

Contribution of Palm Sugar Income and Farmer Household Welfare in Jawisari Village, Limbangan District, Kendal Regency

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Abstract. Indonesia as an agricultural country is enriched with fertile soil and a tropical climate that supports plant growth. As an agricultural country, Indonesia is supported by several agricultural sectors including food crops, plantations, forestry, livestock and fisheries. Palm sugar or enau (*Arrengata pinnata* Merr) has great potential as one of the agricultural commodities in Indonesia. The welfare of palm sugar farmers in Jawisari Village can be met by doing many ways. This research was conducted in Jawisari Village, Limbangan District, Kendal Regency. The objectives of this study were to (1) Identify the income and receipts of palm sugar farmers. (2) Analyze the contribution of palm sugar income to the total income of farmer households. (3) Analyze the level of welfare and factors that correlate with the welfare of farming households. Respondents were taken through a census with a total of 30 farmers as respondents. The data were analyzed using descriptive and quantitative approaches. The results showed that palm sugar farming generated IDR 23,580,000.00 per year, with a profit of IDR 22,636,557.62, and a revenue contribution of 36.69%. The government assistance variable had the strongest correlation, at -0.414. **Keywords:** palm sugar, welfare, contribution, farming.

1 Introduction

Indonesia as an agricultural country is enriched with fertile soil, a tropical climate that supports plant growth and allows planting throughout the year, this makes the majority of the Indonesian population work as farmers. As an agricultural country, Indonesia is supported by several agricultural sectors including food crops, plantations, forestry, livestock and fisheries [1]. The plantation sector itself made a significant contribution in 2021 of 3.94% to Indonesia's GDP [2]. One of the plantation sectors is sugar cane, with a production figure of 5,607 kh/ha of white crystal sugar in 2019 (Plantation Service, 2021), however sugar cane production cannot meet the sugar needs of the Indonesian population, in 2022 sugar imports reached 6 million tons obtained from several sugar exporting countries [3]. As in the table below:

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Table 1. Cane Sugar Imports by Major Country of Origin 2018-2022.

| Country of origin | 2018 | 2019 | 2020 | 2021 | 2022 |
|----------------------|-----------|-----------|-----------|-----------|-----------|
| India | 0 | 540 | 619,904 | 1,967,271 | 1,612,627 |
| Australia | 922,897 | 542,205 | 1,214,466 | 1,331,388 | 653,559 |
| Thailand | 4,037,528 | 3,539,251 | 2,027,117 | 1,033,800 | 2,418,668 |
| Brazil | 60,000 | 0 | 1,547,314 | 1,143,038 | 1,317,454 |
| South Korea | 7,191 | 7,200 | 4,742 | 4,992 | 4,992 |
| United Arab Emirates | 0 | 0 | 0 | 2,080 | 0 |
| German | 6 | 6 | 7 | 20 | 35 |
| Other | 1,232 | 851 | 126,128 | 27 | 268 |
| Amount | 5,028,854 | 4,090,053 | 5,539,679 | 5,482,617 | 6,007,603 |

Source: Ministry of Finance (Directorate General of Customs and Excise). PEB and PIB documents

The data in Table 1 shows that the number of sugar imports tends to increase every year, in 2022 the increase in sugar imports has increased quite high compared to previous years. This is due to the high national sugar consumption both from the industrial side and household consumption. In 2023, national sugar consumption reached 7.8 million tons [4]. Cane sugar is the primary sweetener consumed in Indonesia, compared to other sweeteners. Besides cane sugar, Indonesia has several alternative sugars that can be used as a substitute to meet national sugar needs.

Palm sugar or enau (*Arrengata pinnata* Merr) has the potential to be used as an alternative to cane sugar, where this sugar is also healthier because its nutritional content is better when compared to cane sugar [5]. In addition, the sugar palm tree also has a fairly high economic value. Almost all parts of the sugar palm tree can be utilized, starting from the fruit (kolangkaling), sap, tree to the roots can be utilized as medicine. The processing of palm sugar still uses simple tools and is still produced on a home scale; in this case the production of palm sugar can also improve the welfare of farmer families.

Jawisari Village, which is located on a fairly high plain, namely 480-740 meters above sea level, makes the sugar palm tree grow abundantly. Some sugar palm farmers have sugar palm trees that are quite far from their homes, most farmers take sugar palm sap using motorbikes to get to the trees to be tapped. There are still quite a lot of palm sugar farmers in Jawisari Village, although only a few farmers tap the sugar palm trees. Most of them are only actors who cook the sap into sugar. the system used by farmers is profit sharing with a "turn" pattern. Sap is easily fermented so it must be processed immediately after being harvested [6]. If it is not processed immediately, the quality of the sap will be bad and not good if made into sugar. In Jawisari Village itself, most farmers print their palm sugar using coconut shells. So, the resulting size is not the same. The price received by farmers has so far been determined by the middlemen who buy their sugar, in certain seasons such as during the fasting month, palm sugar will tend to be more expensive than usual. This is beneficial for palm sugar farmers but does not increase the profits received by farmers. Because in the month of Ramadan all forms of needs also experience price increases. To fulfill the needs of farmers must do other jobs, so that their families can prosper and all their needs are met [7].

The welfare of palm sugar farmers in Jawisari Village can be fulfilled by doing many ways to maximize income and minimize expenses. The main job is a job with longer working hours compared to other jobs that are done [8]. The work of palm sugar farmers has been carried out since the time of our ancestors who passed down the work of tapping palm trees as an inheritance. Many of them make the work of tapping palm sap a side job from their main job as construction workers or private employees, because it is not enough to rely on the results of palm sap alone. Because some of the palm sugar farmers in Jawisari Village are small farmers with few palm trees. Some even only work on other people's palm trees and then share the results with the tree owners, the profit-sharing pattern that is usually carried

out is in turns. The mechanism is that two days of tapping results belong to the tapper and the next two days become the rights of the palm tree owner. Some of them are even under privileged families who receive assistance from the government. Therefore, it is necessary to conduct further studies on the contribution of palm sugar income to total family income and household welfare, as well as factors that correlate with the welfare of palm sugar farmer households in Jawisari Village, Limbangan District, Kendal Regency.

2 Research Methods

The research method used was descriptive analytical. The research location was purposively determined in Jawisari Village, Limbangan District, Kendal Regency, considering that the area is a center of palm sugar farming activity.

Respondents were determined using a census technique, resulting in a sample size of 30 palm sugar farmers. This approach was chosen to ensure comprehensive representation of the entire population and to enhance the accuracy of the research results.

3 Results And Discussion

3.1 Costs and Income of Palm Sugar Farming

3.1.1 Cost of Production Facilities

The cost of production facilities is the actual cost incurred to run a business, where the costs incurred are used to purchase goods that are needed in the palm sugar farming business. The following are the costs of palm sugar production facilities.

Table 2. Average Cost of Palm Sugar Production Facilities.

| Description | Amount (IDR) | Percentage (%) |
|------------------|--------------|----------------|
| Injet/Betel Lime | 29,533.34 | 4.00 |
| Firewood | 709,333.33 | 96.00 |
| Total | 738,866.67 | 100.00 |

From Table. 2 it can be seen that the cost of production facilities incurred is IDR 738,866.67. The costs incurred are only the cost of lime and firewood. The percentage of lime costs is very small, only 4% because the average price of lime is only IDR 6,000 in addition. The use of lime is not large and in one purchase it can be used for up to two months depending on the number of palm trees tapped. While the average cost of firewood for one year is IDR 709,333.33 because most farmers look for firewood themselves in the forest and only a few farmers buy firewood. The purchase of firewood is done because of high demand, and farmers are unable to meet it themselves. Farmers who have large firewood needs are farmers who tap many palm trees and usually also work on palm trees belonging to other people [9].

3.1.2 Depreciation Expense

Depreciation cost is one of the explicit costs that must be incurred in running a business. Where this cost is calculated from the depreciation value of production equipment, which in the future if the equipment used is damaged. New equipment can be purchased with money

that has been collected from depreciation costs each year. The following is the depreciation cost incurred in the palm sugar farming business for one year.

Table 3. Average Depreciation Cost.

| Description | Amount (IDR) | Percentage (%) |
|--------------------|--------------|----------------|
| Frying pan/kenceng | 10,397.55 | 50.05 |
| Irus | 4,492.89 | 2.20 |
| Deres | 16,795.27 | 8.21 |
| Jrigen/tube | 80,890.00 | 39.54 |
| Total | 204,575.71 | 100.00 |

From the data in Table 3. it can be seen as the amount of depreciation costs in palm sugar farming. The largest depreciation cost is the frying pan/kenceng of 50.05% because farmers have several to cook palm sap, and the price of the kenceng itself is quite expensive because it is made of brass. The same is true for jerry cans which have a large depreciation of 8.21% because the jerry cans used to tap palm are many. in one tree or one flower that is tapped farmers must provide two jerry cans used to collect sap in the morning and evening. While the smallest amount of depreciation is the irus of 2.20% this happens because farmers usually make their own irus from coconut shells and bamboo as handles.

3.1.3 Palm Sugar Farming Business Revenue

Farming income is the result of multiplying production results by prices, where in palm sugar farming the income calculated is income for one year with a balanced average price and average production value calculated in two seasons, namely dry and rainy. With details of palm sugar farming income in one year as follows.

Table 4. Average Income from Palm Sugar Farming.

| Description | Production (kg) | Price (IDR) | Receipts (IDR) | Percentage (%) |
|--------------|-----------------|-------------|----------------|----------------|
| Dry season | 573.90 | 22,584 | 12,961,200.00 | 54.97 |
| Rainy season | 497.70 | 21,336 | 10,618,800.00 | 45.03 |
| Total | | | 23,580,000.00 | 100.00 |

From the Table 4. it can be seen the amount of income from palm sugar farming, where the income received by farmers is 9.93% greater in the dry season because the quality of palm sap and sugar produced is better in the dry season. During the dry season, the tapped palm sap does not mix with rain and the wood obtained by farmers is in a dry condition that is easy to burn. While during the rainy season, palm sap has the risk of mixing with rainwater when it is not covered properly. In addition, during the rainy season, the firewood obtained is in a wet condition that is difficult to burn and makes the fire unstable. This condition causes the quality of palm sugar to decrease due to cooking with unstable fire not infrequently the sugar cooked by farmers cannot be molded perfectly. Therefore, palm sugar production also decreases during the rainy season. Poor quality also causes prices to fall, which is why the price of palm sugar in the rainy season tends to be cheaper when compared to the dry season.

3.1.4 Palm Sugar Farming Income

Palm sugar farming income is obtained from the production value in one year minus the total explicit costs in one year, with details of production costs and equipment depreciation costs. The following are the results of the calculation of palm sugar farming income in one year.

Table 5. Average Income of Palm Sugar (PS) Farming Business.

| Description | | Value (IDR) |
|--|---------------------|---------------|
| Palm Sugar Farming Business Income (A) | | 23,580,000.00 |
| Cost: | | |
| | Means of production | 738,866.67 |
| | Tool Depreciation | 204,575.71 |
| Total Cost (B) | | 943,442.38 |
| Income (AB) | | 22,636,557.62 |

Table 5 shows the results of the calculation of the average income of palm sugar for one year, where the average farmer earns an income of IDR 22,636,557.62 in one year. The results of this calculation are obtained from the average total income in the dry season and the rainy season which is then reduced by the cost of production facilities and equipment depreciation costs.

3.2 On-Farm Income

On-farm income is the amount of income from a farm minus costs. In this study, on-farm income can be obtained from seasonal crops, perennial crops, and palm sugar farming. The following table details on-farm income other than palm sugar for one year.

Table 5. Average Total Income on Farm.

| Description | Value (IDR) | Percentage (IDR) |
|------------------|---------------------|------------------|
| Annual Plants | 3,032,880.26 | 79.48 |
| Perennial Plants | 783,000.00 | 20.52 |
| Total | 3,815,880.26 | 100.00 |

From Table5. It can be seen that the largest income is obtained from annual crops with a percentage of 79.48% because 15 farmers from the total respondents manage rice fields planted with annual crops. While from annual crops, only farmers who have sugar palm trees can sell the results of the sugar palm trees, and one farmer who sells coffee plants with a total income of IDR 3,000,000.

3.3 Off Farm Income

Off-farm income is a number of wages received from work in the agricultural sector that is not self-owned or can be used as agricultural labor. The work done is not only on the on-farm side but also in the farming process such as rice milling and others. The following is the income of farmer households from the off-farm sector.

Table 6. Average Income *Off Farm*.

| Work | Value (IDR) | Percentage (%) |
|----------------|--------------|----------------|
| Bamboo Workers | 5,760,000.00 | 84.51 |
| Wood Worker | 1,056,000.00 | 15.49 |
| Total | 6,816,000.00 | 100.00 |

From Table 6. It can be seen that off-farm income is only owned by the head of the family and one family member who works in the agricultural sector. The data shows that the average off-farm income received is IDR 5,760,000.00 per year. The income is received from work as a woodworker. which is a tree cutter and bamboo cutter.

3.4 Non-Farm Income

Non-farm income is an amount of money received from work outside the agricultural sector. This income can be obtained in units of IDR/day/week/month. in this study non-farm income is obtained from several forms of work. the following is a table of income of farmer families from the non-farm sector [10].

Table 7. Average *Income On-Farm*.

| Work | Value (IDR) | Percentage (%) |
|----------------------|---------------|----------------|
| Construction workers | 6,864,000.00 | 24.66 |
| Factory Employee | 16,488,000.00 | 59.24 |
| Massage therapist | 80,000.00 | 0.29 |
| Jamu | 480,000.00 | 1.72 |
| Trade | 3,280,000.00 | 11.78 |
| Other | 640,000.00 | 2.30 |
| Total | 27,832,000.00 | 100.00 |

From the Table 7 it can be seen that the largest non-farm income comes from work as a factory employee at 59.24%. This income is obtained from children's work as factory workers who are mostly in Semarang City. And the smallest income is from work as a masseuse at 0.29% which is obtained by the wife of one of the farmers who works as a massage therapist. The second largest income is from work as a construction worker with a percentage of 24.66%. which is done by farmers as their main job besides tapping palm sap. While work as a herbal medicine seller and trader is the work of the farmer's wife. and other jobs are income obtained from the farmer's children as odd jobs and online courses.

3.5 Receipt of Government Assistance

Government aid receipts represent the amount of aid funds from the government given to several households that are considered less prosperous. With this assistance, it is hoped that the level of welfare of farmer households can increase. Some of the assistance provided is PKH (Program Keluarga Harapan) and PIP (Program Indonesia Pintar) assistance, which is given periodically throughout the year. The following is the amount of government assistance given to farming families.

Table 8. Average Receipt of Government Assistance.

| Description | Value (IDR) | Percentage (%) |
|----------------------------------|-------------|----------------|
| Receipt of Government Assistance | 589,333.33 | 100.00 |
| Total | 589,333.33 | 100.00 |

Table 8 shows the average receipt of government assistance of IDR 589,333.33.33. This income is obtained from PIP and PKH assistance provided every three months. This assistance is provided by the government to improve the welfare of farmer families.

3.6 Revenue Contribution

Income contribution is the result of calculation per income divided by total income which is then multiplied by 100%. From the results of this calculation, it can be seen how much income is made from various sectors, such as the farming sector, off-farm, non-farm and others. The following are the results of the calculation of the income contribution of farmer households.

Table 9. Average Contribution to Farmer Household Income

| Income | Value (IDR) | Percentage (%) |
|-----------------------|---------------|----------------|
| Palm sugar | 22,636,557.62 | 36.69 |
| On Farm | 3,815,880.26 | 6.19 |
| Off Farm | 6,816,000.00 | 11.05 |
| Non-Farm | 27,832,000.00 | 45.12 |
| Government Assistance | 589,333.33 | 0.96 |
| Total | 61,689,771.21 | 100.00 |

From Table 9 It can be seen that the income contribution from the palm sugar sector is 36.69% and is included in the category of "moderate" income contribution. and has the largest percentage of the total income of farmer households, which means that palm sugar farming has an important role in meeting family needs. Where the income from palm sugar farming can help farmers to meet the needs of farmer households. And the receipt for government assistance has the smallest contribution of 0.95%. which is obtained by eight farmer households from a total of 30 respondents. In research [11] shows that family farming has contributed to increasing total household income and reducing stunting rates with better nutritional fulfillment [12].

3.7 Household Expenditure

Household expenditure is a number of costs incurred to meet household living needs. The costs incurred are costs in one household born by the head of the family. These expenses can be in the form of food and non-food expenses incurred in one year.

3.7.1 Food Expenditure

Food expenditure is a number of costs incurred to meet household food needs every day. This expenditure is in the form of staple food expenditure. side dishes. and snacks and drinks. The following is data on household food expenditure in one year.

Table 10. Average Food Expenditure.

| Expenditure | Value (IDR) | Percentage (%) |
|----------------------------|---------------|----------------|
| Rice | 3,170,400.00 | 27.31 |
| Vegetables and Side Dishes | 7,864,000.00 | 67.75 |
| Drinks and others | 573,600.00 | 4.94 |
| Total | 11,608,000.00 | 100.00 |

From Table 10, it can be seen that the average household food expenditure of farmers is dominated by vegetable and side dish expenditure with a percentage of 67.75%, because vegetable and side dish consumption is purchased from outside and cannot be fulfilled by themselves, with an average expenditure per day of IDR 27,301, the calculation of vegetables and side dishes is combined because each farmer family tends to buy them together from traveling vegetable sellers. Meanwhile, expenditure on drinks is only 4.94%, the smallest compared to other food expenditure, because farmers more often consume ordinary water that is boiled and comes from springs that are distributed to residents' homes. And rice expenditure with a percentage of 27.31%. The number of vegetables and side dish expenditure is greater because the price of these condiments is quite expensive, and consists of several products such as vegetables, spices, side dishes and others. However, sometimes farmers also get vegetables from the garden, for example when farmers go to the garden and get young jackfruit, the jackfruit is used to be cooked and consumed as vegetables.

3.7.2 Non-Food Expenditure

Non-food expenditure is a number of costs incurred by households in meeting needs, both clothing, housing, and social needs. Non-food expenditure also includes education and health that must be met. The following is data on non-food expenditure of farmer households.

Table 11. Average Non-Food Expenditure.

| Expenditure | Value (IDR) | Percentage (%) |
|-----------------------------|--------------|----------------|
| Firewood | 0.00 | 0.00 |
| Gas | 683,200.00 | 3.18 |
| Gasoline/Diesel | 4,582,400.00 | 21.34 |
| Electricity | 612,800.00 | 2.85 |
| Water | 64,066.67 | 0.30 |
| Credit | 374,000.00 | 1.74 |
| Internet | 1,286,520.00 | 5.99 |
| Bathing Needs | 1,242,000.00 | 5.78 |
| Cosmetics | 100,000.00 | 0.47 |
| RT/RW/Village Contributions | 167,166.67 | 0.78 |
| Health | 0.00 | 0.00 |
| Education | 4,982,866.67 | 23.21 |
| Cigarette | 4,667,600.00 | 21.74 |
| Clothing | 1,345,000.00 | 6.26 |

| Expenditure | Value (IDR) | Percentage (%) |
|--------------|----------------------|----------------|
| Recreation | 236,666.67 | 1.10 |
| Celebration | 626,666.67 | 2.92 |
| Vehicle Tax | 346,400.00 | 1.61 |
| Property Tax | 152,433.33 | 0.71 |
| Total | 21,469,786.67 | 100.00 |

Based on the data in Table 11 it can be seen that the highest expenditure is education expenditure of 23.21%. This is because some of the farmers' children attend private schools and this education expenditure includes pocket money given every day. Then for the smallest expenditure is water expenditure with a percentage of 0.30% this is because the water distributed to each resident's house is water from a spring near the village. and farmers are only charged maintenance fees charged per month or per year. While for cigarette expenditure is the second largest expenditure because most farmers and male members of farmers' families are active smokers. Recreational spending is also small, only 1.10%, as neither farmers nor their families frequently vacation. In Krajan Hamlet, nearly five of the palm sugar farmers surveyed make annual pilgrimages to sacred sites every year. Meanwhile, in Lebari Hamlet with 25 respondents only one farmer family does recreation every year.

3.7.3 Total Household Expenditure of Farmers

Total household expenditure for farmers is the sum of food and non-food expenses a household must incur to meet its living needs. This expenditure also includes primary and secondary expenses. Secondary expenditures typically cover non-food items such as education, internet access, and so on. The higher the secondary expenditure, the higher the level of well-being, as it can be interpreted as having met primary needs and being able to fulfill secondary and tertiary needs. This aligns with Maslow's theory, which culminates in self-actualization. The following is data on household expenditure for farmers.

Table 12. Average Total Expenditure of Farmer Households.

| Expenditure | Value (IDR) | Percentage (%) |
|----------------------|----------------------|----------------|
| Food Expenditure | 11,608,000.00 | 35.09 |
| Non-Food Expenditure | 21469,786.67 | 64.91 |
| Total | 33,077,786.67 | 100.00 |

Table 12 it can be seen that non-food expenditure is greater when compared to food expenditure. with a percentage of 64.91%. This is because to meet food needs, farmers are unable to produce it themselves and almost all needs are met by buying. Meeting food needs, some farmers are still able to meet them by taking or utilizing the agricultural products they have, although some are also met by buying, and for food expenditure of 35.09%.

3.8 Welfare

In calculating welfare using GSR analysis which compares food and non-food expenditure in palm sugar farming households in Jawisari Village. the following calculation is obtained:

$$GSR = \frac{\text{food production}}{\text{non-food production}} \dots\dots\dots (1)$$

$$GSR = \frac{11,608,000.00}{21,469,786.67} \dots\dots\dots (2)$$

$$GSR = 0.54 \dots\dots\dots (3)$$

From welfare calculation using the GSR formula that compares the average food and non-food expenditure of palm sugar farmer households in Jawisari Village has a "more prosperous" level of welfare with an analysis result of 0.54. And from a total of 30 farmer respondents. There are only 4 farmer households that are not prosperous. This is because in these households. non-food expenditures are not large. The four households Most of the family members are no longer in school. And from the four farmer households who go to school. There are only two people, and they are still in elementary school, which at this level the costs incurred are not too large compared to other levels of education.

In research conducted by [13] entitled COVID19 Pandemic, Household Well-being, and Smallholder Farmer Diversification Strategies in Uganda. also showed an increase in the level of well-being of farming households, despite a decrease in income. In another study conducted by [14] entitled analysis of income and welfare levels of industrial households that Bonggola snack industry households have a higher level of welfare, namely at the KS III level or self-actualization.

3.9 Factors Related to Well-being

In measuring variables that correlate with the welfare of farmer households using Spearman rank correlation analysis. the following results were obtained in Table 13:

Table 13. Results of Spearman Rank Correlation Analysis.

| Variables | Correlation Coefficient | Sig. |
|------------------------|-------------------------|--------|
| Age | 0.299 | 0.109 |
| GA Farming Experience | 0.290 | 0.120 |
| Number of Dependents | -0.140 | 0.462 |
| Education | -0.106 | 0.576 |
| Government Assistance | -0.414 | *0.023 |
| The Number of PS Trees | 0.098 | 0.608 |
| PS Revenue | -0.051 | 0.787 |

Based on the analysis results in Table 13. it can be seen that there are four variables that have a negative correlation with the welfare variable of farmer households stated in the GSR value parameter. Of the seven independent variables that have been determined. There is one variable with the strongest strength and falls into the "sufficient" correlation category with a value of 0.414 and is negatively related. This variable is a government assistance variable. This indicates that if the farmer's family is increasingly less prosperous, the assistance provided by the government will be higher.

4 Conclusion And Recommendations

Based on the results of the study on the contribution of income and welfare of palm sugar farmers in Jawisari Village. Limbangan District. Kendal Regency. it can be seen that the average income from palm sugar farming per year in Jawisari Village is IDR 23,580,000. with an average income of IDR 22,636,557.62. With the value of the contribution of palm sugar farming income to the total income of farmer households is 36.69% and has a moderate contribution category. And the welfare of farmer households in Jawisari Village. The results show that the average farmer household is more prosperous with the GSR calculation result

of 0.54. Based on the results of the Spearman rank correlation analysis, the variable that has a correlation with welfare is the variable "government assistance" with a correlation value of -0.414 and is included in the category of sufficient correlation and negative correlation.

Palm sugar farming has very good potential if training and education are carried out for farmers to improve the quality and value of palm sugar so that the income received by farmers becomes greater, with better knowledge and processing of palm sugar. It is hoped that the results received by farmers will be better. So that it can help improve the welfare of palm sugar farmer households. And the government can consider further regarding the provision of assistance to farmers so that the assistance provided can be distributed to the right targets, so that community welfare is more evenly distributed.

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