

Development Strategy Analysis of Breadfruit Agribusiness in Bone Regency

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Abstract. Breadfruit (*Artocarpus altilis*) has been recognized by Indonesian as an alternative food source that is rich in nutrients. The production of breadfruit in Bone Regency has shown a stable trend with a fairly consistent increase over the last five years. The purpose of this research is to analyze the development strategy of breadfruit Processing Agribusiness in Bone Regency. Analytical Hierarchy Process (AHP) method was applied to formulate the most effective strategies for breadfruit processing business development. The research was conducted by involving informants from various backgrounds such as processed breadfruit farmers in Bone Regency, breadfruit traders and businessmen from processing subsystem, government and agricultural extension workers. From the result of the analysis it can be identified that in order, efforts to increase the production and quality of breadfruit, development of marketing areas, optimization of natural resources, human resources, and existing equipment are important elements in the breadfruit development strategy in Bone Regency, South Sulawesi. increasing the production and quality of breadfruit holds the highest rank with a value of 0.1517 as a priority in encouraging stakeholders to innovate and optimize available market opportunities. By considering these factors, the government can form policies that support the sustainable growth of breadfruit agribusiness.

1 Introduction

The horticulture sector stands out as a promising area within the agribusiness industry, especially for fruits and vegetables. In Indonesia, there are various types of fruit that are a source of carbohydrates and can be used as an alternative to rice as a staple food. One fruit that has great potential is breadfruit (*Artocarpus altilis*). Breadfruit has been recognized by the Indonesian people as an alternative food source that is rich in nutrients [1,2] Breadfruit plants can grow well in various geographical conditions, ranging from lowlands to highlands [3]. Therefore, the spread of breadfruit covering various regions in Indonesia has a great opportunity for development as an alternative food companion to rice [4].

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Breadfruit primarily yields fruit, known for its high nutrient content and widespread consumption as both a supplementary and staple food, especially in countries across the Pacific region. Developing breadfruit as a viable alternative food source entails addressing the challenge of cultivating superior breadfruit clones with high fruit production and sufficient nutrient and chemical composition to serve as food and medicinal resources for communities. This effort aims to harness breadfruit's potential to meet dietary needs and contribute to medicinal practices [5].

In the past five years, breadfruit production in Bone Regency has demonstrated a consistent upward trend, albeit with modest fluctuations. Despite reaching 4,321 tons in 2020, indicating promising potential among breadfruit farmers, there remains a discrepancy between actual achievements and anticipated outcomes. This gap underscores the necessity for a thorough investigation encompassing all facets of breadfruit agribusiness, encompassing production, processing, and marketing subsystems. A comprehensive analysis is imperative to discern the underlying reasons behind the unmet expectations and to identify the opportunities and obstacles hindering the realization of breadfruit agribusiness potential in Bone Regency. Such an examination will facilitate the formulation of tailored strategies to optimize the development of breadfruit agribusiness within the region.

This situation underscores the imperative for a cohesive and meticulously crafted strategy for the development of breadfruit agribusiness. Such a strategy must encompass all dimensions of the breadfruit agribusiness continuum, spanning from production to marketing. By implementing an effective strategy, it is anticipated that the full potential of breadfruit agribusiness in Bone Regency can be realized, leading to enhanced farmers' income and substantial contributions to the regional economy. Given this context, the author is keen on conducting an analysis focused on the development strategy for breadfruit processing in Bone Regency.

2 Research method

2.1 Research design

This paper will focus on analyzing breadfruit processing business development strategies in Bone Regency, South Sulawesi by formulating the most effective strategies for breadfruit processing business development, which will be evaluated using the Analytical Hierarchy Process (AHP) method. The Analytical Hierarchy Process (AHP) operates by first breaking down a complex and dynamic problem into manageable components and organizing them hierarchically. This hierarchical structure allows for the comparison of the relative importance of each variable against others within the system. Following this comparison, synthesis occurs to identify variables with higher priority, which significantly influence the overall outcomes [6]. The fundamental steps of AHP, as outlined in the literature [7], involving:

- Hierarchy Construction: Identifying the main objective or problem to be addressed, breaking down the objective into smaller, more manageable criteria and sub-criteria, organizing these criteria and sub-criteria in a hierarchical structure, with the main objective at the top and the specific criteria at the lower levels.
- Criteria and Alternative Assessment: Defining the criteria that will be used to evaluate alternatives, identifying and list the possible alternatives or solutions to the problem. assessing how each alternative performs against each criterion, typically using a numerical scale or pairwise comparisons.
- Priority Determination: Conducting pairwise comparisons between criteria and alternatives to determine their relative importance, using mathematical calculations, often

involving eigenvectors and eigenvalues, to derive priority weights for each criterion and alternative, aggregating these weights to establish an overall priority ranking for the alternatives.

- Logical Consistency: Ensuring that the pairwise comparisons made during the process are logically consistent, checking for inconsistencies by examining the consistency ratio (CR) of the pairwise comparison matrices, revising the comparisons if necessary to maintain logical coherence and reliability in the decision-making process

AHP measures the overall consistency of various considerations through a consistency ratio. The consistency of expert opinions using a consistency ratio with a maximum value of 10% (0.1).

2.2 Samples and data collection

The selection of the research location was carried out using purposive sampling technique, with the consideration that the largest breadfruit production is in Bone Regency, which is one of the breadfruit producing centers in South Sulawesi with potential both in terms of the number of plants and the yield/production of breadfruit itself. Dua Boccoe and Ulaweng Districts were the locations taken for the study with the consideration that both Districts had the highest level of breadfruit production in 2000. Ulaweng District is the center of breadfruit processing agroundustry in Bone Regency, South Sulawesi.

The involvement of various informants from various backgrounds is important in producing a comprehensive and sustainable development strategy. The list of five informants that plays key role for the Processing Subsystem involves breadfruit farmers in Bone Regency, breadfruit traders and business actors from the processing subsystem, government and agricultural extension workers. With a variety of contributing views, decision-making becomes more informed and based on a deep understanding of the dynamics of breadfruit agribusiness in Bone Regency.

3 Results and discussion

3.1 Strategic priority of ahp analysis

The determination of the priority strategy for developing breadfruit agribusiness in Bone Regency was carried out using the AHP (analytical hierarchy process) method. The determination of priority strategies was carried out through an assessment of the relative importance of each element in the hierarchy structure contained in the questionnaire. Each element was compared pairwise at one level with the level above. In order to select the most suitable strategy, a number of criteria will be set as considerations in the strategy selection process. The determination of these criteria is based on the belief that through the fulfillment of these criteria, the development of breadfruit agribusiness in Bone Regency will be able to increase farmers' income. Some agroindustry of these criteria was gathered through discussions with various key stakeholders, including:

1. Market potential criteria
2. Availability of resource criteria
3. Environmental sustainability criteria
4. Government support criteria
5. Breadfruit farmer welfare criteria
6. Availability of infrastructure Criteria
7. Community empowerment Criteria.

Comparisons were made based on the scale of importance of each criterion. The assessment was conducted by five purposively selected experts. The assessment matrix of each respondent must have a consistency ratio value of less than 10%. After obtaining the matrix from each respondent, it is processed and combined into a combined matrix. Vertical data processing is used to prioritize each element in the hierarchy towards the focus of breadfruit agribusiness development in Bone Regency. The hierarchy of alternative strategy selection for developing white pepper agribusiness in the Bangka Belitung Islands province with the results of vertical prioritization is shown in Figure 1.

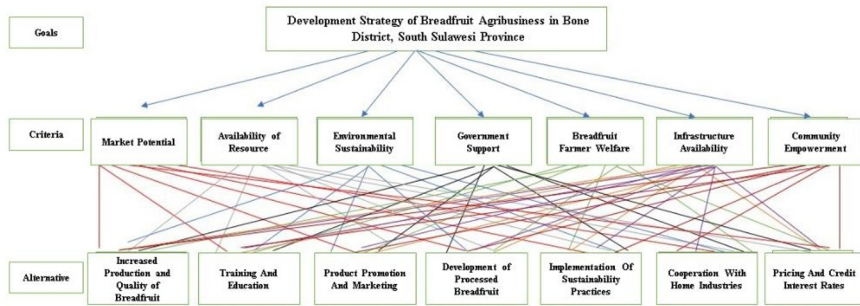


Fig. 1. Hierarchy of AHP analysis results of breadfruit agribusiness development strategies in Bone Regency.

Since bread fruit is a seasonal crop that produces much more than can be consumed fresh, Pacific islanders have developed many techniques to utilize large harvests and extend its availability [8]. Breadfruit cultivation is an activity that has been carried out for generations by some people in Bone Regency. By increasing the production and quality of breadfruit produced by farmers, there will be an increase in welfare for some communities in Bone Regency. Below is a table containing the combined results of all participants, combined to determine the highest priority of their most desired expectations:

Table 1. AHP results of the overall combination of informants for breadfruit agribusiness development in Bone district, 2023.

Alternative	Criteria							Mean	Priority
	1	2	3	4	5	6	7		
a. Increasing production and quality of breadfruit	0,139	0,153	0,124	0,157	0,177	0,165	0,147	0,1517	1
b. Training and Education of breadfruit farmers	0,117	0,138	0,157	0,138	0,111	0,134	0,167	0,1374	6
c. Promotion and marketing of breadfruit	0,165	0,129	0,105	0,134	0,133	0,162	0,137	0,1379	5
d. Development of processed breadfruit products	0,172	0,153	0,132	0,128	0,155	0,131	0,146	0,1453	4
e. e. Implementation of sustainable practices	0,111	0,132	0,198	0,113	0,113	0,145	0,114	0,1323	7
f. Cooperation with home industries	0,145	0,150	0,147	0,148	0,144	0,147	0,142	0,1461	3
g. Pricing and interest rates	0,151	0,146	0,136	0,183	0,168	0,116	0,147	0,1496	2
Inconsistency Ratio	0,02	0,02	0,01	0,006464	0,01	0,01	0,01	0,01	-

Source: Data primer, 2023

The analysis ranks strategies based on seven criteria, with input gathered from government actors, farmers, traders, home industries, and extension workers. The highest priority strategy, scoring 0.1517, focuses on enhancing breadfruit production and quality. Following closely, the second priority, scoring 0.1496, involves setting prices and interest rates, while the third, with a score of 0.1461, emphasizes collaboration with home industries. Subsequent priorities include developing processed breadfruit products (0.1453), promotion and marketing (0.1379), and training and education (0.1374). The lowest priority strategy, scoring 0.1323, concludes the ranking. A consistency ratio (CR) value of 0.01 indicates a high level of consistency in the analysis, affirming the reliability of the AHP method for decision-making purposes.

Increased production of breadfruit serves as a foundational step towards ensuring a consistent supply of raw materials for the food industry. Given its versatility, breadfruit plays a pivotal role in the creation of various food and processed products, ranging from snacks to functional food ingredients and flour. A boost in production not only enhances the reliability of the food industry's supply chain but also enhances the overall quality of end products. Furthermore, the benefits extend to farmers, who stand to gain from higher yields and improved product quality, resulting in more favorable pricing and increased income. This, in turn, fosters greater commitment among farmers to engage in the development of breadfruit agribusiness. To achieve this increase in production within Indonesia, it's imperative to develop new markets, establish innovative distribution systems, and refine existing market channels, as highlighted in prior research [9].

Histifarina (2022) [10] highlight the significance of developing technologies for processing breadfruit into various food products, which can contribute to food diversification and enhance breadfruit farming businesses in Indonesia. Moreover, these efforts align with sustainability principles, as improving breadfruit production and quality entails adopting more efficient and environmentally friendly agricultural practices. By embracing such practices, breadfruit farming can not only generate economic benefits but also maintain ecological balance. This resonates with findings from research by Widyatama (2019) [7], which underscores the importance of increasing fruit production capacity through utilizing available land for breadfruit tree cultivation in the development of breadfruit agribusiness.

4 Conclusions

Alternative strategies for developing breadfruit agribusiness in Bone Regency cover various important aspects. These include efforts to increase breadfruit production and quality, development of marketing areas, optimization of natural resources, human resources, and existing equipment. In addition, improving farmers' knowledge through education and training, creating special cultivation areas, and using organic fertilizers and pesticides are key factors in this strategy. In addition, the development of breadfruit production and processing technology as well as guidance for farmers and extension workers are also integral parts of this strategy.

The priority strategy for developing breadfruit agribusiness in Bone Regency is increasing breadfruit production and quality with a value of 0.1517. This indicates that increasing the production and quality of breadfruit has a very important role in supporting the development of breadfruit agribusiness, because it is the basis for encouraging stakeholders to innovate and optimize available market opportunities. By focusing efforts on improving the quality and quantity of breadfruit yields, industry players can meet the increasing market demands. In addition, initiatives to improve breadfruit processing and introduce the latest technology will be key in increasing the competitiveness of breadfruit products in the market.

References

1. S. Widowati, N. Richana, S, P. Raharto. Studi Potensidan Peningkatan Daya guna Sumber Pangan Lokal Untuk Penganekaragaman Pangan di Sulawesi Selatan. *Puslitbangtan* (2001).
2. T. F. Djafar, S. Rahayu. Pemanfaatan Sukun Sebagai Bahan Pangan Alternatif. *Jurnal Agros* **4**, 133–141 (2005).
3. G. Kartono, H, S, T. Purbiati. Keragaman Kultivar Sukun Dan Pemanfaatannya di Jawa Timur (Studi kasus di Kabupaten Kediri dan Banyuwangi). *BPTP Jatim* (2004).
4. A. M. P. Jones, D. Ragone, N. G. Tavana, D. W. Bernotas, S. J. Murch. Beyond the Bounty: Breadfruit (*Artocarpus altilis*) for food security and novel foods in the 21st Century. *Ethnobotany Research and Applications* **9**, 129 (2011).
5. A. H. Adinugraha, D. Setiadi. Pengembangan klon Sukun (*Artocarpus altilis* (Park.) Fosberg.) unggulan untuk mendukung ketahanan pangan. *Jurnal Biologi Tropika* **1**, 21–29 (2018).
6. S. Sumiyati, L. Sutiarto, W. Windia, P. Sudira. Kajian Aspek Lingkungan Dalam Pengembangan Agroekowisata Pada Sistem Subak. *Bumi Lestari* (2012).
7. N. Widyatama. Strategi Pengembangan Komoditas Sukun (*Artocarpus communis* Forst) di Kabupaten Cilacap (Pendekatan Metode Analisis Hierarki Proses / Ahp). (Universitas Sebelas Maret, Semarang, 2019).
8. D. Ragone. Breadfruit—*Artocarpus Altilis* (Parkinson) Fosberg. In *Exotic Fruits*. (Academic Press, 2018).
9. E. G. Fonsah. Fonsah, Esendugue Greg, et al. "The fruits and vegetables industry in Indonesia: production and limited access to market. *Journal of food distribution research* 62–66 (2008).
10. D. Histifarina, N. R. Purnamasari. The Prospect of Developing Breadfruit as An Alternative Source of Food to Support Food Diversification. *IOP Conf Ser Earth Environ Sci.* **1012** (2022).