

## Challenges in Brittle-Red Guava Business: A Lesson Learn from Potentials and Problems in Sukorejo Plantation

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**Abstract.** The business development of brittle-red guava plantation facing complex challenge from cultivation to selling, and increase economical losses. This research identifies the potentials and problems, that guava-farmers faced during the plantation development. There were 120 guava farmers involved as respondents from four sub-district in Sukorejo as largest guava center: Bringinsari, Kalipakis, Pesaren and Trimulyo. The data was collected through in-depth interview, questionnaire and focus group discussion, then were analyzed using SWOT and analytical hierarchy process (AHP) analysis. There were five major categories, includes: education and training; plantation production; farmer groups (FGs) development; business profitability; and promotion and marketing, may contribute in business of guava plantation. Interestingly, the farmers high motivated and confident conducting their business with no significantly technology improvement, low budgeting and low profit. Most of them have low education background that being obstacle for improving their business especially for marketing and promoting. Based on the AHP analysis, increasing business profit was chosen as the first problem should be overcome followed by improvement in marketing and promoting. It was relevant, considering guava business has long fluctuated condition. The priority activities shall be conducted such as business training, farmer group reactivation and post-harvesting diversification product to overcome the problems.

**Keywords:** analytical hierarchy process, brittle-red guava, guava-plantation, Sukorejo District.

### 1. Introduction

Brittle-red guava (*Psidium guajava* L, var. *guajava*) is a fruit commodity that is widely developed in Indonesian plantations (Nurain *et al.*, 2019). Even in 2017, the largest production of guava fruit in Indonesia is in Central Java, amounting to 26.34% or 52,805 tons mainly in Kendal Regency. The red guava tree is planted massively in Sukorejo District, Kendal Regency, and become a major commodity. A total of 257 hectares of plantations with a total of 280,000 red guava trees are planted in Sukorejo District. The total area of plantations and the number of trees, making the amount of red guava production increases every year (Hoyyi & Darwanto, 2017). In 2015, productivity of Kendal District red guava increased by 64.04% compared to 2014, giving the highest contribution to the provincial level.

High fruit production, often not matches by good marketing and sales, makes many farmers lose their incomes. This is caused by high fruit production which resulted in a decrease in market demand and selling prices (Omayio *et al.*, 2019). The massive production in the same harvesting time makes the farmers leaving the guava in the field until get rotten, and do not process to be a new product because of limited expertise, a funds and technology. Increasing income from red guava business results needs to be done by making improvements from various aspects. However, the success of these improvements can be achieved by planning exactly which aspects need to be improved according to the needs of business actors. Therefore, researchers identified the strengths and weaknesses of the development of the red guava business to map aspects that need to be improved according to the needs of red guava businesses in Sukorejo District.

## 2. Method

This research was used a case study design, with the locus of research was Sukorejo District, which was intended to investigate and understand the problem in the brittle-red guava business. Data collection was conducted using in depth interviews, questionnaires and focus group discussions (FGD) to the respondents. A total of 120 guava farmers from four villages in Sukorejo included, Bringinsari, Kalipakis, Pesaren and Trimulyo villages were involved as the respondent and selected using proportional sampling techniques. Identification of problems and potentials was carried out during the FGD process using criteria analysis of strengths, weaknesses, opportunities, and threats (SWOT). The results of the interviews and FGDs were then grouped into five main classes: education and training; plantation production; farmer group development (FGs); business profitability; and promotion and marketing. The results of the grouping were then assessed based on the preferences of respondents with the assessment method referring to the analytical hierarchy process (AHP). The AHP was chosen because it provides a systematic scale of measurement and sees problems as a single model so that it is easy to implement (Taherdoost, 2017; Thanki et al., 2016). In this research, AHP was used to get priority problems that were under guava farmers, which must be solved based on the priority levels that represent their needs. The results of the assessment were then interpreted and discussed in a descriptive narrative.

## 3. Result and Discussion

High farmer's motivation in brittle-red guava plantations is a main gear in conducting the guava industry in Sukorejo, but in the same time, it makes the farmers over confident with their experiences on it. Until without realizing it, the plantation business is delivered from generation to generation without significant technological improvements. The results showed that, market demand for brittle-red guava was not proportional to the amount of production, that lowering the profits. In addition, this research succeeded in identifying several facts of potential and weaknesses of the guava business in Sukorejo District (Table 1).

**Table 1.** SWOT analysis of brittle-red guava in Sukorejo District.

Subject	Strengths	Weaknesses	Opportunities	Threats
Education and training		<ul style="list-style-type: none"> <li>- As many as 74.17% of respondents in Sukorejo District has took formal education less than 12 years</li> <li>- Most of the respondents (55.08%) less experienced in guava plantation</li> <li>- Low education increases difficulties of the farmers to access information</li> <li>- 90.76% respondents are never attending business training</li> </ul>	<ul style="list-style-type: none"> <li>- Engaging academician from nearest university, such as UNNES</li> <li>- Engaging corporate social responsibility (CSR) programs for private sector</li> <li>- A lot of free-access agriculture-training on online social media platform</li> <li>- A plenty agriculture facilitator from government</li> </ul>	<ul style="list-style-type: none"> <li>- Low educated-farmer is not able to catch up global development, especially in technology</li> </ul>

Subject	Strengths	Weaknesses	Opportunities	Threats
Guava Production	<ul style="list-style-type: none"> <li>- 94.17% of total plantations belong to the farmers</li> <li>- Consistent abundance production to supply food industries</li> </ul>	<ul style="list-style-type: none"> <li>- The production areas are less than 1 Ha</li> <li>- Uncapable storage to keep the fruit still fresh</li> <li>- Over-production without further appropriate management</li> <li>- Most of the plants are old, and have low production</li> </ul>	<ul style="list-style-type: none"> <li>- Agriculture innovation technology to increase the production and shorten waiting period</li> <li>- The climate in Sukorejo supports the development of organic guava plants</li> <li>- Old plant or non-productive guava plant replacement using best appropriate new guava plant</li> </ul>	<ul style="list-style-type: none"> <li>- Land conversion from guava to vegetable plantation</li> <li>- Guava plantation has emerge in other places, outside Sukorejo</li> </ul>
Farmer Groups (FGs)	<ul style="list-style-type: none"> <li>- There are existed farmer groups in Sukorejo District</li> </ul>	<ul style="list-style-type: none"> <li>- Existed farmer groups are not active and not effective to support farmers business</li> <li>- Low participation, 62.39% of respondents are not affiliated with farmer organization(s)</li> <li>- 60.68% farmers do not have employer</li> </ul>	<ul style="list-style-type: none"> <li>- FGs are able to increase networking and expand market penetration</li> <li>- FGs can be used as a platform to collect funding from government and private sector</li> <li>- Agriculture innovation technology through intensification of modern tools</li> </ul>	
Business Profitability	<ul style="list-style-type: none"> <li>- The farmer still earn profit by selling fresh guava fruits</li> </ul>	<ul style="list-style-type: none"> <li>- It is a small plantation with start-up capital less than 20 million and producing less than 10 ton/ year of guava from &lt;200 trees only</li> </ul>	<ul style="list-style-type: none"> <li>- Involving family members to help grow the crops.</li> </ul>	

Subject	Strengths	Weaknesses	Opportunities	Threats
Promotion and Marketing	- Post-harvesting diversification	- The average total revenue per year approximately less than 30 million	- Loan capital participation by involving banks, angel investor or CSR program	
	- High farmer's motivation in guava plantation	- Low selling price that decided by the broker		
	- The farmers already have fixed buyer for their product	- Low promotion activities	- Many guava-based food industries are developing	- Low purchasing power of community
		- No commercial-attracted branding	- New supermarkets have sprung up to attract new customers	- Processed other fruits is more preferable
			- Community believes guava has beneficial impact for health	- Massive commercial of processed guava products manufactured at low prices
			- Social media viral effects	

The information gathered shows five main clusters that were became a problem in brittle-red guavabusiness development. The problems we found includes education and training, plantation production, farmer group development/ Farmer Groups (FGs), business profitability, and promotion and marketing. The five categories have a major role in the development of the red-brittle guava business in Sukorejo District. The assessment is carried out by the respondents to see which problems should be prioritized (Table 2). The results of the assessment indicate that the majority of respondents gave high marks for promotion and marketing issues and increased profits.

**Table 2.** Matrix scoring of main subject based on SWOT analysis

Subject	Education and Training	Guava Production	Farmer Groups (FGs)	Profitability	Promotion and Marketing
Education and Training	1.00	0.17	0.33	0.13	0.17
Guava Production	6.00	1.00	4.00	0.20	0.20
Farmer Groups (FGs)	3.00	0.25	1.00	0.14	0.14
Business Profitability	8.00	5.00	7.00	1.00	1.00
Promotion and Marketing	6.00	5.00	7.00	1.00	1.00

Note: scoring was developed based on respondent's answer in questionnaire

The assessment matrix in Table 2, is a pairwise composed on comparison matrix to determine the criteria weights (Saaty, 2018). At that stage, each subject was compared from the weight given by the respondents when filling out the questionnaire, where the amount of paired data will be reversed

and the diagonal value is always one (Shah & Wainwright, 2018). The values obtained in the matrix are then analyzed into the calculation of the analytical hierarchy process (AHP) (Table 3).

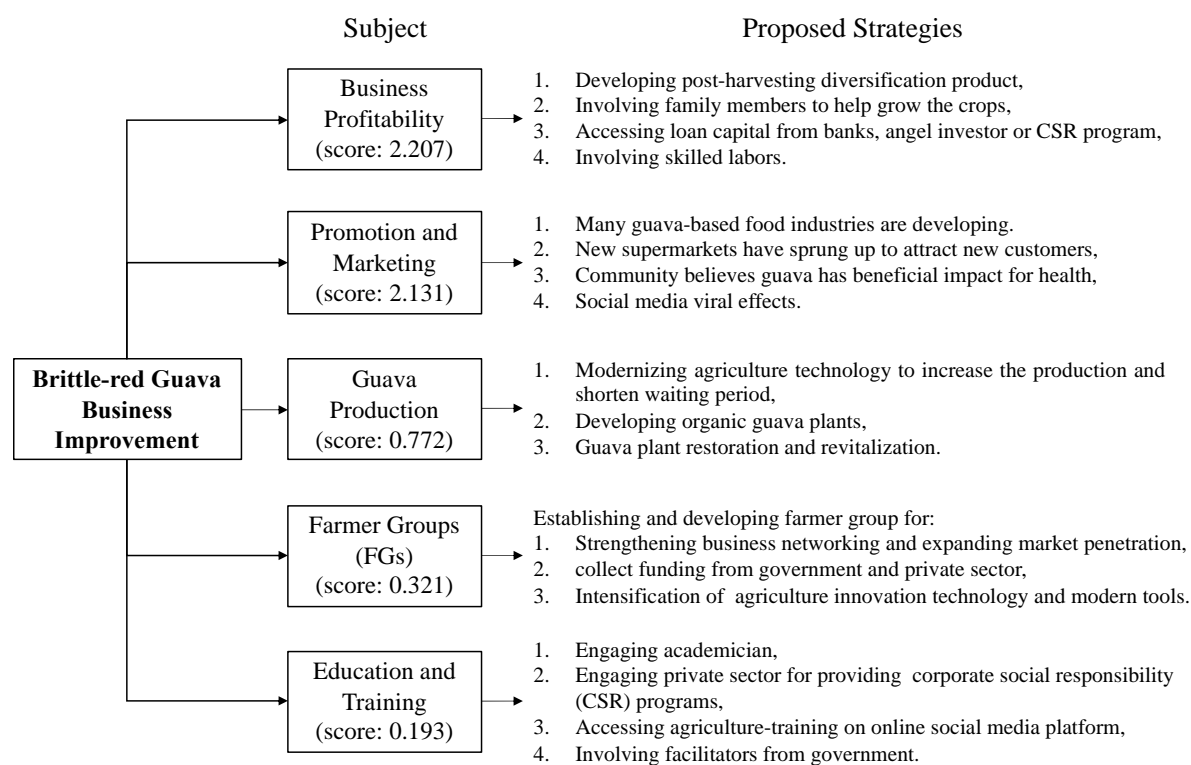
**Table 3.** AHP calculation of main subject

Subject	CW (a)	WSV (b)	$\lambda_m$ (b/a)	CI (d = [c-n]/[n-1])	RI (e)	CR (d/e)	VS
Education and Training	0.0381	0.1927	5.0567	0.1045	1.12	0.0933	0.10
Guava Production	0.1411	0.7721	5.4742				
Farmer Groups (FGs)	0.0627	0.3206	5.1143				
Business Profitability	0.3874	2.2071	5.6971				
Promotion and Marketing	0.3701	2.1309	5.7476				
<b>Total (c)</b>			5.4180				

Note: The matrix scoring (Table 2) is consistence when the CR value less than VS and WSV can be used to determine priority interference. the alphabetic letter (a-e) indicates variable in calculation step, and “n” is for number of subject. CW: criteria weight; WSV: weighted sum value;  $\lambda_m$ ; lamda max; Ci: consistency index; RI: random index; CR: consistency ratio; and VS: validity score.

The AHP assessment produces alternative subjects that can be used as a consideration to create a decision based on the preference scoring that transform into ranking or priority levels. The value in the weighted sum value (WSV) in the Table 3, can represent the priority level of the assessed subject, where the greater the value, the higher the subject should be prioritized. Based on the results, the alternative subjects for development strategies from highest to lowest, included 1) Business Profitability; 2) Promotion and Marketing; 3) Guava Production; 4) Farmer Groups (FGs); 5) Education and Training. The category with the highest score was increasing business profits and promotion and marketing, indicating that both are top priorities that must be addressed first with maximum effort to then be continued with third to fifth priorities.

In the brittle-red guava business, the profit was obtained quite hardly, because the business was only relied on the farmer’s cultivation experiences, and lack of the technology’s improvements. But we do believe, the farmer’s motivation is also positive trigger that able to encourage farmers to improve the business they run. The brittle-red guava productivity greatly contributes in local economic income. Based on the fact, we also proposing several approaches to help brittle-red guava farmers increase their profit in guava production such as: 1) increasing family members involvement; 2) Expansion of production centers by leasing land or seeking investor support. This strategy is supported by Chang (2017) that larger land will have greater profit efficiency, and land rent is more efficient than the ownership status of the land itself (Vicol, 2017); and 3) Developing partnerships with companies with CSR programs to increase capital and propagate and procure superior seeds. Capital is very important for the continuity of farming to improve quality and quantity (Ram & Verma, 2017).



**Figure 1.** AHP flow analysis result of proposed strategies based on the prioritized subject to help farmers improving guava business.

Firstly, the high brittle-red guava productivity is a precious opportunity for making post-harvest diversification products. By creating diversification products, the farmers have various commodity to sell from the fresh brittle-red guava fruit to the processed snack. It also can be used to rebranding the old-fashioned products by rising up the local commodity using valuable new products. To realize the effort, the empowerment program to help farmers creating new product can be conducted by involving several parties, training, and assisting program. To increase the successfulness, the empowerment program has to develop based on the farmers' needs and local potential.

High profits are also related to how much the level of promotion and market penetrating. Long experiences in farming makes farmers increasingly understand and feel capable in the agricultural field occupied (Syahza, *et al.*, 2018). Increasing market penetration should be improved by expanding the promotion strategies through online social media, influencer or hosting an event to introduce the products. This makes brittle-red guava farmers able to attract more consumers and buyers to be the regular customers. The development of increasingly rapid technologies such as the creation of business platforms and social media must be able to be taken by farmers as a means to widely promote their products (M. Sharma & Rajan, 2018). Increasingly shopping online systems provide easy business opportunities, so that promotional activities can be carried out optimally wherever and whenever. The broad reach that can be achieved from promotional activities will be able to improve the manufacturer's external relations with marketing agents or industries that are also developing. As a result, good cooperation with home or modern agents can be created and promotion and marketing can develop. But, in current time, because of lack educational background makes the promotional activities were inconsistent and only conducted in a narrow scope.

There was another problem, such as the absence of commercially attractive labels that reduce marketing opportunities, although, the quality of the product is proven to be good. Even though, the characteristic or brand helps the consumers recognizing the product and promoting easily. The nice and eye-catching packaging strategy, which includes the halal and safety product statement must be contained to increase consumers' beliefs and preference on the product.

As much as approximately 94.17% of the total plantation, is the farmers' own rights. This is a strength that the farmers do not have to pay any extra production cost to other parties, but it can also be a weakness for brittle-red guava if unmanaged properly. Because of the old ages guava plant and

low nutrient, may reduce the productivity in several years latter. Then, the brittle-red guava, naturally cannot survive in fresh for long time without advanced management, such as lowering temperature to delay ripening process.

Increasing the brittle-red guava can be done by improving physical condition, such as creating bio-pores that fulfilled with compose. It will help retain the water, increase plant water access, and the same time nourish the plant (Landl et al., 2019). Because, water and nutrition have a great contribution in increasing brittle-red guava productivity (Ayu et al., 2018). While plants spacing results increasing nutrients absorption by the roots (A. Sharma et al., 2019), high-quality seeds, organic agriculture practise, pest and disease management, and fertilizing can affect the quality of the fruit produced (Alam et al., 2018).

The second last priority is arranging farmer groups. The farmers was not really interest on farmer group establishing may because it needs high collaboration effort and does not has directly generate their incomes. Even thought, the determination of the success of the next agribusiness comes from the role of the farmer groups. The farmer groups provide apperception and motivation to farmers, and to bridge the marketing of products in agribusiness (Anwarudin, 2019). Strengthening external relations with beneficial parties such as the export industry, production, government, and the private sector is something that must be done by farmer groups. By that strategy, the farmers can focus on planting without worrying about the relation and marketing process. It also helps farmer minimizing competition among farmers and makes them able to controlling the selling prices, instead of brokers.

The final subject that can be considered in developing agribusiness is education and training for farmers. The majority of farmers in the brittle-red guava plantation was received low education in less than 12 years, giving rise to the small opportunity for maximum utilization of technology in the business. Evidenced by promotion techniques, marketing, and farming knowledge which is based on hereditary studies without accompanied by increased innovation. The lack of involvement of farmers in business training or counseling is also a factor in the lack of innovation and experience of farmers (Donoghue & Heanue, 2018). A strategy that can be carried out to overcome the weaknesses of farmer education is to involve academics from nearby universities in business training or technology innovation training. Independent training can also be carried out with the help of local farmer groups using online social media platforms. The training and experience gained will help farmers in developing technological innovations both for planting, promotion, or marketing so that the business they run has a high market competitiveness.

#### 4. Conclusion

Based on AHP analysis, increasing business profits is a top priority that must be overcome followed by an increase in marketing and promotion. Improving guava diversification with family members, expanding production centers by leasing land or seeking investor support, and developing partnerships with companies with CSR programs to increase capital and procure superior seeds can be a strategy in increasing business profits. Whereas in terms of promotion and marketing, brand labeling as well as proper and halal recognition, increased cooperation with marketing agents or the food industry, as well as the use of appropriate technology can be a workable solution for the achievement of red guava agribusiness in Sukorejo District which has market competitiveness high.

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