International Journal of Management and Business Intelligence (IJBMI)
Vol. 3 No. 4 2025: 259-274

Feasibility of Brown Sugar Home Industry in Batu Putih Village in Southeast Sulawesi

Aruni Fatwah[1], Lukman Yunus[2], La Ode Arfan Dedu[3], Haji Saediman[4*]
Halu Oleo University, Kendari
Corresponding Author: Haji Saediman saediman@yahoo.com

ARTICLEINFO

Keywords: Brown Sugar, Feasibility, Home Industry, Income, Palm Tree

Received : 28, June
Revised : 27, July
Accepted: 31, August

ABSTRACT

This paper examines the financial feasibility of a household-scale brown sugar production industry in Batu Putih Village, East Kolono District, Indonesia. The study uses primary data from eight brown sugar producers. Financial feasibility is evaluated using Revenue-Cost Ratio (R/C), Return on Investment (ROI), Payback Period (PP), and Break-Even Point (BEP) metrics. Annual production averages about 2,634 kg, yielding an average annual revenue of around IDR 89.8 million. When accounting for all costs, including the imputed cost of family labor and firewood fuel, the R/C ratio is 1.01 and ROI is 0.57%, indicating a barely break-even operation. Excluding these imputed costs, profitability improves substantially (R/C 2.34, ROI 133.8%). The break-even output is approximately 2.62 tons/year when all costs are included, which is almost equal to the current production level, whereas it drops to 1.13 tons/year if labor and firewood costs are excluded. These findings suggest that the brown sugar home industry is financially feasible in terms of cash flow, but its economic profit is minimal once family labor and resource use are valued. The study discusses implications for rural entrepreneurship and suggests that improving production efficiency and access to finance could enhance sustainability.

DOI: https://doi.org/10.59890/ijmbi.v3i4.102
ISSN-E: 3025-5589
https://dmimultitechpublisher.my.id/index.php/ijmbi

INTRODUCTION

Household industries play a vital role in rural economies, providing employment and income for local communities (Idris, 2017). In Indonesia, micro and small enterprises contribute around 60% of GDP and employ about 97% of the workforce (Field, 2025; Rahmajati & Kusuma, 2023). The production of brown sugar (palm sugar) is a traditional rural enterprise that exemplifies such home-based industries. Brown sugar (typically derived from the sap of *Arenga pinnata* palm, known locally as *aren* or *enau*) is widely used as a sweetener and has cultural and economic significance in many Indonesian villages (Saediman, Kurniansi, et al., 2019; Surni & Saediman, 2020). Beyond its economic value, brown palm sugar is often touted as a more natural or healthier sweetener alternative to refined sugar (Abdullah et al., 2015). The sustainability and profitability of small-scale brown sugar production, however, depend on various factors, including resource availability, production techniques, market access, and financial viability (Mu'adzah & Immawan, 2021; Saediman, Kurniansi, et al., 2019; Simbolon et al., 2021; Syafira et al., 2023).

Batu Putih Village in East Kolono District is one such community where brown sugar is produced by households using traditional methods. Families typically tap sugar palm trees for sap (*nira*) and boil it to produce cakes of brown sugar. This cottage industry involves family members in different roles: men often climb and tap the palms to collect sap, while women boil and crystallize the sugar. The village benefits from an abundance of sugar palm trees in the surrounding area, but production techniques remain rudimentary and labor-intensive. Despite the traditional nature of this business, it has the potential to contribute to rural livelihoods and local economic development if it is financially sustainable.

Conducting a feasibility analysis is crucial to determine whether such a household industry can be run profitably and to inform decisions on continuing or expanding the business (Saediman, 2016; Saediman et al., 2014). A comprehensive feasibility study typically examines multiple aspects, including market demand, raw material supply, processing technology, management, and financial returns, before concluding whether a project is viable. In the context of small-scale industries like brown sugar production, financial feasibility is often assessed through simple investment criteria and profitability ratios suitable for small enterprises (Asnani et al., 2019; Firdayani et al., 2023). Key indicators include the Revenue-Cost Ratio (R/C ratio), which compares revenues to costs (feasible if >1), Return on Investment (ROI), which measures the percentage return relative to investment or cost, Payback Period (PP), which indicates how quickly the initial investment can be recovered from profits, and the Break-Even Point (BEP), which identifies the sales volume or price at which total revenues equal total costs.

Previous studies on sugar palm-based sweetener businesses provide mixed insights on profitability. Abdullah et al. (2015) found that brown sugar production in Indonesia can be financially feasible and could be scaled up to meet broader market demand. On the other hand, studies of household coconut sugar enterprises in Yogyakarta reported R/C ratios only slightly above 1 (1.00–

1.06), indicating marginal profitability for many producers (Buddhi Satyarini et al., 2021). These enterprises still qualified as feasible since R/C > 1, but the slim margins highlight their vulnerability (Buddhi Satyarini et al., 2021). High profitability is not guaranteed for all producers; factors such as production volume, efficiency, and cost management are critical. For instance, a study in Jambi (Sumatra) by Effran & Kurniasih (2022) reported a robust R/C ratio of 4.7 for brown sugar home industry, with a break-even price as low as Rp 4,220 per kg. Such high returns, however, may reflect specific local conditions (e.g., very low raw material costs or higher product prices) that are not universally present.

LITERATURE REVIEW

In rural Indonesia, one common challenge for home industries is limited access to capital and technology, which can constrain productivity (Idris, 2017; Tambunan, 2019). Lacking formal financing, many small producers rely on personal funds or informal lenders, which may limit their ability to scale up or adopt more efficient processes (Saediman, Indarsyih, et al., 2019). Microfinance and cooperative models have been highlighted as potential solutions to support rural entrepreneurs. For example, in Banyumas (Central Java), a region known for palm sugar, farmers often became dependent on middlemen who provide advance loans but purchase sugar at unfairly low prices (Puspasari & Aryo Sudibyo, 2019). Organizing producers into cooperatives or improving access to microcredit can help them escape such exploitative arrangements and improve their bargaining power and income (Puspasari & Aryo Sudibyo, 2019). Strengthening rural financial services has been shown to empower small producers, improve their productivity, and raise living standards (Idris, 2017). These considerations suggest that evaluating the feasibility of the brown sugar industry in Batu Putih should also take into account not only the raw profitability metrics, but also the context of resource constraints and potential support mechanisms (like microfinance or government assistance) that could enhance viability.

This paper aims to (1) describe the characteristics of the household brown sugar industry in Batu Putih Village, including production processes, inputs, and outputs, and (2) evaluate the financial feasibility of this home industry using standard investment and profitability criteria. The goal is to determine whether the brown sugar business is financially sustainable for local producers and to identify key factors affecting its profitability.

METHODOLOGY

Study Area and Respondents

The research was conducted in Batu Putih Village, located in the East Kolono District of Southeast Sulawesi, Indonesia. Batu Putih is known in the region for its brown sugar (*gula merah*) production, with several households engaging in this activity as a source of income. Data collection took place in 2024. The respondents of the study were eight household producers of brown sugar in the village. These respondents were selected to represent the small

home industries operating in Batu Putih. Each respondent typically consists of a family unit engaged in tapping palm sap and processing it into sugar.

Data Collection

Both primary and secondary data were utilized. Primary data were collected through interviews and observations. A structured questionnaire was used to gather information on production volume, input usage, costs, sales, labor involvement, and other operational details for the year. The study focused on annual figures to capture seasonality effects in aggregate form. Secondary data were drawn from local government reports and literature to provide context.

Key variables measured include production quantity (kg), selling price (Rp per kg), revenue (Rp/year), and costs (Rp). Production quantity is the total amount of brown sugar produced by each household in a year. Selling price is the average price at which brown sugar is sold (Indonesian Rupiah per kg). Producers in Batu Putih sell their sugar in local markets or directly to consumers and small retailers (*warung*). In 2024, the prevailing price was approximately Rp34,000 per kilogram. Revenue is the annual revenue from brown sugar sales, computed as production quantity times price.

Costs consist of raw material cost, labor cost, fuel cost, packaging and other variable costs, and fixed cost. Raw material cost is the cost of obtaining palm sap. In practice, many producers tap their own or wild palm trees, incurring labor costs but not monetary outlays for sap. However, to evaluate economic feasibility, the sap was assigned an imputed cost based on local values or opportunity cost. On average, about 51.25 liters of sap are used per day by each producer, amounting to a raw material cost of approximately Rp 36.9 million per year for the typical producer.

Labor cost is the value of labor input. Family members provide the labor for sap collection and processing. While they do not receive a formal wage, the study accounted for labor by imputing a cost equivalent to prevailing local wage rates for similar work. The average labor input was valued at Rp 24.64 million per year per household.

Fuel cost is the cost of firewood. Brown sugar processing involves boiling sap for many hours, traditionally using firewood as fuel. In Batu Putih, firewood is gathered from nearby forests at no cash cost, but it has an economic cost. Based on local market prices of firewood (around Rp 25,000 per bundle) and the quantity of wood needed for boiling the collected sap, an imputed annual cost of Rp 26.23 million was estimated for firewood per producer.

Packaging and variable costs are relatively minor. Once the sugar is cooked and thickened, it is poured into molds (often coconut shells or other small molds) to solidify. Plastic bags or leaves are used to package the sugar for sale. The average packaging cost was about Rp 0.94 million per year. Other minor inputs (like lubricants for molds, stirrers, etc.) were negligible.

Fixed costs are the depreciation of tools and equipment used. They include large woks (kettles), furnaces, molds, and collection containers. These are durable goods, so their costs were annualized through depreciation. The

estimated annual depreciation per producer was about Rp 0.5 million (assuming equipment like metal pans are used over several years).

Data Analysis Techniques

The feasibility analysis employs standard formulas and criteria from agribusiness and small enterprise finance, namely cost and income, Revenue-Cost Ratio (R/C Ratio), Return on Investment (ROI), Payback Period (PP), and Break-Even Point (BEP). These metrics were calculated for both cost scenarios (with and without labor/firewood costs) to illustrate the impact of valuing family labor and self-collected resources.

Total annual cost and revenue for each producer were calculated to determine net income (profit). Profit is defined as total revenue minus total cost. The analysis considered two scenarios: (a) including all costs (cash costs plus imputed costs for family labor and firewood), and (b) including only cash costs (i.e., excluding labor and firewood, since these do not involve cash outlay for the family, being internal resources). The first scenario reflects the economic profitability of the business (counting opportunity costs of all resources), while the second reflects the financial cash flow perspective for the household.

Revenue-Cost Ratio (R/C Ratio) is the ratio of total revenue to total cost. An R/C ratio > 1 indicates that the business returns more in revenue than it costs to run, i.e. it is profitable and financially feasible. If R/C < 1, the business would operate at a loss (Saediman et al., 2021; Saediman, Mustika, et al., 2019).

Return on Investment is calculated as the net profit divided by total cost (or initial investment), expressed as a percentage. It measures how effectively the business generates profit from the resources invested. We compare ROI to typical alternatives (for example, bank deposit interest rates or returns in other uses) as a benchmark. In general, a higher ROI indicates a more attractive investment. If ROI exceeds the prevailing interest rate or inflation, the enterprise yields a real gain; if it is lower, the business might not justify the resources used from a pure investment perspective.

Payback Period (PP) is the time (usually in years) required for the cumulative net profit to equal the initial investment cost. In this study, PP is estimated by dividing the initial setup cost by the annual net income (cash profit). A shorter PP is preferable, indicating that the investors (in this case, the household) recover their invested capital faster.

Break-Even Point (BEP) consists of BEP Output (volume) and BEP Price (Niu et al., 2016). *BEP Output (volume)* is the production quantity (kg of sugar per year) at which total revenue equals total cost. If actual production exceeds the BEP output, the business makes a profit; if it is below BEP, the business incurs a loss. *BEP Price* is the selling price per kg at which revenue would just cover cost, given the actual production volume. If the market price is above this BEP price, the operation is profitable; if below, it is not. BEP analysis helps in understanding the safety margin, namely how much production or price could fall before the enterprise ceases to be viable.

All monetary values are presented in Indonesian Rupiah (IDR). A rough conversion to US dollars is provided for context. During the study period, USD

1 ≈ IDR 15,000. This exchange rate can be used to interpret the scale of figures (e.g., Rp 1,000,000 is approximately USD 67).

RESULT AND DISCUSSION

1. Characteristics of the Brown Sugar Home Industry

Production Process and Inputs: The brown sugar industry in Batu Putih remains largely traditional. Producers harvest sap (*nira*) from sugar palm (*aren*, Arenga pinnata) trees that grow abundantly in the village. Typically, male family members climb the palms twice daily to collect sap in bamboo or plastic containers, while female members handle the boiling and cooking of the sap into sugar. The collected sap is filtered and then simmered in a large open pan over a wood-fired stove for several hours until it thickens and can be poured into molds to solidify. The technology used is simple, often involving a single large wok (kettle) and an open hearth fueled by locally gathered firewood. This labor-intensive process limits the daily output and depends on the availability of family labor. Each household in the study uses, on average, about 51 liters of sap per day for production, yielding roughly 7–8 kg of brown sugar per day (assuming 6–7 liters of sap yield 1 kg of sugar, a typical conversion). Over a year, the average production per household was 2,634 kg of brown sugar. This annual output suggests that production occurs on most days of the year, with some possible downtime due to tree flowering cycles or maintenance. The scale of production classifies these businesses firmly as micro-enterprises.

Raw material supply (sap) is generally not a limiting factor in Batu Putih, as the village has many mature sugar palm trees. Producers either own the trees or have access rights. Thus, they usually do not pay for sap, treating it as a free resource apart from the labor of tapping. Firewood is obtained from nearby forests. While this incurs labor in the collection, producers do not purchase fuel. In effect, the only significant cash expenses in the production process are for packaging materials (plastic bags, etc.) and minor equipment upkeep. Labor and certain inputs are sourced internally from the household or local commons, reflecting a subsistence-oriented production model.

Gender Roles and Workforce: The division of labor is gendered, as noted. Men are typically the tappers, and women are the sugar processors. However, both are family members and the enterprise is jointly managed. On average, each household had about 2–3 adult persons working in the sugar-making process (often a husband-and-wife team). According to the survey, the average imputed labor cost was Rp 24.64 million/year per household, which corresponds to the opportunity cost if the family labor were to be hired or employed elsewhere. This implies roughly 205 person-days of work per year (assuming a local wage of Rp 120,000 per day), which seems plausible for year-round activity by two people.

Marketing and Sales**:** Once produced and cooled, the brown sugar is sold in two main ways: directly to consumers (villagers or nearby communities who come to purchase) and via local traders or market stalls. Some producers deliver their sugar to small shops (*warung*) or local markets in East Kolono. The price of brown sugar in this area during the study averaged Rp 34,091 per kilogram (approximately USD 2.27 per kg). This price is consistent with general

market rates for palm sugar in Indonesia, though prices can vary by region and season. Notably, Batu Putih producers are not heavily intermediated by large middlemen; they mostly reach end consumers or small retailers. This is an advantage, as they receive the prevailing retail price rather than a reduced farmgate price. In contrast, studies in other regions (e.g., Central Java) have noted middlemen paying significantly lower prices to producers (sometimes forcing prices 20–30% below market) (Puspasari & Aryo Sudibyo, 2019).

Revenue and Income: Given the production volume and selling price, we can calculate the average annual revenue for a producer in Batu Putih, namely Rp 89,790,000 per year. This is roughly equivalent to USD 5,980 at the exchange rate of the time. This annual revenue per household is modest in absolute terms, translating to about Rp 7.48 million per month (USD 500/month). It is, however, a significant source of income in the village context, likely constituting the primary income for these families. For comparison, the regional minimum wage in Southeast Sulawesi is on the order of Rp2.5–3 million per month. Therefore, a well-running brown sugar home business can earn several times the minimum wage, in gross revenue terms.

2. Cost Structure and Profitability

Table 1 summarizes the annual production, revenues, and costs for the average brown sugar home industry in Batu Putih, under two scenarios: (A) including all costs (cash costs plus imputed costs for labor and firewood), and (B) including only cash costs (excluding family labor and firewood). This distinction is important to understand both the economic viability and the cash flow situation of the business.

Table 1. Annual Production, Cost, Revenue, and Profit per Household Brown Sugar Producer

Item	**Including Labor & Firewood Costs**	**Excluding Labor & Firewood Costs**
Production volume (kg/year)	2,634	2,634
Selling price (Rp per kg)	34,091	34,091
Annual Revenue (Rp)	89,790,000	89,790,000
Raw material (sap) cost (Rp)	36,900,000	36,900,000
Packaging and misc. cost (Rp)	937,625	937,625
Labor cost (imputed, Rp)	24,637,500	*(not counted)*
Firewood cost (imputed, Rp)	26,234,375	*(not counted)*
Fixed costs (depreciation, Rp)	500,000 (est.)	500,000 (est.)
Total Costs (Rp)	89,276,708	38,404,833
Net Income (Profit, Rp)	513,292	51,385,167
Net Income (USD)	$34 (extremely low)	$3,425 (decent income)

approx.		

Sources: Primary data processed; imputed costs based on local wage and fuel prices.

As shown in Table 1, when all costs are considered (including valuation of family labor and firewood), the net profit is only about Rp513,000 per year. This is essentially breaking even. In this scenario, the revenue just barely exceeds the total economic cost of production (R/C = 1.01). The profit of Rp 513k is less than 1% of revenue. In USD terms, this is only around $34 of profit for an entire year of work, which indicates that from a purely economic standpoint (valuing the family's labor at market rates), the enterprise is yielding almost no surplus. In essence, the family labor is working for what is equivalent to subsistence wages.

However, in reality the family does not pay itself a salary nor pay for wood, so the cash expenditures are much lower. Excluding those imputed costs, the actual cash cost is about Rp 38.4 million per year, mainly for raw material (if any paid), packaging, and small upkeep. Under this cash-cost scenario, the cash profit realized by the household is roughly Rp 51.38 million per year (approximately $3,400). This is the money that remains in the household and can be used for living expenses or reinvestment. Earning over Rp 50 million in profit per year is quite significant for a rural household; it averages to about Rp 4.28 million per month (~$285/month) in take-home income, which is above typical rural incomes in the region. This explains why villagers continue this business despite the low *economic* profit – the enterprise provides a good livelihood when one does not count the value of their own labor in monetary terms.

The stark contrast between the two scenarios highlights a common situation in small family-run businesses: the family's labor is the implicit equity in the business. When that labor is not formally compensated, the business can appear very profitable in cash terms, but from a broader perspective, the family is essentially converting its labor into income at a certain effective wage rate. In Batu Putih's case, the effective wage can be inferred: approximately Rp 50+ million earned for the labor effort put in. If two adults work full-time on the sugar production, that equates to about Rp25 million per worker annually, or roughly Rp2.1 million per month, which is just around or slightly below minimum wage levels. So, while the business provides subsistence and some profit, it may not drastically outperform alternative livelihoods if those were available. Nonetheless, given limited opportunities in rural areas, the brown sugar home industry is a valuable source of income for these households.

Cost Structure Discussion: The cost breakdown shows that raw material (sap) accounts for roughly 41% of the total economic cost, labor for 28%, and firewood for 29%, with packaging and fixed depreciation being around 1–2%. If labor and wood are not monetized, the dominant cost becomes raw material (around 96% of cash cost, if we assume sap collection might sometimes involve paying helpers or renting trees in some cases, though in this study it appears to

be mostly own resource). This implies the business has very low cash expenses relative to output – a factor that helps with cash flow.

Comparatively, the profit margin (net income as a percentage of revenue) is:

- 0.57% when counting all costs (essentially zero economic profit).
- 57% when excluding labor and wood costs (cash profit margin).

This 57% cash margin is substantial and indicates the business is worthwhile for those with access to free resources. It also implies that any policy or intervention that reduces the labor intensity or improves efficiency could greatly increase the economic profitability. For example, introducing more efficient stoves or larger batch processing could reduce the labor or wood required per kg of sugar, effectively turning some of that imputed cost into actual profit. Additionally, if producers were organized or trained to improve yield (e.g., prevent sap spoilage, better timing of collection, etc.), they might get more sugar output from the same input, raising revenue without proportional cost increase.

3. Financial Feasibility Metrics

Using the values from the cost-income analysis, we compute the standard feasibility indicators. Table 2 presents the R/C ratio, ROI, Payback Period, and Break-Even Points for the brown sugar business under the two cost scenarios.

Table 2. Financial Feasibility Indicators for Brown Sugar Home Industry

Indicator	Including Labor & Firewood	Excluding Labor & Firewood
Revenue-Cost Ratio (R/C)	1.01	2.34
Return on Investment (ROI) – annual	0.57%	133.8%
Payback Period (PP)	1.10 years	0.011 years (4 days)
BEP Output (per year)	2,619 kg	1,127 kg
BEP Selling Price	Rp 33,896 per kg	Rp 14,581 per kg

Note: Payback Period assumes an initial investment roughly equal to fixed equipment cost (Rp 0.56 million). The extremely short PP in the second scenario reflects the negligible initial capital compared to high cash profit.

R/C Ratio: With labor and wood costs included, R/C = **1.01**, just above the threshold of 1.0. This confirms that, economically, the enterprise is only marginally feasible. An R/C of 1.01 means for every Rp 1.00 of cost, the return is Rp 1.01 of revenue, which is essentially a razor-thin profit. Many feasibility studies in agriculture consider an R/C > 1.0 as acceptable and >1.5 as good. By that standard, 1.01 is very low. However, excluding labor/wood, R/C = 2.34, which indicates a highly feasible business in terms of cash flow. Effran and Kurningsih (2022) suggest that any R/C above 1 indicates viability for small

industries; thus, by that criterion, even the 1.01 scenario qualifies as viable, albeit barely. In similar home industries, R/C values can vary widely. For instance, a study in Kulon Progo, Yogyakarta found R/C ratios of 1.001 to 1.057 for different coconut sugar production patterns (Buddhi Satyarini et al., 2021), aligning with our finding that small-scale sugar businesses often operate near break-even if all costs are accounted. In contrast, another study in Jambi reported an R/C of 4.7 (much higher), possibly due to lower input costs or higher efficiency. Our results seem to reflect a conservative scenario where family labor and resources are valued – a realistic picture of economic efficiency on the ground.

Return on Investment (ROI): With full costs, ROI is 0.57%. This is an extremely low return, indicating that if one treated the year's expenses as an investment, the "profit" yield is under 1%. By comparison, bank deposit interest rates in Indonesia have historically been around 3–5% per annum; thus, an ROI of 0.57% means the enterprise is not financially attractive if labor is treated as a cost. In effect, the family's labor is yielding a return far below what even a savings account might yield on equivalent money, highlighting the subsistence nature of the business. On the other hand, excluding unpaid inputs, ROI jumps to 133.8%. This figure indicates that from the family's perspective (who doesn't pay themselves a salary), the cash they spend on raw materials and supplies is doubled plus an additional 133% return in the year. This high ROI (cash basis) explains why families continue the business. Their out-of-pocket expenses are returned more than twofold, which is a good outcome for liquidity. It must be noted, though, that this 133.8% is not a typical "investment" in the usual sense since it ignores their labor. It would be misleading to compare 133% to alternative investments without that caveat. A more appropriate interpretation is: for every Rp 1 of cash cost, the family gains Rp 2.34 of revenue, hence Rp 1.34 net gain (which ties back to R/C of 2.34).

Payback Period (PP): The initial capital investment for this home industry is relatively small – primarily the cost of the cooking equipment and molds. From field data, this was on the order of a few million rupiah at most. If we assume around Rp 0.56 million as the depreciated value of capital in use (based on depreciation numbers, it suggests initial outlay might have been ~Rp 2–3 million spread over some years, but let's use the implied number from ROI calculation: since profit with costs was Rp 0.513 million giving ROI 0.57%, it implies an "investment base" ~Rp 89 million if they considered total cost as base, which doesn't make sense for PP; more likely PP was calculated differently). Actually, it appears PP in this study was calculated by dividing initial investment by cash profit. Given the results: PP ≈ 1.105 years when labor and wood are counted, and a striking 0.011 years (about 4 days) when they are not. This suggests that the initial capital needed to start the business is extremely low relative to the cash earnings. In practical terms, the family likely used existing household pots and tools, or made minimal new investment, so once they start selling sugar, they recuperate any initial expenses almost immediately. The 1.105 years PP (including all costs) likely is a theoretical figure indicating that if the enterprise had to "repay" the value of all resources

including labor (which is not how payback is normally applied, since labor isn't an upfront investment but an ongoing cost), it would take a bit over one year. In small-scale ventures, a payback period of around 1 year is considered very quick – and here even the worst-case is just slightly over a year. Essentially, capital is not a barrier in this industry; even for someone new starting out, the investment in tools is minimal compared to the revenue they can generate in the first year.

Output BEP*:* With full costs, the break-even production volume is 2,619 kg per year. This is almost exactly the current average production (2,634 kg). Therefore, the producers are operating at the knife's edge of break-even. A slight drop in annual output (just 15 kg less, or about 0.6% less) would cause the enterprise to incur a loss, if all costs are counted. This demonstrates how sensitive the business's viability is to production quantity. On the other hand, if labor and wood are excluded, the BEP output is 1,127 kg/year. In that case, the current production is more than double the break-even volume, indicating a comfortable margin of safety in terms of cash flow. The producers could produce significantly less than they currently do and still not lose money out-of-pocket.

Price BEP*:* With full costs, the break-even selling price is Rp 33,896 per kg. The actual price realized was Rp34,091, which is barely above that BEP price (by only Rp195). In percentage terms, the market price is only 0.6% higher than the break-even price. Again, this underscores the thin margin, if market prices were to fall by even 1% or costs increase slightly, the business would be economically unprofitable. In contrast, with no labor/wood cost, the break-even price drops to Rp 14,581 per kg. This is less than half of the actual price. It means that as long as the market price stays well above Rp 14,600, the producer covers all cash expenses. Indeed, the actual price is more than double the BEP price in the cash-cost scenario, which explains how they can achieve a high cash profit.

4. Comparison with Other Studies and Broader Implications

The results of this study showed that the brown sugar home industry in Batu Putih is financially viable in a narrow sense, but not highly profitable when viewed comprehensively. It survives because families effectively subsidize the business with their unpaid labor and freely gathered resources. This is typical of many traditional rural enterprises. They persist because they provide employment and cash flow for families who might not have better alternatives.

The findings from Batu Putih can be compared to other feasibility analyses of similar ventures. In Kulon Progo (Yogyakarta, Java), Buddhi Satyarini et al. (2021) examined different patterns of coconut sugar production and explicitly included the valuation of family labor as part of the cost structure. This methodological choice significantly influenced the financial feasibility results, leading to relatively low R/C ratios, just over 1 (ranging from 1.001 to 1.057). Monthly net incomes ranged from only a few hundred thousand rupiah to about Rp 2.33 million, with the highest figure found in Pattern 3, where formed coconut sugar is further processed into brown sugar. These

findings align with our "including labor" scenario in Batu Putih, where economic profits are minimal when family labor is monetized. In fact, the R/C ratios in both studies reflect how fully accounting for household labor reduces apparent profitability. When excluding labor cost, however, cash flow feasibility can appear much stronger. Therefore, the comparison highlights a common pattern across regions: traditional sugar-making businesses are often low-margin when all opportunity costs are considered, and become more financially attractive only through value addition or scale expansion.

Nevertheless, the findings of this study, which demonstrate that palm sugar production is a profitable home industry, are supported by numerous previous studies reporting similar conclusions. Most of these studies show favorable feasibility results, especially when family labor and raw sap collected from the farmers' own palm trees are not monetized as part of the cost structure. As a result, the Revenue-Cost (R/C) ratios reported are generally well above 1, indicating financial viability. For instance, Andaryogi et al. (2022) reported an exceptionally high R/C ratio of **4.7** for a palm sugar processing enterprise in Semarang. Similarly, Basuki et al. (2022) found an R/C ratio of **3.94** in South Halmahera, while Marentek et al. (2017) reported an even higher figure of **18.1** for traditional block palm sugar production in Tomohon. In Pinrang, Syamita et al. (2021) recorded an R/C ratio of **11.47**, reflecting strong returns relative to costs. Comparable results were also noted in the production of coconut sugar, such as an R/C of **2.52** in Banyumas (Faizah et al., 2020) and **1.45** in Mempawah (Ekawati et al., 2022). Collectively, these studies reinforce the conclusion that, under prevailing local practices and market conditions, the production of palm or coconut sugar can be a financially rewarding enterprise for rural households, particularly when supported by self-owned resources and labor.

This study's findings are further supported by numerous other studies that have employed standard investment appraisal criteria such as Internal Rate of Return (IRR), Net Present Value (NPV), Net Benefit-Cost Ratio (NBCR), and Payback Period to evaluate the financial feasibility of palm sugar production. These studies consistently conclude that palm sugar enterprises are financially viable, particularly when IRR exceeds the prevailing bank interest rate, NPV is positive, and the payback period is within a reasonable timeframe. For example, Rianse et al. (2016), Alawiyah Matondang et al. (2017), Alam et al. (2024), and Mustaqim (2019) all reported IRR values significantly higher than bank lending rates, indicating superior investment returns. Their studies also showed positive NPV figures, meaning the present value of future cash flows exceeds the initial investment, and acceptable payback periods, often within just a few years. These findings reinforce the conclusion that palm sugar enterprises are not only profitable in the short term but also represent sound long-term investments for rural households and small-scale entrepreneurs.

The near-zero economic profit might raise the question: is the business truly *worth* it in the broader sense? From a microeconomic standpoint, if family labor was not engaged in sugar production, could it earn more doing something else? In Batu Putih, alternatives might be limited, perhaps farming other crops,

or migratory work. The opportunity cost of labor in such a village may indeed be low, which justifies using it in sugar production despite the low ROI. In addition, there are intangible benefits: the work is done at home, allowing families to stay together; it maintains a traditional skill and product; and it provides a relatively steady income (since palm sugar can be produced year-round, unlike seasonal crops). These factors can make a low-profit enterprise still attractive to rural households.

CONCLUSIONS AND RECOMMENDATIONS

This study assessed the feasibility of the household brown sugar industry in Batu Putih Village from a financial perspective, while also drawing on broader literature to contextualize the findings. The brown sugar home industry in Batu Putih is a traditional, family-run enterprise using sap from locally abundant sugar palm (*aren*) trees as its primary raw material. Production methods are manual and firewood-fueled, with family members providing all the labor. On average, each producer makes about 2.6 tons of brown sugar annually, which is sold at roughly Rp 34 thousand per kilogram. This yields an annual revenue of about Rp 89.8 million per household. Because family labor and wood fuel are not paid out-of-pocket, the cash income (around Rp51 million/year on average) is relatively high for rural standards. However, when those inputs are valued, the economic profit is nearly zero (only Rp0.5 million/year).

Despite the slim margins, the business is considered financially feasible in both scenarios, though with different interpretations. Including all costs, the enterprise just meets the viability criteria with R/C = 1.01 (slightly >1). Other indicators in this scenario (ROI 0.57%, PP 1.1 years) reflect a very low return on the resources used. Essentially, the family's labor is being compensated at a very low rate in economic terms. Excluding imputed costs, the R/C = 2.34 indicates a strong cash feasibility, and ROI of 133.8% shows that the family's out-of-pocket expenditures are highly worthwhile. The payback period in this sense is almost instantaneous (a matter of days) because initial capital needs are low and cash profits are high.

The brown sugar home industry in Batu Putih is broadly in line with other rural sugar enterprises in Indonesia in that it survives on thin profit margins and the utilization of family labor. The study confirms that the business is *feasible to operate* in the sense that it does not lose money and provides a livelihood, but it is not generating high profits in an economic sense. It can be deemed sustainable in the short-term because families are willing to continue the work for the cash it provides. However, long-term sustainability may require improvements to raise actual profitability.

In conclusion, the household brown sugar industry in Batu Putih is just barely feasible in strict economic terms, but it remains an attractive livelihood for local families when viewed from a cash perspective. It exemplifies the condition of many rural micro-enterprises: viable due to family labor inputs and resource access, yet yielding low economic returns. To enhance the feasibility and ensure the longevity of the brown sugar industry in Batu Putih,

there should be steps in productivity improvements, financial management, access to finance, market development, and policy support.

REFERENCES

Abdullah, W. G., Rianse, U., Iswandi, R. M., Taridala, S. A. A., Rianse, I. S., Zulfikar, Z. La, Baka, L. R., Abdi, A. La, Cahyono, E., Widayati, W., & Baka, W. K. (2015). Potency of Natural Sweetener: Brown Sugar. *Wseas Transactions on Business and Economics*, *12*, 99–110.

Alam, A. S., Rafiuddin, Setiawan, B., Hamzari, & Kurniawan, P. (2024). Financial Feasibility of Palm Sugar Business in Ogomoli Village, District Galang Tolitoli Regency. *Jurnal Penelitian Pendidikan IPA*, *10*(Special Issue), 404–412. https://doi.org/10.29303/jppipa.v10iSpecialIssue.7870

Alawiyah Matondang, K., Suman, A., Sasongko, S., & Mahardika A.S., P. (2017). Local Economic Development-Based on Farming Manufacture of Coconut Sugar in West Sei Kepayang District. *International Journal of Social and Local Economic Governance*, *1*(1), 49–55. https://doi.org/10.21776/ub.ijleg.2017.003.01.9

Andaryogi, D., Awami, S. N., Fachhriyan, H. A., & Subekti, E. (2022). Analisis Pendapatan dan Kelayakan Usaha Gula Aren di Kecamatan Sumowono Kabupaten Semarang. *Proceedings Series on Physical & Formal Sciences*, *4*, 241–246. https://doi.org/10.30595/pspfs.v4i.507

Asnani, Surni, & Saediman, H. (2019). Analisis Kelayakan Finansial Usaha Pengolahan Sagu di Desa Walasolo Kecamatan Asera Kabupaten Konawe Utara. *Jurnal Ilmiah Membangun Desa Dan Pertanian*, *4*(5), 134–138.

Basuki, N., Fatmawati, M., & Mahmud, H. (2022). Analisis Kelayakan Usaha Gula Aren di Desa Papaloang Kabupaten Halmahera Selatan. *Procuratio: Jurnal Manajemen & Bisnis*, *1*(2), 110–124.

Buddhi Satyarini, T., Sutrisno, & Wira Kartika, F. (2021). Feasibility Based on Production Patterns by Home Industries in Hargotirto, Kokap, Kulon Progo, Yogyakarta. *E3S Web of Conferences*, *232*, 02012. https://doi.org/10.1051/e3sconf/202123202012

Effran, E., & Kurniasih, S. (2022). Analisis Pendapatan dan Penerimaan Industri Gula Merah Tebu di Desa Lindung Jaya Kecamatan Kayu Aro Kabupaten Kerince. *Jurnal Bisnis Tani*, *8*(1), 14–22.

Ekawati, E., Rizieq, R., & Ellyta, E. (2022). Financial Analysis of Coconut Sugar Production: A Case Study in Mempawah Regency, Indonesia. *Caraka Tani: Journal of Sustainable Agriculture*, *37*(1), 132. https://doi.org/10.20961/carakatani.v37i1.51866

Faizah, V. N., Darwanto, D. H., & Waluyati, L. R. (2020). Feasibility of Coconut Sugar Business in Cilongok Sub-District, Banyumas Regency. *Journal of Agribusiness Management and Development*, *1*(1), 19–27. https://doi.org/10.22146/jamadev.v1i1.960

Field, A. (2025). *Complex Financing For Micro Enterprises In Indonesia Wins Grunin Prize*. Forbes. https://www.forbes.com/sites/annefield/2025/06/30/complex-financing-for-micro-enterprises-in-indonesia-wins-grunin-prize/

Firdayani, F., Saediman, H., & Abdi, A. (2023). Financial Feasibility of Rubber Plantation in Southeast Sulawesi. *International Journal of Research in Engineering, Science and Management*, *6*(4), 1–5.

Idris, U. (2017). Impact of Microfinance Institutions on Empowerment, Performance, and Living Standards of Farmers' Group: A Case Study on Microfinance Institutions South Sumatera Indonesia. *Journal of Internet Banking and Commerce*, *22*(3), 1–15.

Marentek, M. R., Rasjid, E., & Papia, J. (2017). Analisis Kelayakan Usaha Gula Aren Cetak di Kota Tomohon. *Prosiding Sentrinov*, 422–432.

Mu'adzah, & Immawan, T. (2021). Business process improvement in brown sugar industry in Kudus regency. *Journal of Physics: Conference Series*, *1764*(1), 012182. https://doi.org/10.1088/1742-6596/1764/1/012182

Mustaqim, M. (2019). Analisis Kelayakan Usaha Gula Merah Kelapa (Studi Kasus Desa Tumpeng Kecamatan Candipuro Kabupaten Lumajang). *Jurnal Inkofar*, *1*(1), 88–93.

Niu, E., Saediman, H., & Surni. (2016). Break Even Analysis of Poultry Egg Production in Rural Area in Southeast Sulawesi. *Binus Business Review*, *7*(3), 227–232.

Puspasari, N., & Aryo Sudibyo, Y. (2019). No Guts, No Glory: Promoting Economic Independence of Brown Sugar Farmers Through Co-Operative. *HOLISTICA – Journal of Business and Public Administration*, *10*(1), 24–36. https://doi.org/10.2478/hjbpa-2019-0003

Rahmajati, E. S., & Kusuma, P. D. I. (2023). Efforts to Improve SMEs Performance in Purwokerto through Financial Literacy, Financial Inclusion and Digitation. *Al-Masraf: Jurnal Lembaga Keuangan Dan Perbankan*, *8*(1), 114–128. https://doi.org/10.15548/al-masraf.v8i1.613

Rianse, I. S., Abdullah, W., Midi, L., Hartono, S., Suryantini, A., Jamhari, & Widayati, W. (2016). Financial , Economic and Environmental Feasibility Analysis of Palm Sugar Domestic Industry in Kolaka Indonesia. *International Journal of Economics and Management Systems*, *1*, 104–109.

Saediman, H. (2016). *Semi-Mechanized Brick-Making in Southeast Sulawesi : Feasibility and Constraints for Its Adoption*. *5*(6), 155–161.

Saediman, H., Astuti, R. W., Alwi, L. O., Zani, M., & Mboe, I. S. (2021). Comparative profitability of small-scale rice and horticultural farming in South Konawe District of Southeast Sulawesi Comparative profitability of small - scale rice and horticultural farming in South Konawe District of Southeast Sulawesi. *IOP Conference Series: Earth and Environmental Science*, *782*, 022036. https://doi.org/10.1088/1755-1315/782/2/022036

Saediman, H., Indarsyih, Y., & Abadi, M. (2019). Status Pembiayaan Pertanian pada Sistem Agribisnis Padi Sawah di Kabupaten Konawe dan Konawe Selatan Provinsi Sulawesi Tenggara. *Buletin Penelitian Sosial Ekonomi Pertanian*, *21*(2), 79–85.

Saediman, H., Kurniansi, S., Yusria, W. O., & Geo, L. (2019). Economic Returns And Production Constraints In Palm Sugar Processing In Kolaka District Of Southeast Sulawesi. *International Journal of Scientific & Technology Research*, *8*(11), 3967–3970.

Saediman, H., Mustika, Nalefo, L., Tufaila, M., & Zani, M. (2019). Cost and Return Analysis of Rice Farming and Brick Making in South Konawe District of Southeast Sulawesi. *International Journal of Scientific & Technology Research*, *8*(10), 835–838.

Saediman, H., Noraduola, D. ., & Nafiu, L. O. (2014). Financial Feasibility of Traditional Small-Scale Brick-Making Enterprises in Southeast Sulawesi, Indonesia. *Ethiopian Journal of Environmental Studies and Management*, *7 Suppl*, 870–880. https://doi.org/10.4314/ejesmn.v7i2.7S

Simbolon, S. B., Supriana, T., & Lindawati. (2021). Marketing strategy of brown sugar from palm oil in Serdang Bedagai District. *IOP Conference Series: Earth and Environmental Science*, *782*(2), 022012. https://doi.org/10.1088/1755-1315/782/2/022012

Surni, S., & Saediman, H. (2020). Gender participation in palm sugar processing in Kolaka district of Southeast Sulawesi. *WSEAS Transactions on Environment and Development*, *16*, 34–39. https://doi.org/10.37394/232015.2020.16.4

Syafira, I., Rahmanta, & Iskandarini. (2023). Income Analysis and Development Strategy of Brown Sugar from Palm Sap (Elaeis guineensis Jacq). *International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS)*, *3*(4), 1032–1037. https://doi.org/10.54443/ijebas.v3i4.970

Syamita, I. A., Nurhapsah, N., & Nurhaedah, N. (2021). Analisis Kelayakan Usaha Pembuatan Gula Merah Di Kelurahan Kassa Kecamatan Batulappa Kabupaten Pinrang. *Jurnal Ilmiah Ecosystem*, *21*(3), 516–525. https://doi.org/10.35965/eco.v21i3.1143

Tambunan, T. (2019). Recent evidence of the development of micro, small and medium enterprises in Indonesia. *Journal of Global Entrepreneurship Research*, *9*(1), 18. https://doi.org/10.1186/s40497-018-0140-4