# Superior food crop commodities in the Pawonsari area, Boalemo Regency, Gorontalo

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**Abstract.** The Pawonsari Transmigration Area in Boalemo Regency has strategic potential for the development of food crop commodities. The aim of the research is to identify superior food crop commodities in the Pawonsari area, Boalemo Regency, Gorontalo. This study uses a two-stage analytical approach, namely the Location Quotient and Analytical Hierarchy Process methods. The research data consist of food crop production statistics and expert assessments from relevant government institutions. The LQ results indicate that rice, soybean, and sweet potato are classified as basic commodities. The finalization stage through AHP identifies priority levels of stakeholders, namely the Department of Agriculture, the Regional Development Planning Agency Bappeda, the Agricultural Extension Center, the Department of Transmigration, and the Department of Industry and Trade. At the criteria level, land availability and suitability emerge as the most influential factors, followed by production and continuity, business profitability, market demand, and value added. Integration of the LQ and AHP results positions maize and rice as the primary priority commodities, while soybean, cassava, and sweet potato serve as secondary priorities. The transmigration area in Pawonsari is very suitable for planting corn and rice which can then be commercialized to other provinces or even exported.

## 1 Introduction

Economic development is fundamentally aimed at improving public welfare by reducing unemployment, inequality, and poverty, as key indicators of development success. In this process, understanding a region's comparative advantages is crucial, as local economic potential, production specialization, and the region's ability to optimize resources significantly influence the direction of economic growth. Therefore, identifying regional conditions, superior potential, and the challenges faced is a crucial initial step in developing

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regional development plans.

The agricultural sector plays a central role in development, particularly in regions whose economic structures still rely heavily on cultivation and food production. This sector plays a key role not only in providing basic community needs but also as a driving force for the economy through its contribution to regional income and employment. From a food perspective, Law of the Republic of Indonesia Number 18 of 2012 explains that food encompasses all biological products, both processed and unprocessed, including agricultural, plantation, forestry, livestock, fishery, and aquatic products. Various plant-based commodities from agricultural crops have long been utilized as sources of food and beverages. Widely recognized food crops include vegetables, fruits, cereals, nuts, and tubers [1].

Sectoral economic potential analysis needs to be complemented by the identification of superior commodities to ensure more targeted and data-driven development decision-making. This process allows for the determination of economic development priorities down to the level of strategic commodities with highly competitive potential. In the context of regional autonomy, each region has the flexibility to choose which commodities to optimize, making identifying commodity strengths crucial for achieving economic efficiency while strengthening regional competitiveness [2].

Studies of superior commodities generally examine two perspectives: supply and demand. From the supply side, a commodity is considered superior if it can grow optimally under favorable biophysical, technological, and socioeconomic conditions in the region. Meanwhile, from the demand side, a commodity is considered superior if it has substantial market demand and is highly competitive in both domestic and international markets [3]. The development of superior commodities is also heavily influenced by environmental factors such as soil quality, climate, infrastructure, institutions, and local culture related to cultivation practices [4]. Commodities that demonstrate this superiority generally become the mainstay of regional economic development.

In regional economic analysis, the economic base approach is used to distinguish between basic and non-basic sectors as drivers of regional growth. One of the most common quantitative methods used to identify base/leading sectors or commodities, whereas AHP is a decision-making tool for prioritization). This method measures the level of specialization of a commodity by comparing its contribution in a region to its contribution in the wider region. An LQ value greater than one indicates a commodity has a comparative advantage and plays a significant role in the regional economic structure [5]. Thus, the LQ is an important instrument for identifying priority development for leading sectors in regional development. Furthermore, the AHP method is used to determine priority development for leading commodities based on relevant criteria, taking into account the opinions of experts and relevant stakeholders.

The Pawonsari Transmigration Area in Boalemo Regency, Gorontalo Province, is one of the regions with significant agricultural potential and serves as a mainstay for the local community's economic activities. Its favorable geographic conditions, relatively extensive land availability, and the transmigrant community's largely agricultural-oriented social structure make this area a valuable area for analyzing its food commodities. However, the variety of commodities cultivated by transmigrants and the development of their production structures in each settlement unit demonstrate the need for more in-depth studies to determine which commodities are truly worthy of being designated as leading regional commodities. The purpose of this research is to identify and determine superior food crop commodities in the Pawonsari transmigration area.

## 2 Methods

This research was conducted in the Pawonsari transmigration area, Boalemo regency, Gorontalo province, which administratively encompasses two sub-districts with a total of 17 villages. This study used secondary data to identify superior food commodities in the transmigration area. The food commodities studied included rice, corn, soybeans, peanuts, cassava, sweet potatoes, and mung beans. The data used was production value, obtained by multiplying production volume by consumer prices for each commodity over a six-year period, from 2019 to 2024.

### 2.1 *Location Quotient (LQ)*

LQ analysis is used to determine and classify the distribution of commodities based on the commodity potential of a region or area [6]. According to [6], the data used should be from at least the previous five years in time series format. The formula for analyzing LQ data is as follows:

$$LQ = \frac{Vi/Vt}{Yi/Yt}$$

Description:
Vi: production/harvested area/population of commodity i at the regional level.
Vt: production/harvested area/total population of commodity group at the district level.
Yi: production/harvested area/population of commodity i at the regional level.
Yt: production/harvested area/total population of commodity group at the district level.

The criteria are:
LQ > 1 the commodity is classified as a basic sector.
LQ < 1, the commodity is classified as a non-basic sector.
LQ = 1, the commodity can only meet regional needs (self-sufficiency).

### 2.2 *Analysis Analytic Hierarchy Process (AHP)*

The selection of priority superior commodities was carried out using the AHP method. The AHP is a model that provides the opportunity to build ideas and define problems by making assumptions and obtaining desired solutions [7]. This method is able to accommodate all problems in optimal decision-making from several alternative decision choices. The AHP method of decision-making is obtained from the results of distributing questionnaires to selected respondents. The stages in solving problems using AHP are as follows:

1. Create a hierarchical structure
   Creating a hierarchical structure is the first step in describing problems and decision-making into several interconnected levels, from the main objective to the decision alternatives [8]. The main objective is established at the top level, followed by relevant actors, criteria, and sub-criteria at the middle level, and finally at the decision alternative level at the bottom. Each element can be analyzed systematically, and the relationships between levels can be clearly understood, thus facilitating the evaluation of priorities and the selection of the most appropriate decision alternative.
2. Determining priorities
   a. Pairwise comparison matrix
      A pairwise comparison matrix is used to compare two elements at the same level. This matrix was completed through a questionnaire completed by experts and stakeholders, including: the Boalemo Regency Regional Research and Development Agency (Head

of BAPEDA, Head of Research and Innovation, and Head of Regional Infrastructure Planning), the Boalemo Regency Agriculture Office (Head of Agriculture, Head of Food Crops and Horticulture, Head of Food Security, and Head of Agricultural Extension and Infrastructure), the Boalemo Regency Transmigration Office (Head of Transmigration, Head of Transmigration, and Head of Manpower), the Cooperatives, Industry, and Trade Office (Head of Trade), and the Agricultural Extension Center (Wonosari BPP Coordinator). Respondents were asked to rate the intensity of the relationship between elements using a scale of 1–9, which is considered effective in distinguishing the level of importance or dominance between two elements (Nurani et al., 2023). Next, the questionnaire results were processed into a pairwise comparison matrix, as presented in Table 1 and 2.

**Table 1**. AHP pairwise comparison assessment indicators

| **Level of importance** | **Definition** | **Explanation** |
|---|---|---|
| 1 | Both elements are equally important | Two elements have the same influence on goals |
| 3 | One element is slightly more important than the other element | Experience and judgment slightly favor one element over another. |
| 5 | One element is more important than another element | Experience and judgment strongly favor one element over another. |
| 7 | One element is clearly more important than the other elements. | One element is strongly supported and its dominance has been seen in practice. |
| 9 | Satu elemen mutlak lebih penting daripada elemen yang lainnya | One element is absolutely more important than the other elements |
| 2, 4, 6, 8 | Values between two adjacent consideration values | |
| Reciprocal | If element i gets one number compared to element j, then the value of element j has the opposite value when compared to element i. | |

**Table 2.** Calculation of AHP pairwise comparison matrix

| C | A1 | A2 | A3 | A… | An |
|---|---|---|---|---|---|
| A1 | 1 | a12 | A13 | …. | a1n |
| A2 | 1/a12 | 1 | 1/a23 | …. | a2n |
| A3 | 1/13 | 1/a23 | 1 | …. | …. |
| A.. | …. | …. | …. | …. | … |
| An | 1/a1n | 1/a2n | 1/a3n | …. | 1 |

Description:
C = Criteria or characteristics used for comparison
A1, A2, A3, Cn = The set of elements being compared, one Level below C
a12, a13,....1 = Quantification of opinion from comparative results

b. Calculating normalization
The normalization calculation is performed to determine the priority vector or eigenvector values in the next stage using the following formula:

$$eVpi = \frac{zi}{\sum_{i=1}^{n} zi}$$

Description:
Vpi = Priority vector (eigenvector) of element i
Zi = Multiplication of row i

3. Calculating consistency
a. Calculating eigenvalues and maximum lambda (**λ** max)

VA = aij x Vp where VA = (V aij); VA is the vector between
VB = $\frac{VA}{VP}$ where VB = (V bi); VB is the eigenvalue
**λ** max = $\frac{\sum_{i=1}^{n} Zi}{n}$

b. Index Consistency (CI)

CI = $\frac{\lambda \text{ max} - n}{n}$

c. Ratio Consistency (CR)

CI = $\frac{\text{Ci}}{RI}$

The Random Index (RI) values of matrices of order 1 to 10 used in the CR calculation are listed in Table 3. The RI values refer to [9].

**Table 3.** RI values for the number of elements (n) 1 to 10

| RI | N | R1 |
|---|---|---|
| 0.00 | 6 | 1.24 |
| 0.00 | 7 | 1.32 |
| 0.58 | 8 | 1.41 |
| 0.90 | 9 | 1.45 |
| 1.12 | 10 | 1.40 |

# 3 Result and discussion

## *3.1 Location Quotient (LQ)*

The results of the LQ analysis related to the initial identification of superior food crop commodities in the Pawonsari transmigration area can be seen in Table 4.

**Table 4.** Results of the LQ analysis: Initial identification of superior food crop commodities

| Commodity | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | Average |
|---|---|---|---|---|---|---|---|
| **Corn** | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | **0.9** |
| **Rice** | 2.0 | 1.6 | 1.6 | 1.7 | 1.5 | 2.0 | **1.7** |
| **Soya bean** | 2.2 | 2.1 | 1.7 | 0.9 | 1.1 | 0.9 | **1.5** |
| **Sweet potato** | 2.2 | 2.1 | 0.0 | 0.0 | 1.6 | 2.3 | **1.7** |
| **Cassava** | 1.4 | 1.3 | 0.0 | 0.0 | 0.4 | 0.9 | **0.5** |
| **Peanuts** | 0.0 | 2.1 | 0.0 | 1.1 | 1.0 | 1.6 | **0.7** |
| **Mung beans** | 0.0 | 2.1 | 0.0 | 0.0 | 0.0 | 0.0 | **0.3** |

Description:
LQ > 1 = Base which fulfills the needs of the own region
LQ = 1 = non-base where production is only sufficient to fulfill the needs of the own region.
LQ < 1 = non-base where the commodity cannot fulfill the needs of the own region

The results of a LQ analysis of seven food crop commodities in the Pawonsari Transmigration Area indicate a differentiation in production capacity, reflecting the comparative advantage and level of commodity specialization in the region. Based on the average LQ value for the 2019–2024 period, rice, sweet potatoes, and soybeans have an LQ value > 1, categorizing them as basic or superior commodities. Rice and sweet potatoes have an LQ value of 1.7, and soybeans have an LQ value of 1.5. Food crops with an LQ value > 1 demonstrate comparative advantage, as they are able to meet the region's own food needs while simultaneously generating a surplus that can be marketed outside the region [10]. These food crops also contribute significantly to the regional economy due to their production specialization. This means the region excels in developing rice, sweet potatoes, and soybeans, thus becoming distinctive and contributing to the local economy.

Food crops in the Pawonsari Transmigration Area with an LQ value of <1 include corn, cassava, peanuts, and mung beans. Corn has an LQ of 0.9, cassava 0.5, peanuts 0.7, and mung beans 0.3. Food crops with an LQ value of <1 are categorized as non-basic or non-primitive. An LQ value of <1 indicates a low level of production specialization, resulting in a relatively small contribution to the local economy compared to basic commodities.

The results of the LQ analysis cannot be used as an absolute basis for determining superior commodities; they can only be used as an initial analysis to identify superior food crop commodities based on statistical data. The LQ approach has limitations because it only assesses the relative contribution of a commodity compared to a comparison region, without considering important factors such as government policy, production continuity, profitability, added value, land suitability, and other strategic factors. However, the findings of this LQ analysis remain relevant as interim recommendations for an initial overview of rice, sweet potatoes, and soybeans as superior food crop commodities before conducting more in-depth and specific follow-up studies.

These limitations render the LQ method inadequate for comprehensively identifying superior commodities. Therefore, further, complex, multidimensional analysis, such as the AHP, is required to measurably determine superior food crop commodities.

### *3.2 Analytical Hierarchy Process (AHP)*

The AHP method for determining superior food crop commodities involved expert respondents, assessment criteria, and weighted data for each commodity to determine development priorities. This study involved 10 expert respondents from five key agencies: the Transmigration Office, the Agriculture Office, the Trade and Industry Office, the Regional Development Planning Agency (Bappeda), and the Agricultural Extension Center.

The experts were selected based on their multidisciplinary competencies, encompassing regional planning, agricultural production and technology, commodity trade management, and the role of actors directly involved with farmers, namely agricultural extension workers. This competency-based selection allows for a holistic, measurable, and representative assessment of the actual conditions in the Pawonsari transmigration area.

Based on expert analysis supported by literature review, five main criteria were identified for determining superior food crop commodities in the Transmigration Area. These include production and continuity of production, profitability, market demand, added value, and land availability and suitability. The hierarchical structure and weighting results for determining superior food crop commodities in the Transmigration Area can be seen in Figure 1. The AHP hierarchical structure for determining superior food crop commodities is structured into four levels. The first level represents the primary objective, which is to determine superior food crop commodities. The second level contains the actors or stakeholders involved in the assessment process. The third level contains the criteria used as indicators of commodity superiority. Finally, the fourth level includes alternative food crop commodities recommended for determining superior food crop commodities.

The selection of alternative commodities in determining superior food crop commodities focused on five of the seven commodities proposed by expert respondents to deepen the analysis and facilitate the comparison process. Although not entirely in line with the results of the LQ analysis, the selected commodities were deemed more relevant to biophysical and socioeconomic conditions, development potential, and strategic considerations. The five alternative food crop commodities selected by expert respondents included corn, rice, sweet potatoes, cassava, and soybeans.

The results of the AHP at the actor or stakeholder level showed a good level of consistency with a CR value of 0.092, so the resulting weighting is acceptable. A CR value below the tolerance limit of 0.10 indicates that respondents' assessments are consistent [11]. Based on the weighting, the Boalemo Regency Agriculture Office received the highest weighting (0.498), indicating its role as the most dominant actor in determining the direction of food crop commodity development in the Pawonsari Transmigration Area. BAPPEDA (0.211) ranked second through its coordinating function in synergizing cross-sectoral planning. The Agricultural Extension Center (0.170) played a significant role in empowering and providing technical assistance to farmers, while the Transmigration Office (0.082) and DISPERINDAG (0.037) had lower weightings due to their more limited roles in regional development and marketing facilitation. At the criteria level, the AHP analysis also demonstrated strong consistency with a CR value of 0.059, thus the inter-criteria weightings were considered valid as a basis for decision-making. Land availability and suitability were the criteria with the highest weighting (0.375), indicating that biophysical aspects are the primary determinants of the feasibility of commodity development in transmigration areas. Production and continuity (0.214) ranked second, followed by business profitability (0.196), as an economic aspect that also influenced priority. Market demand (0.138) was a medium priority, while value-added (0.049) received the lowest weighting, indicating that downstream activities have not yet become a primary focus in the strategy for developing superior commodities.

The results of geomean calculations from 10 expert respondents on each alternative matrix against the criteria showed a high level of consistency, with CR values for production and continuity of 0.051, business profitability of 0.037, market demand of 0.036, value-added of 0.044, and land availability and suitability of 0.021. All CR values below 0.10 indicate that respondents' assessments were consistent across criteria, thus making the alternative weights reliable. The lowest CR value for the land availability and suitability criteria (0.021) indicates the highest level of agreement among respondents, reinforcing the dominant role of biophysical aspects in the decision structure.

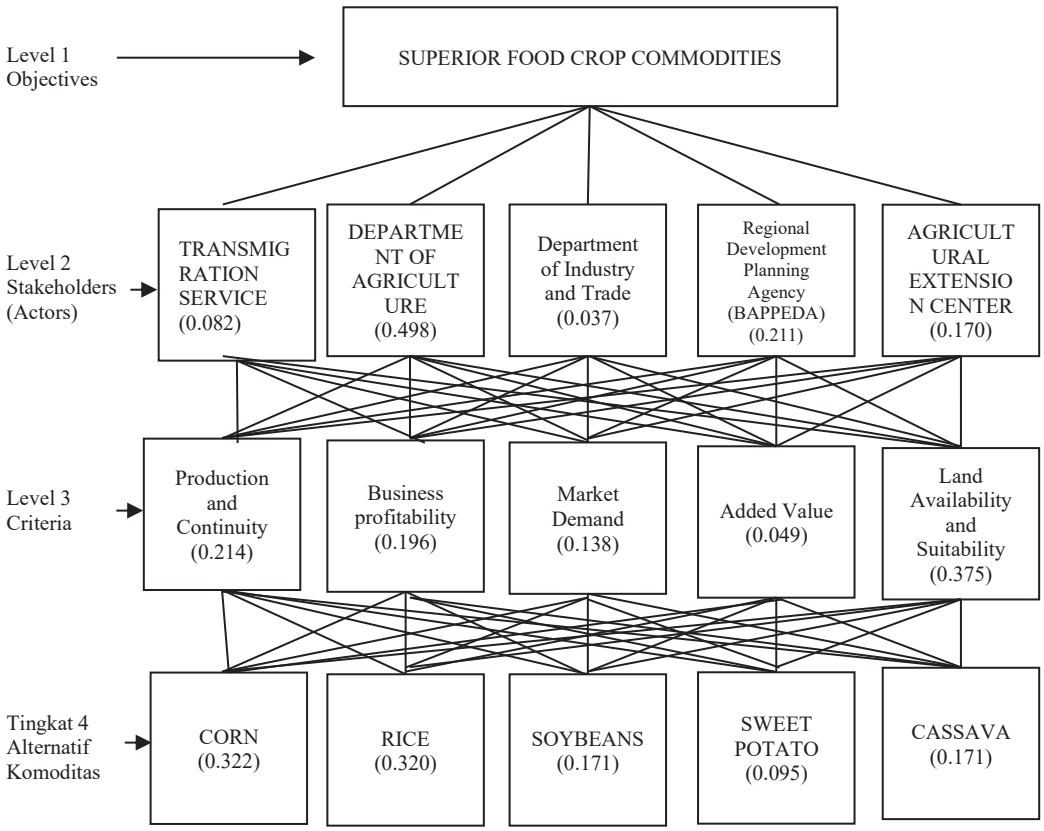


**Fig. 1.** AHP results for determining food crop commodities in the Pawonsari Transmigration Area.

At the alternative level, the final results indicate that corn (0.322) and rice (0.320) are the most feasible commodities to develop. These two commodities are supported by high land suitability, stable production potential, and significant support from key agricultural sector actors. Soybeans (0.171) and cassava (0.171) are ranked as medium priority, indicating that development opportunities remain open, although not as strong as those of the two main commodities. Meanwhile, sweet potatoes (0.095) are ranked last due to their perceived production continuity, market demand, and relatively lower land availability and suitability compared to other food crops.

The following is the supporting data used in the AHP analysis to provide a more comprehensive overview of the empirical basis for the calculation results. The presentation of this information is intended to ensure that the priority setting process is carried out in a transparent, measurable manner, and is based on methodologically accountable evidence.

1. Production and continuity

   The production and continuity criteria in the AHP hierarchical structure utilize trend data on the distribution of harvested areas for food crops in the Pawonsari Transmigration Area. The use of harvested area distribution data is positively correlated with food crop production, as the larger the planted area, the greater the production capacity that can be generated in a region [12]. This relationship reflects the basic principle of agricultural productivity analysis, where harvested area is a structural indicator that plays a direct role in the volume of harvested crops and the efficiency of farming efforts. Data on the distribution of harvested areas for food crops in the

Pawonsari Area can be seen in Figure 2.

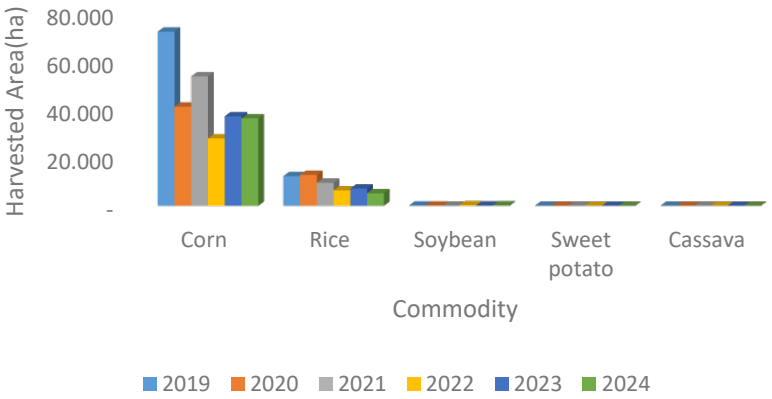


**Fig. 2.** AHP data on the area of superior food crop commodities.

The distribution data of the harvested area of the superior alternative food crop commodities AHP from 2019 to 2024 is dominated by corn. The following is the order of food crop commodities with the largest to smallest harvested area. Corn is in first place with a harvested area ranging from 28,001 ha to 72,323 ha with an average harvested area of 44,790 ha. Rice is in second place with a harvested area ranging from 5,215 ha to 12,846 ha with an average harvested area of 8,920 ha. Soybeans are in third place with a harvested area ranging from 16 ha to 225 ha with an average harvested area of 148 ha. Sweet potatoes are in fourth place with a harvested area ranging from 1 ha to 9 ha with an average harvested area of 4 ha. Cassava is in last or fifth place with a harvested area ranging from 3 ha to 7 ha with an average harvested area of 3 ha.

2. Business profitability

The profitability criteria in the AHP hierarchical structure were analyzed using food crop commodity selling price data in the Pawonsari Transmigration Area. This selling price data served as a baseline indicator for assessing the relative profit potential between commodities, given that more detailed business feasibility data was not yet available in the field. Higher selling prices generally reflect greater profitability opportunities and can therefore serve as an initial reference in determining commodities with more profitable business prospects. Updated food crop commodity price data in the field can be seen in Figure 3.

Food crop commodity selling price data shows significant variation between commodities. Premium rice holds the highest price, at Rp16,469.00, followed by Medium Rice at Rp13,923.00, and SPHP Rice at Rp12,000.00. These three types of rice confirm that rice is in the upper price bracket in the food market. Dry soybeans are next, with a selling price of Rp10,500.00.

For corn, prices vary based on moisture content. Bulog corn with 18–20% moisture content is priced at Rp6,500.00, while corn with 12% moisture content is priced at Rp6,100.00, and Bulog corn with 14% moisture content is priced at Rp5,500.00. These differences reflect the influence of quality and post-harvest standards on corn selling prices in the market. The lowest-value commodities are tubers, namely cassava and sweet potatoes, each at Rp2,200. Food crops.

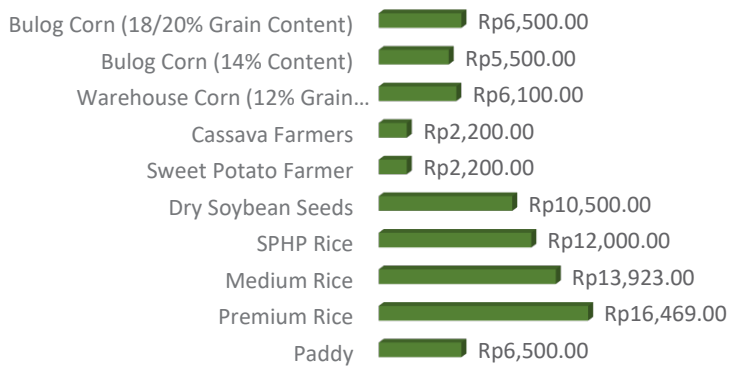


**Fig 3.** Data update prices (kg) of food crop commodities.

The following is a list of food crop commodities in the Pawonsari Transmigration Area, from highest to lowest selling prices. Rice ranks first, with prices ranging from Rp6,500 to Rp16,496, with an average selling price of Rp12,223. Soybeans rank second, with a selling price of Rp10,500. Corn ranks third, with prices ranging from Rp5,500 to Rp6,500, with an average selling price of Rp6,033. The selling price of corn can decrease if it is marketed through middlemen, with the price range generally being around IDR 4,000–IDR 5,000 per kilogram, thus reducing the potential income of farmers. Sweet potatoes and cassava are in last place with a selling value of IDR 2,200 each. The large price difference between these commodities shows that each crop has a different economic value and level of competitiveness.

3. Market demand

The market demand criteria in the AHP hierarchical structure were analyzed using food crop commodity marketing data in the Pawonsari Transmigration Area. This market demand data served as a baseline indicator to determine the level of market demand for these food crops. Field demand data for food crop commodities can be seen in Figure 4.

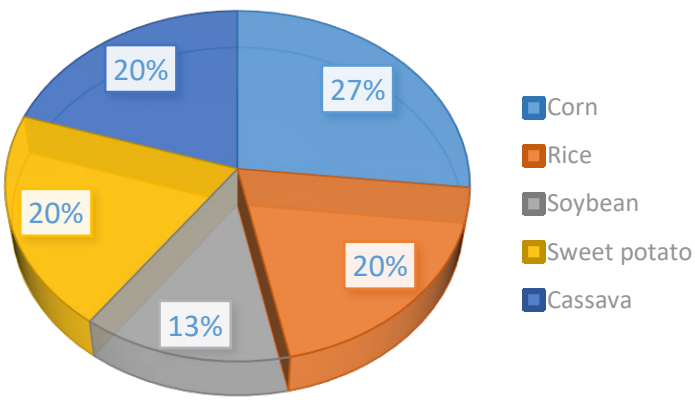


**Fig. 4.** Market demand data for food crop commodities.

Based on the analysis, market demand for food crops varies, reflecting the different functions and usage orientations of each commodity. Corn holds the highest demand position at 26.7%, driven by broad demand from Bulog, storage companies, the feed industry, and livestock farms outside Gorontalo, making it a strategic commodity in the food and feed supply chain. In the medium demand group, rice, sweet potatoes, and cassava each contribute 20% of total demand. Demand for rice remains high due to its role as a staple food, while sweet potatoes and cassava are largely absorbed by MSMEs and traditional markets as raw materials for local food products. Soybeans show the lowest demand, at 13.3%, due to their use being more limited to specific processing industries such as tofu and tempeh producers.

The order of demand from highest to lowest is as follows: corn, rice, sweet potatoes, cassava, and soybeans. This pattern confirms that commodities with broader utilization coverage have higher demand than commodities with more limited markets. This finding confirms that the diversity of functions and sectors of users of a commodity plays an important role in increasing market absorption and demand [13].

4. Added value

The value-added criteria in the AHP hierarchical structure were analyzed using literature study data and recommendations from expert respondents who explained various forms of utilization of food crop commodities into derivative products with higher economic value. This analysis considered the extent to which each commodity could be processed into products that are competitive, have economic value, and have broader market potential. Thus, the identification of added value is based not only on the basic characteristics of the commodity but also on the opportunities for processing it into products that can increase income, expand the supply chain, and make a greater contribution to the sustainable development of the agricultural sector. Data on the utilization of food crop commodities into products with added value can be seen in Table 5.

**Table 5.** Added value of food crop commodities

| No | Commodity | Value-added | Literature study |
|---|---|---|---|
| 1 | Corn | – Organic fertilizer<br>– Briquettes<br>– Silage for livestock feed<br>– Processed livestock feed<br>– Bioethanol<br>– Corn oil<br>– Various processed foods | – Dahlia *et al*. 2022<br>– Faizah *et al*. 2022<br>– Mujahidin *et al.* 2022<br>– Bunyamin *et al.* 2013<br>– Cusna *et al*. 2023<br>– Dwiputra *et al*. 2015<br>– Dewi *et al*. 2022 |
| 2 | Rice | – Consumable rice<br>– Rice flour | – Marwanti *et al*. 2023<br>– Wahyuningsih *et al*. 2015 |
| 3 | Soybean | – Tofu<br>– Tempeh<br>– Soy sauce<br>– Soy milk<br>– Animal feed (oil cake waste) | – Andarwulan *et al*. 2018<br>– Kusumawati *et al.* 2020<br>– Palupi and rahmatika 2022<br>– Aritonang *et al*. 2015 |
| 4 | Sweet potato | – Snacks<br>– Mocaf flour<br>– Cakes | – Zaddana *et al*. 2021<br>– Setyajid *et al.* 2022<br>– Pratiwi 2020 |
| 5 | Cassava | – Snacks<br>– Mocaf flour<br>– Liquid sugar<br>– Tapioca flour | – Octaviany *et al.* 2024<br>– Yani and Akbar 2019<br>– Permanasari and Yulistiani 2015 |

Based on data on the added value of various food crop commodities, it is clear that each commodity has varying processing potential, resulting in varying levels of economic value. Corn is the commodity with the highest added value because it can be processed into various products such as animal feed, briquettes, silage, processed animal feed, bioethanol, corn oil, and various processed foods.

This diversity of processed products demonstrates that corn plays a strategic role not only in the food sector but also in the energy and feed sectors. Rice comes in next, with added value derived primarily from consumption rice and rice flour, which are the basic ingredients of various food products. Soybeans also provide significant added value through processed products such as tofu, tempeh, soy sauce, soy milk, and their use in the animal feed industry from their oil palm meal waste. Sweet potatoes and cassava also have added value through processed products such as snacks, mocaf flour, cakes, liquid sugar, and tapioca flour, although the variety is not as extensive as that of corn and soybeans [14].

The order of commodities based on the highest to lowest added value is as follows: (1) Corn, which has the widest product diversification and covers the food, feed, and energy sectors, thus providing a significant economic contribution. (2) Soybeans, which produce various high-value food and feed products through processing into tofu, tempeh, soy sauce, soy milk, and oil cake as animal feed. (3) Cassava, which offers many derivative products such as mocaf, liquid sugar, and tapioca flour which have stable market demand. (4) Sweet potatoes, which provide added value through processed products in the form of snacks, flour, and cakes, although the variety of processing is not as much as the previous commodity. (5) Rice, which remains a strategic commodity as a staple food source, but the variety of added value is more limited compared to other commodities. This order shows that the breadth of processing opportunities in a commodity is directly proportional to the high economic value that can be generated.

5. Land Availability and Suitability

The land availability and suitability criteria in the AHP hierarchical structure were analyzed using data on harvested area for food crops, as presented in Figure 5. Spatial topographic slope data served as the basic reference for classifying land suitability for superior food crops in the Boalemo Transmigration Area. Land suitability for corn was analyzed using the reference from Djaenuddin *et al.* [15], which was deemed relevant because the evaluation parameters developed have been widely used in agro-climate research and land suitability evaluation in various regions of Indonesia, particularly Gorontalo.

Land suitability for rice, soybeans, sweet potatoes, and cassava refers to Ministerial Regulation No. 79 of 2013 concerning Guidelines for Land Suitability for Food Crop Commodities. This reference was chosen because it provides more standardized criteria and aligns with the needs of food crop cultivation planning at the regional and national levels. Expert respondents also recommended the use of these two benchmarks because they were considered most appropriate to the biophysical conditions and land characteristics in the field, and they provided comprehensive and easily adaptable indicators for commodity development decisions. A land suitability map based on slope parameters can be seen in Figure 5.

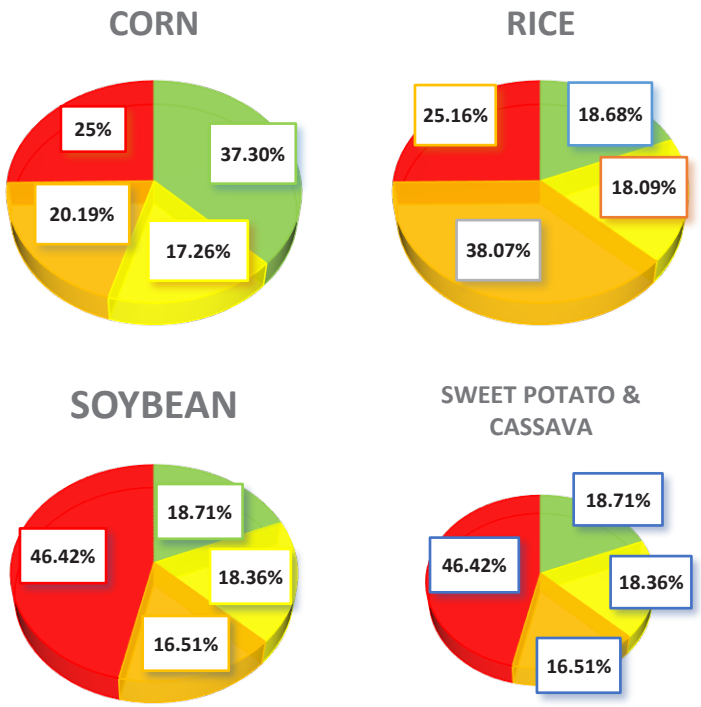


**Fig. 5.** Percentage of land suitability for food crop commodities.

Land suitability based on slope indicates variations in land capacity to support food crop cultivation in the research area. Corn ranks first (1) as the commodity with the highest suitability, indicated by the proportion of the Very Suitable class reaching 37.30 percent. This condition indicates that corn has good tolerance to variations in land slope, so it remains productive in areas with gentle to slightly steep slopes. Rice is ranked second (2) with 18.68 percent of the area categorized as Very Suitable, although most of the land is categorized as Marginally Suitable due to rice's more specific needs for flat land and irrigation systems. Soybeans are ranked third (3), followed by cassava in fourth (4), and sweet potatoes in fifth (5). All three show a similar suitability pattern, with only around 18.71 percent of the area categorized as very suitable but have a high level of unsuitability reaching 46.42 percent. This pattern reflects that these three commodities are more sensitive to steep slopes which increase the risk of erosion and reduce potential productivity.

## 4 Conclusions and suggestions

### 4.1 Conclusion

The superior food crop commodities in the Pawonsari transmigration area are rice and corn, rice occupies the first position and corn occupies the second position. The actor in AHP are agriculture office is the most influential stakeholder (0.498), BAPPEDA (0.211), and BPP (0.170). At the criteria level, land availability and suitability are the most important factors (0.375), followed by production continuity (0.214), and business profitability (0.196). This finding confirms that superior commodities are determined not only by statistical superiority

in production, but also by interrelated biophysical, economic, and market aspects.

### 4.2 Suggestion

Regional development programs are recommended to focus on rice and corn as primary commodities through increased productivity and institutional strengthening. Intermediate commodities such as soybeans and cassava need to be improved through land expansion and market support, while optimizing land suitability and product downstreaming should be prioritized to increase added value and improve the welfare of transmigrant communities.

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