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Community-Based Local Food System Development Strategy in Improving Food Security in Jayawijaya Regency Using the Analytic Hierarchy Process (AHP) Approach

Tukijan[1]*, Nurul Yaqin[2], Vestus Febrian Aristoteles Jawan[3], Ayu Anggraini Tambunan[4]
[1,2,3,4]Universitas Amal Ilmiah Yapis Wamena
Email: tukijanbima@gmail.com

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Abstract

Food security is a condition for meeting household food needs, both in terms of quantity, quality, safety, equity, and affordability. Jayawijaya Regency, Papua, is classified as a very food vulnerable area with a ranking of 404th out of 416 districts/cities in the National Food Security Index (IKP) in 2024. This research aims to formulate an effective community-based food management strategy in improving food security in the area. The method used is the Analytical Hierarchy Process (AHP) involving 15 respondents from the community, government, and related sectors. The criteria used include economic, social, cultural, and environmental aspects. Meanwhile, alternative strategies analyzed are land optimization, food diversification, strengthening agricultural institutions, and developing community distribution. The results of the analysis showed that the land optimization strategy had the highest weight (0.494825) and was the main priority in developing food security in Jayawijaya Regency. This strategy is considered the most effective because it is able to utilize local potential optimally and sustainably.

INTRODUCTION

Food security is one of the main keys in order to realize the welfare and independence of a nation. Adequate food availability, equitable accessibility, and food system stability are prerequisites for every individual to be able to live a healthy and productive life (Battalova & Kundakchyan, 2015; Compton, 2014; Sari et al., 2023). Referring to the publication of the Jayawijaya Regency Food Security Office in 2024 regarding the Jayawijaya Regency food security index as a composite classified priority 1 (very food vulnerable) and IKP ranked 404th out of 416 regencies/cities in Indonesia. Vulnerability to food insecurity is certainly closely related to food and nutrition problems. The latest data for the percentage of stunting toddlers in Jayawijaya in 2023 is 29%, this data means that there is a percentage increase of 4% from the previous year's data of 25% (Food Security Index, 2023). This figure is far from the national target set by the government of 16 percent. In the remarks of the Regent of Jayawijaya in the context of the official launch of the 2023 Jayawijaya Regency *Food Security and Vulnerability Atlas (FSVA)* Document at the Baliem Pilamo Hotel, Tuesday, November 14, 2003, Lekius Jikwa, Assistant II of the Jayawijaya Regional Secretary, explained that *"Food Security and Vulnerability Vulnerability and Nutrition is a multi-dimensional problem that requires comprehensive handling in various sectors, not only the affairs of the Not only the Food Security Service, but also cooperation between other agencies"* (Amin Momiage, 2023).

Food fulfillment is part of individual human rights so that food sufficiency must be fulfilled continuously, stably and affordably by all levels of society. Jayawijaya Regency faces major challenges in food security due to limited access to agricultural resources, lack of optimal land utilization, and low utilization of community-based local food systems. In fact, the local

community has local wisdom and the potential of natural resources that can be developed to increase food security in a sustainable manner.

From the problems in the above background, the author hopes that there will be a system of food development for local residents towards food security that is systematic, effective, efficient and on target. Therefore, the purpose of this study is to formulate a community-based local food system development strategy through a multi-criteria decision-making approach that considers various aspects that affect food security effectively, efficiently, and on target in Jayawijaya Regency. The main focus of this study is to establish and sequence a priority framework informed by criteria according to the local context, with the active involvement of local stakeholders and indigenous peoples in Jayawijaya Regency.

This literature review discusses theories and references related to the development of community-based food systems in improving food security in Jayawijaya Regency using the *Analytical Hierarchy Process (AHP) Method*:

Food security is one of the main foundations in realizing sustainable development. This concept includes not only food availability, but also stability, accessibility, and sustainability (Dania, 2022). It further said that food security can only be achieved if all individuals have sufficient physical, social, and economic access to food to meet the needs of a healthy and productive life (FAO, 2015). In the global context, the challenge of food security is increasing due to climate change affecting food production and distribution patterns around the world (Tang et al., 2022). Likewise, Indonesia faces a high risk of climate change due to its dependence on the traditional agricultural sector.

Threats to food security stem not only from climate change, but also from land degradation and unsustainable agricultural practices (Webb et al., 2017). Climate change is driving extreme climate events as air temperatures rise and uncertainty over future rainfall patterns (Orlowsky & Seneviratne, 2012). Rice farming is a system that is still dominant in supplying food needs in Indonesia, so extreme climate events, including droughts, will have a major impact on food security (Eka Suranny et al., 2022; Nur et al., 2023). Erratic rainfall and increasing extreme weather events have reduced crop yields in several strategic areas in Indonesia. In addition, policy approaches that are too focused on agricultural intensification often ignore long-term social and ecological impacts (Dulbari et al., 2021; Kuswanto et al., 2018).

Government Regulation (PP) Number 17 of 2015, Food Security and Nutrition is a condition for the fulfillment of food and nutrition needs for the state and individuals, which is reflected in the availability of sufficient food, both in quantity and quality, safe, diverse, meets nutritional adequacy, is equitable and affordable and does not contradict the religion, beliefs, and culture of the community, to realize a good nutritional status in order to live a healthy life, active, and productive in a sustainable manner (Government Regulation Number 17 of 2015). Food security is the availability of food in sufficient quantity and quality, distributed at affordable prices and safe for consumption for every citizen to help their daily activities. Thus, food security concerns the availability, affordability, and stability of its procurement (Astina et al., 2021). The Food Law No.7 Tahuln 1996 states that the condition of the need for food for households is reflected in the availability of adequate food, both in terms of quantity and quality, safe, equitable and affordable . Suharyanto, 2011)

Community-based governance is an approach that emphasizes collective resource management by involving all elements of society in decision-making (Eufemia et al., 2023; George, 2022). This concept has been widely recognized as one of the effective strategies to address social and ecological challenges in the management of agricultural resources (Park & An, 2023; Ryan et al., 2023). In the context of food security, community governance provides a framework that enables more equitable food distribution, increased production efficiency, and joint risk management. In developing countries, this approach is key to improving food access for marginalized groups.

In the agricultural sector, collective land management is one of the tangible forms of the implementation of community-based governance. This approach not only contributes to increasing food productivity but also strengthens social networks at the community level (Kresna et al., 2024; Mahaarcha & Sirisunhirun, 2022, 2023). Through joint land management, smallholders can share resources such as seeds, technology, and agricultural infrastructure, and maximize yields by adopting innovative practices. This approach also creates space for the adaptation of modern technologies that can improve the efficiency and sustainability of the agricultural system (Alblas & van Zeben, 2023; Bodonirina et al., 2018).

However, the implementation of community-based governance in Indonesia is still limited and rarely systematically integrated into food security policies (Mindarti et al., 2025; Muis et al., 2019). Several studies note that government policies tend to be oriented towards a top-down approach, which often ignores local dynamics and the potential for collective management (Akbar et al., 2022; Nurhidayah et al., 2022) For example, in one village in Indonesia, local institutions such as Village-Owned Enterprises (BUMDes) have not fully supported community-based collective management efforts. In fact, this model has great potential to increase food security through more inclusive and local needs-based resource management.

In addition, the literature highlights that strong institutional support is key to success in strengthening community-based governance (Bahri et al., 2025; Nurhidayah et al., 2022; Rudiarto et al., 2023). Strengthening local institutional structures, such as cooperatives or farmer groups, allows farmers to gain greater access to the necessary markets, technologies, and financing (Maiwashe-Tagwi, 2023; Neupane et al., 2023). Without adequate institutional support, the integration of community governance into food security strategies risks experiencing significant obstacles, both in terms of implementation and sustainability (Bahri et al., 2021; Tambunan et al., 2021, 2024).

The Analytic Hierarchy Process (AHP) is a model of decision support developed by Thomas (Saaty, 1980). The decision support model describes complex multi-factor or multi-standard problems as hierarchical structures (Gathot Pujo Sanyoto et al., 2017). This method is a framework used to make a decision in a more effective and structured way on a complex problem by simplifying funds to speed up the process of taking it by solving the problem into parts (Hutagalung, 2021) Hierarchical structure is defined as a representation of complex problems in a multi-level structure, where the first level is the goal, followed by factor levels, standards, sub-standards, etc., to the last and alternative levels (Limbong & Yanti, 2020).

For each standard and alternative, we must make a paired comparison, that is, compare each element with other elements in each hierarchical structure in pairs, so that the value of the importance of the element is obtained in the form of qualitative opinions. To quantify qualitative opinions, an assessment scale is used to obtain opinion values in the form of promotion (quantitative).

Table 1 : Example of a Paired Matrix Table

C	C1	C2	C3	C4
C1	1			
C2		1		
C3			1	
C4				1

Table 1 is a paired matrix table or comparison filled in by policymakers or decision-makers by assessing the level of importance of one element over another. The pairing comparison process starts at the top of the hierarchy and aims to select criteria, such as C, then select items to be compared, such as C1, C2, C3, and C4.

AHP has several advantages in explaining a decision-making process. One of them is that it can be depicted graphically so that all parties involved in decision-making can easily understand it (Yanti kemala Sari Siregar Pahu & Joko Susanto, n.d.). Basic principles of the analytical hierarchy process When using the analytical hierarchy process to solve problems, it must be understood first for several principles, including (Yohanes Setyo Prabowo et al., 2015):

a) Creating a Hierarchy
   A complex system can be understood by dividing it into supporting elements, then organizing those elements into a hierarchical structure and combining them.
b) Differentiating criteria and alternatives
c) Standards and alternatives are implemented through paired comparisons. For many questions, a scale from 1 to 9 is the best scale for expressing an opinion.

Table 2 : Comparative Scale Analysis

Intensitas Kepentingan	Keterangan
1	Kedua elemen sama pentingnya
3	Elemen yang satu sedikit lebih penting
5	Elemen yang satu lebih pentingdari elemen lainnya
7	Satu elemen jelas lebih mutlak penting dari pada elemen lainnya
9	Satu elemen mutlak penting dari pada elemen lainnya
2,4,6,8	Nilai-nilai antara dua nilai pertimbangan yang berdekatan

d) Prioritization For each criterion and alternative, it is necessary to make pairwise comparisons. The relative comparative value value is then processed to determine the alternative ranking. Consideration of paired comparisons is synthesized to obtain overall priorities through the following stages: a. Squared the matrix of the results of the comparison in pairs b. Calculate the number of values of each row, then normalize the matrix.

Logical consistency Logical consistency calculation is carried out by following the following steps: a. Multiply the matrix with the corresponding prorite. b. Summing the multiplication results per row. c. The results of the summation of each row are divided by the priority concerned and the results are summed up. d. The result c is divided by the number of elements, λmax will be obtained. e. Consistency Index (CI) = (λmax-n) / (n-1) f. Consistency Ratio = CI/ RI, where RI is a random consistency index. If the consistency ratio ≤ 0.1, the result of the data calculation can be justified

METHODS

Research Stages

The method used is *the Analytic Hierarchy Process* (AHP), the AHP Method can be used for both qualitative and quantitative data (*Mix Method*), because AHP is designed to process subjective human preferences and convert them into numerical values through paired comparison scales. This research began with problem identification and problem analysis through literature study, *Focus Group Discussion* (FGD) and in-depth interviews. Furthermore, a hierarchy of objectives, criteria, and alternative strategies was prepared. The next step is to make a questionnaire according to the desired data and disseminate it to experts and community leaders in Jayawijaya Regency. Then the data is analyzed through weighting by experts and community leaders involved in food

security to determine which strategy priorities are the most effective. And then draw a conclusion and suggestions on data analysis in determining strategy priorities.

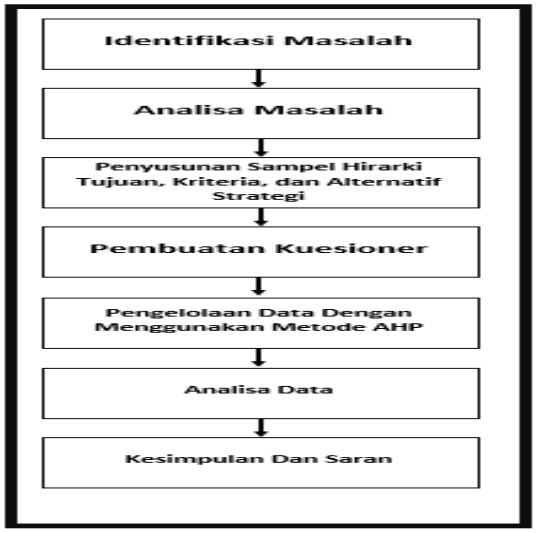

Figure 1: Research Stages

The stages of research can be described in general as follows:

1. *Problem Identification*

   Define the problem and also determine the expected solution, and then create a hierarchical structure. The identification of this problem was carried out by examining problems taken through previous literature data, in-depth interviews, and FGDs on sectors that play a role in food security to discuss food security problems in Jayawijaya Regency.

2. *Literature Review*

   In the literature review, this study obtained theories from experts in their fields that affect food security in Jayawijaya Regency.

3. *Population Determination and Research Sample*

   The population in this study is respondents from the community, the government sector, and other sectors that have a direct or indirect influence on food security in Jayawijaya Regency. Namely for the government sector, data was obtained from the Regent of Jayawijaya and the Food Security Office, while for the community sector in Jayawijaya Regency, data was obtained from Figures in 4 Villages and 5 Farmer Groups, including: 1.) There are 2 Farmer Groups in Pyramid Village; 2.) There is 1 Farmer Group in Megapura Village; 3.) There is 1 farmer group in Tulem Village; 4.) There is 1 Farmer Group in Wouma village and for other sectors it is obtained from Academics. Sampling in this study was carried out by means of in-depth interviews and *Focus Group Discussions* (FGD) to the population involved in food security in the Jayawijaya Regency area. In this study, it is expected that the number of respondents will be at least 15 people with records that can represent the three parties to the population in the formation of panagan resilience strategies, namely from the community, the Government Sector, and other sectors involved, to determine the hierarchy of goals, objectives, and alternatives.

4. *Questionnaire Creation*

   To make this research easier, the author conducted a questionnaire survey when making a questionnaire, it must be in the form of well-structured questions and interconnected with the problem being carried out in this study.

5. *Data Collection*

After distributing the questionnaire to the respondents, a data coverage test was carried out. The calculation of data coverage is to determine the minimum number of samples that can be processed in the next calculation process. This calculation is done to see if there is enough content collected. If the data obtained is insufficient, then the data collection process must be repeated.

6. *Data processing with the Analytical Hierarchy Process (AHP) Method*

After collecting data, the author can process the data using the *Analytical Hierarchy Process (AHP) method.*

7. *Conclusions and Suggestions*

From this research, a description of the research process was produced by drawing conclusions from an existing problem.

Data Analysis Methods

To achieve what is the goal of this study, the author uses a method, namely quantitative analysis. This analysis is a research that compares between criteria and alternatives which can produce a decision to do something, namely the selection of the best securities application for beginners with the AHP method which is tested using Microsoft Excel 2010.

In this study, the researcher used the AHP method. This method is one of the ways that can solve problems that occur in a complex and unstructured way into its parts by dividing them into hierarchical groups, and then entering their numerical values as a substitute for human perception into a more relative comparison by determining the element with the highest priority from the results obtained in the study.

The steps in the AHP method are as follows:

1. Define the problem and also determine the expected solution, and then create a hierarchical structure.
2. Create a matrix with paired comparisons to describe a relative contribution value
3. Calculate the eigenvector of each matrix where the weight of each element determines the priority for the element of the hierarchy.
4. Checking the consistency of the hierarchy, which is measured is the level of consistency ratio based on the consistency index. The expected consistency is one that can get close to perfect results in order to get a decision that is close to valid. The consistency ratio is expected to be less than or equal to 10%.

The consistency index formula is (Arán Carrión et al., 2008):

$$CI = \frac{\lambda - n}{n - 1}$$

Where:
CI = *Consistency Index*
λ = Average score of all criteria/alternatives
n = Number of criteria/alternatives tested

Meanwhile, the consistency ratio can be calculated using the following formula (Arán Carrión et al., 2008):

$$CR = \frac{CI}{IR}$$

Where:
CR = *Consistency Ratio* (Consistency Ratio)
CI = *Consistency Index* (Consistency index)
GO = *Random Index* (Random Index)

Table 3 : List of *Random Consistency Index*

n	1	2	3	4	5	6	7	8
RI	0,00	0,00	0,58	0,90	1,12	1,24	1,32	1,41

Where:
RI = *Index Random Consistency*
n = Number of criteria/alternatives tested

In this study, the criteria chosen by the author in the strategy for developing community-based local food systems in improving food security in Jayawijaya Regency are Economic, Social, Cultural, Environmental. Then for the alternatives used are the Land Optimization Strategy, Food Diversification Strategy, Farmer Institutional Strengthening Strategy, and Community Distribution Development Strategy. All of the above data variables were obtained through an in-depth study of the previous literature and interviews with several *experts* involved in food security in Jayawijaya Regency. From the explanation of the above criteria and alternatives, the researcher made a hierarchical model in the strategy for developing community-based local food systems in improving food security in Jayawijaya Regency as follows:

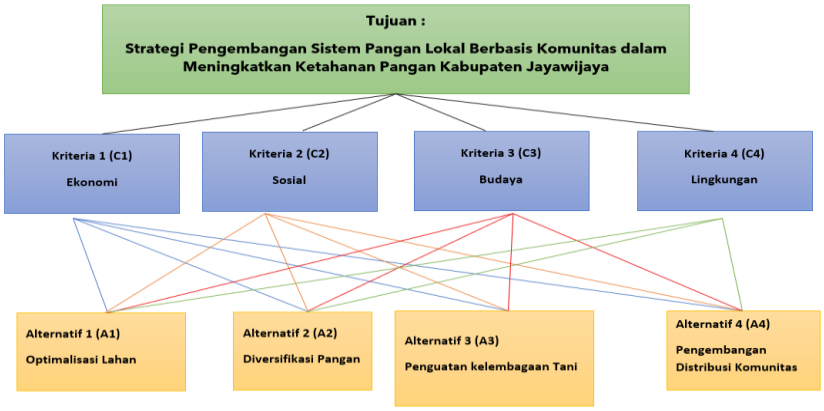

Figure 2: Community-Based Local Food System Development Strategy Hierarchy Model in Improving Food Security in Jayawijaya Regency

RESULTS AND DISCUSSION

After managing the data obtained through the steps described above in this study, the author continues to analyze the data to meet the purpose of this study, which is to find an effective, efficient and targeted strategy, namely the strategy for developing community-based local food systems in improving food security in Jayawijaya Regency. The data obtained from this research were obtained from 15 respondents involved in the selection of food security strategies in

Jayawijaya Regency. And the data that is managed and calculated is from the geometric average (*Geo Mean*) of the entire number of respondents.

Criteria Comparison Matrix

Table 5. *Geomean* Matrix Table Criteria

Geomean Matrix Comparison Criteria										
All Respondents					Nilai Eigen				Quantity	average
Criteria	C1	C2	C3	C4						
C1	1	4.306635	5.398658	8.164933	0.65	0.70	0.61	0.57	2.53	0.63
C2	0.2322	1	1.916474	3.197421	0.15	0.16	0.22	0.22	0.75	0.19
C3	0.185231	0.521792	1	1.984506	0.12	0.08	0.11	0.14	0.46	0.11
C4	0.122475	0.312752	0.503904	1	0.08	0.05	0.06	0.07	0.26	0.06
Quantity	1.54	6.141179	8 5/6	14.34686						1.000
λ Max	4.062408									
CI	0.020803									
CR	0.023114									

Description : Criterion 1 (C1) = Economics
Criterion 2 (C2) = Social
Criterion 3 (C3) = Culture
Criterion 4 (C4) = Environment

λ Max = Average score of all Criteria
CI = Consistency Index
CR = Consistency Ratio

Judging from the results of the calculation above, it is obtained from the calculation of the overall respondents' Consistency Index for *the Geomean* matrix criteria, the comparison criteria are: *Consistency Index* (CI) = 0.020803 with *Consistency Ratio* (CR) = 0.023114 which can be declared valid consistent. This can be stated according to the valid consistency requirement, where if the CR value has a value less than equal to (≤) 10%. And for the value of this *Consistency Ratio*, it is obtained from the *value of the Consistency Index* divided by the *value of the Random Index* ( ) where the value of $CR = \frac{CI}{RI}$ *this Random Index* can be seen from table 3 (List *of Random Index Consistency*). For the random index of this criterion is 0.09 which corresponds to the number of criteria determined/tested is 4 criteria clusters. The data also shows that for the Economic criterion (C1) has a dominant average value of 0.63 (63%), this shows that respondents view the economic aspect as the main priority in the development of the food system. This reflects the urgent need to increase farmers' productivity and income.

Alternative Comparison Matrix with Criteria

In this alternative comparison matrix, there are 4 alternative strategies that are tested, namely: 1. alternative community distribution development (A1); 2. alternative food diversification (A2); 3. Alternative strengthening of agricultural institutions (A3); 4. Community Distribution Development (A4). And for the results and analysis of these alternatives, it can be seen as follows:

1. **Alternative Comparison Matrix with Economic Criteria.**

Table 5. *Geomean* Alternative Comparison Matrix with Economic Criteria

Geomean Alternative Comparison Matrix with Economic Criteria										
All Respondents					Nilai Eigen				Quantity	average
Alternatives	**A1**	**A2**	**A3**	**A4**						
A1	1	3.555837	6.654539	6.393522	0.63	0.69	0.51	0.57	2.41	0.60
A2	0.281228	1	3.47593	3.20007	0.18	0.19	0.27	0.29	0.93	0.23
A3	0.150273	0.287693	1	0.542195	0.09	0.06	0.08	0.05	0.28	0.07
A4	0.156408	0.312493	1.844355	1	0.10	0.06	0.14	0.09	0.39	0.10
Quantity	**1.59**	**5.156023**	**13**	**11.13579**						1.000
λ Max	4.133905									
CI	0.044635									
CR	0.049594									

Description :

Alternative 1 (A1) = Land Optimization λ Max = Average value of all Alternatives
Alternative 2 (A2) = Food Diversification CI = Consistency Index
Alternative 3 (A3) = Strengthening of Agricultural Institutions CR = Consistency Ratio
Alternative 4 (A4) = Community Distribution Development

For this Alternative Comparison with Economic Criteria, it can be seen from the results of the calculation above. And it is obtained for the calculation of the overall respondents' Consistency Index for this alternative (*Geomean* matrix of Alternative Comparison with Economic Criteria) this is for the value of the *Consistency Index* (CI) = 0.044635 with the *Consistency Ratio* (CR) = 0.049594 which can be declared valid consistent. This is obtained in accordance with the valid conditions of consistency, where if the CR value is less than equal to (≤) 10%, so that the data can be used as a benchmark for selection and strategy determination. And for the value of this *Consistency Ratio*, it is obtained from the *value of the Consistency Index* divided by the *value of the Random Index* ( ) where the value of $CR = \frac{CI}{RI}$ *this Random Index* can be seen from table 3 (List *of Random Index Consistency*). For the random index for the Comparison of Alternatives with Economic Criteria, this is 0.09 which corresponds to the number of alternatives determined/tested is 4 Alternative clusters. And the data above also shows that the priority weight of the alternative comparison matrix with the economic criteria is aimed at the alternative of land optimization with an average value of 0.6 (60%), this shows that there is a potential for significant productivity increase through the improvement of cultivation techniques and irrigation infrastructure in agriculture for food security.

2. Alternative Comparison Matrix with Social Criteria.

Table 6. *Geomean* Comparison Matrix Alternative with Social Criteria

Geomean Comparison Matrix Alternative with Social Criteria										
All Respondents					Nilai Eigen				Quantity	average
Alternatives	A1	A2	A3	A4						
A1	1	0.206165	0.2807	0.1232	0.06	0.05	0.03	0.07	0.21	0.05
A2	4.850473	1	2.986895	0.329579	0.28	0.22	0.36	0.19	1.05	0.26
A3	3.562522	0.334796	1	0.243901	0.20	0.07	0.12	0.14	0.54	0.13
A4	8.11691	3.034173	4.100018	1	0.46	0.66	0.49	0.59	2.21	0.55
Quantity	17.53	4.575134	8 3/8	1.69668						1.000

λ Max 4.174134
CI 0.058045
CR 0.064494

Description :
Alternative 1 (A1) = Land Optimization λ Max = Average value of all Alternatives
Alternative 2 (A2) = Food Diversification CI = Consistency Index
Alternative 3 (A3) = Strengthening of Agricultural Institutions CR = Consistency Ratio
Alternative 4 (A4) = Community Distribution Development

From the data above (table 6), it can be seen that the calculation of the value of the Alternative Comparison with the Social Criteria also includes having a value that is valid consistently. This can be seen from the value *of the Consistency Ratio* (CR) is 0.064494, where this CR value is obtained from the comparison between the *value of the Consistency Index* and the *value of the Random Index* ( ) from the $CR = \frac{CI}{RI}$ *Geomean* matrix of Alternative Comparison with Social Criteria, and shows that the value meets the consistency standard, this can be seen from the value of CR which has a value less than equal to (≤) 10%, so that the data can be used as a benchmark for selecting and determining strategies. For the priority weight in the calculation of the alternative comparison matrix with social criteria, it is shown in the alternative Community Distribution Development (A4) with an average value of 0.55 (55%). This community-based distribution system receives the highest priority because it has the potential to strengthen social solidarity and ensure equitable access to food for all members of the community.

3. Alternative Comparison Matrix with Cultural Criteria.

Table 7. *Geomean* Alternative Comparison Matrix with Cultural Criteria

Geomean Alternative Comparison Matrix with Cultural Criteria										
All Respondents					Nilai Eigen				Quantity	average
Alternatives	A1	A2	A3	A4						
A1	1	2.744687	5.914725	7.589983	0.60	0.65	0.55	0.45	2.25	0.56
A2	0.36434	1	3.565205	5.372139	0.22	0.24	0.33	0.32	1.11	0.28

A3	0.16907	0.280489	1	2.797835	0.10	0.07	0.09	0.17	0.43	0.11
A4	0.131753	0.186146	0.357419	1	0.08	0.04	0.03	0.06	0.22	0.05
Quantity	1.67	4.211321	10,8333	16.75996						1.000

λ Max 4.163958
CI 0.054653
CR 0.060725

Description :
Alternative 1 (A1) = Land Optimization
Alternative 2 (A2) = Food Diversification
Alternative 3 (A3) = Strengthening of Agricultural Institutions
Alternative 4 (A4) = Community Distribution Development

λ Max = Average value of all Alternatives
CI = Consistency Index
CR = Consistency Ratio

For the Alternative Comparison with the Cultural Criteria, it can be seen from the results of the matrix calculation above (table 7). And it was obtained for the calculation of the overall respondent Consistency Index for the alternative of *the Geomean* matrix of Alternative Comparison with Cultural Criteria has a *Consistency Ratio* value (CR) = 0.049594 which can be declared valid consistent. This is in accordance with the valid requirement of consistency, where if the CR value is less than equal to (≤) 10%. And for the value of this *Consistency Ratio*, it is obtained from the division between the *value of the Consistency Index* and the *value of the Random Index* ( ) where the value of $CR = \frac{CI}{RI}$ *this Random Index* can be seen from table 3 (List *of Random Index Consistency*). For the random index of this alternative is 0.09 which corresponds to the number of determined/tested alternatives is 4 alternative clusters. Therefore, the data for the Alternative Comparison with Cultural Criteria can be used as a benchmark for determining and selecting strategy priorities. The data also shows that the priority of weighting the value in the alternative comparison matrix with the Cultural criteria is shown in the alternative value of Land Optimization (A1), because it can be said that land has a sacred value in Papuan culture and a representation of spiritual relationship with ancestors.

4. Alternative Comparison Matrix with Environmental Criteria.

Table 8. *Geomean* Alternative Comparison Matrix with Environmental Criteria.

Geomean Comparison Matrix Alternatives with Environmental Criteria										
All Respondents					**Nilai Eigen**				**Quantity**	**average**
Alternatives	**A1**	**A2**	**A3**	**A4**						
A1	1	5.051178	4.666909	5.977056	0.63	0.65	0.66	0.54	2.48	0.62
A2	0.197974	1	1.052994	1.313843	0.13	0.13	0.15	0.12	0.52	0.13
A3	0.214275	0.949673	1	2.797835	0.14	0.12	0.14	0.25	0.65	0.16
A4	0.167306	0.761126	0.357419	1	0.11	0.10	0.05	0.09	0.34	0.09
Quantity	1.58	7.761977	7	11.08873						1.000

λ Max 4.100459

CI	0.033486
CR	0.037207

Description :

Alternative 1 (A1) = Land Optimization
Alternative 2 (A2) = Food Diversification
Alternative 3 (A3) = Strengthening of Agricultural Institutions
Alternative 4 (A4) = Community Distribution Development

λ Max = Average value of all Alternatives
CI = Consistency Index
CR = Consistency Ratio

The results of the calculation of the Geomean matrix for the comparison of the Alternative Comparison of Community Distribution Development above obtained *the value of the Consistency Index* (CI) = 0.044635 with the *Consistency Ratio* (CR) = 0.037207 which can be declared valid and consistent. This can be stated in accordance with the valid conditions of consistency, where the CR value is less than equal to (≤) 10%, so that it can be used as a benchmark for determining and selecting strategy priorities. And for the value of this *Consistency Ratio*, it is obtained from the *value of the Consistency Index* divided by the *value of the Random Index* ( ) where the value of $CR = \frac{CI}{RI}$ *this Random Index* can be seen from table 3 (List *of Random Index Consistency*). For the random index of this Alternative is 0.09 which corresponds to the number of determined/tested alternatives is 4 Alternative Clusters. And this data also shows that the priority weight for the alternative comparison matrix to environmental criteria is aimed at the alternative land optimization with an average value of 0.62 (62%). It can be stated that land optimization is seen as the most environmentally friendly strategy because it focuses on increasing the productivity of existing land without expanding it that damages natural ecosystems.

Ranking Strategy Selection

Table 9. Geomean Matrix *Ranking*

Geomean Matrix *Ranking*		**No. Rank**
Alternative Land Optimization Strategies	0.494825	1
Alternative Food Diversification Strategies	0.235855	2
Alternative Strategies for Strengthening Agricultural Institutions	0.091816	4
Alternative Community Distribution Development Strategy	0.177505	3

The results of the Ranking to determine the priorities of the community-based local food system development strategy in improving food security in Jayawijaya district can be seen from the data table above (table 9), the results show that the weight of the value of the Alternative Land Optimization Strategy = 0.494825; the value of the Alternative Food Diversification Strategy = 0.235855; the value of the Alternative Strategy for Strengthening Farmer Institutions = 0.091816; and the value of the Alternative Development Strategy Community Distribution = 0.177505. From the weight of the values shown for the first priority, the first is the Alternative Land Optimization Strategy, the second is the Alternative Food Diversification Strategy, the third is occupied in the

Alternative Community Distribution Development Strategy, and the last one shows the Alternative Strategy for Strengthening Farmer Institutions

CONCLUSION

Judging from the results and analysis explained above, all data from respondents involved in the selection of community-based local food system development strategies in increasing food security in Jayawijaya Regency can be used as a benchmark for determining alternative strategies, this is obtained from the calculation of *Geomean* comparison matrix between Alternatives and Criteria. The data shows that the entire Consistency *Ratio* (CR) value of the Criteria Matrix and the four Alternative Strategies matrix determined shows less than 10%, so it can be stated that the data can be used as a benchmark for determining and selecting priorities from the four (4) alternatives determined for the community-based local food system development strategy in improving food security in Jayawijaya Regency. The ranking results show that the main priority value for the four alternative strategies is shown in the alternative land optimization strategy. Where the weight of the ranking value for land optimization alternatives is greater than other alternative strategies.

From the above conclusion, the author hopes that there will be an acceleration of the realization of the strategy that has been determined through the priority selection of food management strategies for food security in Jayawijaya Regency, so that it can be tested whether this determined strategy is an effective, efficient and targeted strategy in improving food security in Jayawijaya Regency. And this research is also expected to be developed again in increasing food security in Jayawijaya Regency in the future. The author also hopes that the results and analysis of this paper can be used as a reference and benchmark for the development of science and research in the future.

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