10.	Kute Panang	9	9	1,340
11.	Choose Nara	-	-	-
12.	Ketol	-	-	-
13.	Celala	-	-	-
14.	Rusip Between	-	-	-
	total	47	43	

Planted Area, Harvested Area & Mustard / Petsai Production in Central Aceh Regency, 2014

Table 6. Planted Area, Harvest Area & Cauliflower Production

No.	districts	Large Plant (Ha)	Large Harvest (Ha)	Productivity (kw / ha)
1.	Linge	-	-	-
2.	Atu Lintang	11	8	640
3.	Jagong Jeget	-	-	-
4.	Star	-	-	-
5.	Bargaining Lut	10	12	880
6.	Plumpness	-	-	-

7.	Pegasing	-	-	-
8.	Bies	-	-	-
9.	Bebesen	8	8	160
10.	Kute Panang	6	7	1,060
11.	Choose Nara	-	-	-
12.	Ketol	-	-	-
13.	Celala	-	-	-
14.	Rusip Between	-	-	-
	total	35	35	

Planted Area, Harvested Area & Cauliflower Production in Central Aceh Regency, 2014

Table 7. Total Population

No.	districts	Population				
		2010	2011	2012	2013	2014
1.	Linge	8,757	8,958	9,195	9,267	9,589
2.	Atu Lintang	5,804	3,935	6,092	6,140	6,354
3.	Jagong Jeget	8,871	9,074	9,314	9,387	9,715
4.	Star	8,504	8,699	8,929	8,998	9,312
5.	Bargaining Lut	17,960	18,372	18,858	19,005	19,667
6.	Plumpness	14,041	14,362	14,742	14,857	15,374
7.	Pegasing	17,640	18,044	18,521	18,666	19,317
8.	Bies	6,414	6,561	6,735	6,787	7,023
9.	Bebesen	34,342	35,129	36,060	36,340	37,606
10.	Kute Panang	6,815	6,971	7,155	7,211	7,262
11.	Choose Nara	20,542	21,012	21,658	21,736	22,493
12.	Ketol	11,342	11,602	11,909	12,001	12,420
13.	Celala	8,367	8,558	8,784	8,853	9,161
14.	Rusip Between	6,129	6,269	6,435	6,485	6,711
	Central Aceh	175,527	179,546	194,297	185,733	192,204

Population Development by Subdistrict in Central Aceh Regency, 2010-2014

3. RESULTS AND ANALYSIS

No	Alternatif	Hasil Ketersediaan Pangan	Asupan	Keterangan
1	tomat	13.77	1416	Terpenuhi
2	sawi / pepsai	8.057	1416	Terpenuhi
3	kembang kol	4.500	1416	Terpenuhi
4	kacang panjang	2.515	1416	Terpenuhi
5	buncis	1.609	1416	Terpenuhi
6	labu siam	1.042	1416	Tidak Terpenuhi

Figure 2. Hasil Keputusan ketersediaan Pangan

This research is a process of collecting and analyzing data which is carried out systematically and logically to achieve certain goals. This research is to test existing theories / sciences for practical purposes

that are directly useful. The purpose of research on food availability is to obtain decisions about food availability in Lut Tawar District, Central Aceh Regency.

In the case of research This research uses a survey that is to collect as much data as possible about the vegetables found in Lut Tawar District which is a decision support for the quality of the research. Then analyze vegetables in meeting production targets and food availability. The application of the Simple Additive Weighting (SAW) method to the decision support system is to create a decision support system for the availability of food that is assessed from the results of its production.

1) There are 4 criteria used to make the assessment, namely:

- a. C1: Productivity
- b. C2: Harvested Area
- c. C3: Planted Area
- d. C4: Total Population

2) Decision making assigns weight to each criterion

Alternative types of vegetables are as follows:

- a. Chayote
- b. Bean
- c. Tomato
- d. Long beans
- e. Sawi / Petsai
- f. Cauliflower

3.1 Alternative Data Display

No	Alternatif	C1	C2	C3	C4	Opsi
1	labu siam	120	2	5	19667	Hapus Hitung
2	buncis	105	3	8	19667	Hapus Hitung
3	tomat	9070	28	60	19667	Hapus Hitung
4	kacang panjang	390	6	8	19667	Hapus Hitung
5	sawi / pepsai	540	20	23	19667	Hapus Hitung
6	kembang kol	880	12	10	19667	Hapus Hitung

Figure 3. Alternative Data Display

No	Alternatif	C1	C2	C3	C4	Opsi
1	labu siam	0.013	0.071	0.083	1	Hitung
2	buncis	0.011	0.107	0.133	1	Hitung
3	tomat	1	1	1	1	Hitung
4	kacang panjang	0.042	0.214	0.133	1	Hitung
5	sawi / pepsai	0.059	0.714	0.383	1	Hitung
6	kembang kol	0.097	0.428	0.166	1	Hitung

Figure 4. Normalisasi

3.2 Data normalization is carried out using the following formula

$$R_{ij} = \frac{X_{ij}}{\text{Max } X_{ij}}$$

No	Alternatif	C1	C2	C3	C4	Opsi
1	labu siam	0.054	8.450	5.263	0.005	Perangkingan
2	buncis	0.054	8.450	5.263	0.005	Perangkingan
3	tomat	0.054	8.450	5.263	0.005	Perangkingan
4	kacang panjang	0.054	8.450	5.263	0.005	Perangkingan
5	sawi / pepsai	0.054	8.450	5.263	0.005	Perangkingan
6	kembang kol	0.054	8.450	5.263	0.005	Perangkingan

Figure 5. The Ranking Process

The ranking process uses the weight determined by the decision maker using the following formula

$$V_i = \sum_{j=1}^n w_j r_{ij}$$

4. CONCLUSION

- Vegetables harvested by the farming community in Lut Tawar Subdistrict can meet their food needs with the exception of the type of chayote.
- Tomato vegetable is the biggest producer, reaching 13.77 tons per year when compared to other types of vegetables.
- The Decision Support System using the SAW method is a tool to simplify the process of calculating vegetable yields in Lut Tawar District

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