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Spatial Characteristics of Porang Development and Competitive Advantages in The Central Lombok Highlands

Baiq Santi Rengganis[1*], Baiq Diah Fitasari[2], Slamet Mardiyanto Rahayu[1]

[1] Program Studi Agribisnis, Fakultas Pertanian, Universitas Al-Azhar Mataram, Indonesia.
[2] Program Studi Biologi, Fakultas MIPA, Universitas Al-Azhar Mataram, Indonesia

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Corresponding Author:
Baiq Santi Rengganis
santirengganis@gmail.com

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Abstract: In 2020 Indonesia's export volume for porang reached 14,568 tons compared to 2019 of 11,720, so it deserves priority for development including in Central Lombok Regency. This study aims to analyze the spatial characteristics of porang development, analyze the competitiveness of porang, and analyze the stabilization of porang production in Central Lombok Regency. Data analysis uses the analysis of Localization Coefficient, Specialization Coefficient, Location Quotient (LQ), Basic Service Ratio (BSR), Regional Multiplier (RM), and competitive profit. To obtain diversity and variety of data, Central Lombok is divided into 4 research areas or clusters; Batu Keliang District Area, Kopang District Area, Pujut District Area, Praya Barat District Area. Furthermore, in each cluster area, 5 samples (respondents) were determined for each commodity under review (porang, cassava, sweet potato). Thus the number of respondents to 60 people. While secondary data is in the form of time series data collected from 2019 to 2021, including data on the development of harvested area, production and productivity of porang.

Keywords: Competitive Advantages; Porang; Spatial Characteristics

Introduction

Trademap data shows that in 2020, Indonesia is the fifth largest supplier of people in the world with an export share of 2.2% of total world exports of people (Map, 2021). In 2020 Indonesia's export volume for porang reached 14,568 tons compared to 2019 of 11,720 (Hayati, 2021), so this is a strategic and promising potential for farmers. The great opportunity to reach national and international markets makes people a priority commodity and for the development of sustainable development.

Porang is considered a plant that has a high survival probability of 40-60% even though it lives between other plants. In other words, porang plants are not difficult to grow even if they are in poor soil and land. Based on data from the Ministry of Economy, 2021 that the government is taking strategic steps to develop porang production with economic goals, namely by expanding the planting area, developing superior varieties, using fertilizers as needed, financing and implementing good agricultural practices.

In the Province of West Nusa Tenggara (NTB), porang cultivation began to develop in 2020 (Naufali & Putri, 2022) and currently the NTB government has a planting area of up to 4000 ha which is spread across all districts in West Nusa Tenggara. This is done because porang has relatively good economic value compared to other types of tubers (cassava, sweet potato) (Hidayat, 2023; Riptanti et al., 2022; Satyarini et al., 2021; Yasin, 2021). In 2021, NTB will be one of the provinces designated to meet the need for export of people to Vietnam, and until now the fulfillment of the need for export of people has continued to increase.

Central Lombok Regency is one of the porang development areas; with an increase in planted area and production (Sjah et al., 2021). Wet porang have a price of Rp. 7,600 to 8,000. However, if porang plants are

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processed into semi-finished products and finished products, of course the economic value obtained will be even greater. Porang is processed into semi-finished products, namely chips (Muswanti et al., 2023), the price is around Rp. 58,000 to Rp. 63,000/kg. Currently what is being developed is porang flour at a price of Rp. 160,000 to 190,000/kg and when it is processed into glucoman flour, the price increases, namely Rp. 600,000 to Rp. 1,000,000 per kg. It is a joint task between farmers and the government to find a solution so that the production of porang in each district in West Nusa Tenggara increases from the total planted area and also finds a way so that porang is exported in the form of derivative products.

As a guide especially for porang farmers in developing porang in Central Lombok Regency, it is considered very important to study the spatial characteristics of the development and competitive advantages of porang. This study aims to analyze the spatial characteristics of porang development, analyze the competitiveness of porang, and analyze the stabilization of porang production in Central Lombok Regency.

Method

This study used a descriptive method aimed at gaining insight from data on an activity related to the development of porang and other food commodities (tubers) as competitors (Irianto et al., 2023). Furthermore, the findings are described systematically in a factual and accurate manner according to the facts, nature and relationships between the phenomena studied.

This research was conducted in Central Lombok Regency. To obtain diversity and variety of data, Central Lombok is divided into four research areas Batu Keliang District, Kopang District, Pujut District, and Praya Barat District. Furthermore, in each cluster area, five samples (respondents) were determined for each commodity under review (porang, cassava, sweet potato). Thus the number of respondents to 60 people. While secondary data is in the form of time series data collected from 2019 to 2021, including data on the development of harvested area, production and productivity of porang. To answer the problems and objectives that have been set, the data collected is analyzed as follows:

The localization coefficient is used to measure the relative concentration of porang development in Central Lombok. The formula 1 for this calculation.

$$\alpha i = [Si/Ni] - [\Sigma Si/Ni] \quad (1)$$

The specialization coefficient used to show Central Lombok specialization in porang. This coefficient is calculated by the Formula 2.

$$\beta i = [Si/Si] - [Ni/Ni] \quad (2)$$

Information:

Si : Porang harvest area in the District/Research Area
Ni : Porang harvest area in Central Lombok Regency
ΣS : The total area of the competitor crops studied is (district)
ΣN : Total harvested area of competing crops (tubers) in Central Lombok District
αi : The localization coefficient is positive with a value of $0 < \alpha < 1$
βi : The specialization coefficient is positive with a value of $0 < \beta i < 1$

Decision Criteria for a

$\alpha < 1$: Distribution of porang development locations in several areas in Central Lombok Regency
$\alpha \geq 1$: The distribution of porang development locations is concentrated in certain locations in Central Lombok

Decision Criteria for β

$\beta < 1$: Central Lombok is not specialized in porang commodity
$\beta \geq 1$: Central Lombok specializes in porang commodities

Whether porang is a superior or non-leading commodity is determined by the Location Quotient (LQ), as shown by Formula 3.

$$LQ = [Si/\Sigma Si] / [Ni/\Sigma Ni] \quad (3)$$

Information:

LQ : Location Quotient for porang commodity in Central Lombok Regency
Si : Porang harvest area at research location
Ni : Porang harvest area in Central Lombok
ΣSi : Total harvested area of root crops (cassava, sweet potato) at the study site
ΣNi : Total harvest of root crops in Central Lombok

Decision Criteria

LQ < 1 : porang is a superior commodity in Central Lombok Regency
LQ ≥ 1 : porang is the main/base commodity in Central Lombok Regency

Determining the role of the commodity porang as a sector base in supporting the agricultural sector in Lombok is being implemented by the analysis of Basic Service Ratio (BSR) and Regional Multiplier (RM) (Sjah, n.d.; Sukardi et al., 2021). BSR (Basic Service Ratio) is applied to determine the ability of basic commodities to

serve the development needs of non-base areas as seen in Formula 4.

$$BSR = \Sigma \text{ Base Sector} / \Sigma \text{ Non Base Sector} \quad (4)$$

Information:
Σ Base Sector : Total production of porang in the base area (tons)
Σ Non Base Sector : Total production of people in non base areas (tons)

RM (Regional Multiplier), is used to determine the power distribution of base activities and their direct and indirect effects. RM uses the formula 5.

$$RM = 1 / (1- NB/Y) \quad (5)$$

Information:
NB: Number of porang production in non base areas (tons)
Y : Total production of porang in base and non-base areas (tons)

Decision Criteria
BSR and RM<1: Porang commodity base sector supports agricultural activities in Central Lombok
BSR and RM ≥ 1 : Porang commodity base sector does not support agricultural activities in Central Lombok

Competitive Advantage Analysis
Competitiveness
The minimum yield needed by people to be able to compete with other commodities is analyzed by analyzing competitiveness using the formula 6 (Siregar et al., 2022).

$$Y_j^1 = (TC_j^0 + NR_j^0) / P_j^0 \quad (6)$$

Information:
Y^1_j : Porang yields compete with other commodities (kg/ha)
TC_j^0 : Total initial cost porang (Rp/ha)
NR_j^0 : Competitor's initial net income (Rp/ha)
P_j^0 : Initial porang price (Rp/kg)

Competitive output prices
In order for people to be able to compete with other commodities, people have a certain price level that generates a net profit of at least the size of competing commodities. This can be calculated using the formula 7 (Siregar et al., 2022).

$$P_j^1 = (TC_j^0 + NR_k^0) / Y_j^0 \quad (7)$$

With P_j^0 = Increase in price of person

Stability Analysis
Stability results were determined through the coefficient of variety (CV) time series data on porang yields. This research examines porang outcomes from 2019-2021. Agustian and Hutabarat classify the criteria as follows Stable: CV < 5%; Intermediate : 5% < CV ≤ 10%; Low: CV > 10%.

Result and Discussion

Potential for developing Porang in Central Lombok Regency

Porang tubers are tuber plants that contain various types of carbohydrates such as starch, crude fiber and free sugars (Kumoro et al., 2019; Soesilowati et al., 2018). This type of tuber can be served as an alternative food ingredient because it contains nutritional components as listed in Table 1. Meanwhile, porang flour is porang tubers that have been dried and then ground into flour and have nutritional content as listed in Table 1. The glucoman content contained in porang ranges from 50.84-10.70% which is the result of extraction from porang flour (Latief et al., 2023). As an export commodity that is in high demand, these tubers are generally processed by slicing them, drying them into chips, grinding them into flour and then exporting them without any further processing due to the long and complicated process (Alonso-Sande et al., 2009; Shenglin et al., 2020).

The potential for porang production in NTB is quite large (Fahrudin & Sukartono, 2022). So far, porang production is sold in logs outside the region (Rahayuningsih, 2020). This is because porang can be used as raw material for various food products (Dermoredjo et al., 2021; Ermawati & Winarsi, 2018; Herawati et al., 2021). Currently, NTB will become one of the regions providing export porang. Porang is a plant that was developed and became a plant that was planned to improve the economy of the people of Central Lombok because of its high price (Rohmaya et al., 2022; Yasin et al., 2021). The high demand for porang has made the West Nusa Tenggara government declare that several regions will prioritize porang crops, even in August 2023, the NTB government officially opened the largest porang factory in the West Lombok Regency region and became one of the largest factories in the Southeast Asia region for exporting porang to the country like America and Australia.

Table 1. Content of nutritional components in Porang tubers and flour

Nutrient components	Porang Tubers	Porang Flour		Porang Flour
		Yellow	White	
Water (%)	80.1	13.477	12.326	5.025%
Carbohydrates (%)	-	-	-	43.48%
Also	4.16	5.958	7.554	-
Amylose	-	16.948	17.536	-
Crude fiber	5.20	-	-	5.025%
Glucomannan	50.19-66.40	72.54%	73.70%	15.49%
Protein (%)	9.50	-	-	5.70%
Fat (%)	0.30	-	-	5.17%
Abu (%)	0.83	3.901	4.612	4.61%

Localization Coefficient of Porang Development in Central Lombok

Localization analysis is used to determine whether porang development in Central Lombok Regency is concentrated in one area or spread across several areas (Zikria, 2020). The research results show that the localization coefficient value porang in Central Lombok is 0.351 (a) as presented in Table 2. This means that the locations for porang development are spread across several sub-districts in Central Lombok Regency. In other words, porang development in Central Lombok is not concentrated in one region but spread to several regions.

Based on the harvested area, of the 12 sub-districts in Central Lombok Regency, there are only 4 (four) sub-districts that are positive localization coefficient areas, namely Batu Keliang, Kopang, Pujut and West Praya sub-districts. This shows that these four sub-districts are the areas with the highest porang harvest area, although it is known that the area of porang plants is not comparable to the area of other carbohydrate source plants. The distribution of porang commodities has very high development opportunities. Porang development areas that are not concentrated in one area provide advantages, including that porang is produced by several regions, but is not yet able to provide large quantities according to market needs.

The West Nusa Tenggara (NTB) provincial government has planned a 40,000 ha area for porang harvesting, but to date only 1,900 ha has been realized. This is because there are no large producers specifically for porang in NTB.

Analysis of Porang Development Specialization

In this research, specialization analysis is used to find out whether Central Lombok Regency has a specialty or specialization in porang commodities. The results of the analysis are presented in Table 3, showing the value of the specialization coefficient porang in Central Lombok is 0.539 (b<1). This is interpreted as Central Lombok Regency not specializing Porang as a commodity in agricultural activities. In other words, Central Lombok Regency does not only specialize in developing porang but various other agricultural commodities.

The Role of Porang as a Commodity in Supporting Agricultural Activities in Central Lombok

The results of the analysis show that the Location Quotient (LQ) coefficient is more than 1 in 4 sub-districts, namely less than 1, which means that porang is not a basic and main commodity for the district's economic growth, but there are agricultural crops, namely cassava and sweet potato, which are still the main commodity. besides rice and corn in the study area (Table 2).

Next, Basic Service Ratio (BSR) analysis was applied to see the carrying capacity of the agricultural activity sector base area in Central Lombok Regency. The BSR value of porang in Central Lombok Regency in 2022 based on production indicators (tons) is 4.5648. The BSR value means that 1 part of porang commodity production is used to meet regional development needs, while 3.5648 parts are used to serve non-basic regional development needs.

Furthermore, the Regional Multiplier (RM) Analysis is a continuation of the BSR analysis, where from the results of this analysis it can be seen whether there is a direct or indirect relationship to the existence of the base sector. The regional multiplier value (RM) of porang in Central Lombok Regency based on the production indicator (tons) is 1.0342 (>1) thus the porang commodity can help and support the economic development of the agricultural and plantation sectors in Central Lombok Regency and provide a multiplier effect for other regions.

Table 2. Results of Analysis of Location Quotient (LQ), Localization Coefficient and Specialization Coefficient for Porang Development in Central Lombok 2023

District	Harvest area (ha)	Coefficient LQ	Localization Coefficient	Specialization Coefficient
Southwest Praya	15	0.0036	-0.096	0.1542
West Praya	251	0.8161	0.0338	0.0918
Flatter	421	0.5125	0.0863	0.2263
East Praya	0	0.0000	-0.0012	0.9345
Janapria	0	0.0000	-0.0026	0,0036
Please	55	0.2236	0.0093	0.0501
Praya	0	0.0000	-0.0019	0.0654
Central Praya	0	0.0000	-0.0017	0.4325
Jonggat	1	0.0086	-0.0027	0.6522
Pringgarata	1	0.0086	-0.0021	0.3214
Batukliang	153	0.8161	0.0754	0.8765
North Batukiang	5	0.0185	-0.0132	0.8324

Porang Competitive Advantage

The filtering power of a commodity is often measured using comparative and competitive advantage approaches (Pei et al., 2020). Comparative advantage is a concept developed by David Ricardo which explains the efficiency of open resource allocation (Moloi et al., 2020). One way to measure competitiveness is to use competitive profit (Dean et al., 2020).

The results of the analysis show that the net income (profit) per hectare of standard porang crops is compared with other tuber crops such as cassava and sweet potatoes, as well as secondary food crops such as peanuts and soybeans. Price range IDR 3700-4000/kg wet. A comparison between tuber food commodities in Central Lombok Regency. Central Lombok Regency has not yet focused on porang plants as a superior crop, because land is still relatively small compared to other commodities. Porang is an intercrop planted between coffee plants, secondary crops, etc.

Competitive Results This research found that the average productivity of porang in Central Lombok district is 4,200 kg/ha. Assuming input and output prices do not change (constant), the planting area and harvest area of porang plants are indeed much smaller compared to other secondary crops. However, if the planting area and harvest increase, porang's competitive advantage can compete with secondary crops.

The analysis results show that productivity is only 50.45%, able to compete with competitors. The required level of porang productivity is 2,428 kg/ha (39.23%). Therefore, the tightest level of competition is cassava and peanuts.

Like competitive yields, porang can provide competitive advantages when compared to other plants (soybeans, cassava, sweet potatoes and peanuts) (Putu Wahyu Kesari, 2023). Assuming constant output and input price levels, then at the current price level, porang has provided quite competitive profits if the land area and porang producers are increased.

Table 3. Minimum Porang Productivity (kg/ha) to be able to compete with competitors

Competing Plants	Porang Minimum Productivity (Kg/Ha)
Cassava	2.136
Sweet potato	1.381
Groundnut	2.238
Soya bean	4.734

Table 4. Porang price (Rp/Kg) needed to compete with other plants in Central Lombok Regency

Competing Plants	Porang Price	Minimum	Note	
Cassava	2.322		50.12% price	current
Sweet potato	1.012		31.21% price	current
Groundnut	1.324		35.10% price	current
Soya bean	3.254		90.12% price	current

The research results show that to be able to compete with soybeans, cassava, sweet potatoes and peanuts, the minimum price for porang is 35.10% or Rp. 1,324/kg. Meanwhile, to be able to compete with soybeans and cassava, the minimum price level for porang is Rp. 3,254 (90.12%) and Rp. 2,322 or 50.12%. Thus, the tightest level of competition is sweet potatoes.

Stability of Porang Yields in Central Lombok Regency

The stability of plantation and horticultural crop yields is greatly influenced by the biological environment and climate of the region concerned. These two factors can have an impact on planting time and land area as well as expected production. The level of stability of results can be measured by the coefficient of variance (CV) which is a comparison between the

standard deviation from year to year with the average results. Furthermore, the development of results in a certain period is said to be stable if it has a CV of 5%, medium or medium 5%CV10% and low CV 10%.

Table 5. Results of Stability Analysis of Porang Yields in Central Lombok 2019-2023

Item	2019-2020	2021-2022	2023
Land area (ha)	335	513	980
Production (tons)	554	1.200	6.200
Productivity (tons/ha)	1.08	3.81	5.14
Standard Deviation (Std)	0.12	0.56	1.18
Actual Coefficient of variant (Cva)	10.65	20.45	21.79
Yield Stability	Low	Low	Low
Delta Std (for CVt= 2.5%)	0.34	1.01	0.64
Probability	0.21	0.56	0.88
Yield saved (ton/ha)	0.23	0.57	0.65
Production Saved (ton/ha)	121,72	627,45	1.043,21
(% of average production)	5.87	5.21	10.21

Target coefficient of variant

The research results show that the level of porang productivity in each period experiences a positive trend, especially in 2022-2023 which is supported by regional government programs. The coefficient of variance becomes greater, meaning the level of productivity is unstable. The high level of variation in these results is reflected in the quite high variance coefficient value, namely 10.65% in the 2019-2020 period. Increase to 20.45% from 2021-2022. Based on these values, it can be concluded that the level of stability of porang production in Central Lombok Regency is still in the low resilience category. Thus, the porang crop is still unstable for 2023.

High productivity and variation cause many losses that occur in production which is production growth. This is because there is still little land for porang and porang is a plant that must be processed first so that its economic value can increase.

Conclusion

The development of porang in Central Lombok is not concentrated in just one region but is also developed in several other regions as indicated by the localization coefficient value (a) of 0.351 (a<1). The research area in Central Lombok Regency does not specialize in porang as a superior crop, this is indicated by the specialization coefficient value (b) of 0.539 (b<1). Porang is not a basic commodity in West Praya, Kopang, Pujut and Batukliang Districts but is an intercrop that can support the agricultural sector and can provide a multiplier effect. Porang has a competitive advantage and can compete with other secondary crops, with an average productivity value of 4,428 kg/ha and 3,230/kg. compete with cassava and sweet potato. The minimum corn yield is IDR 2,428 kg/ha and IDR. 1,324/kg. The level of stability of porang yields in Central Lombok Regency for the 2019-2020 and 2021-2022 periods is included in the low stability category, however the area of land and harvest increased in each period. Yields can be saved through increasing yield stability by 416 kg/ha if the 2023 harvest area level is increased to 3.5%.

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Conflicts of Interest

The authors declare no conflict of interest.

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