

THE RISKS OF *AREN* SUGAR PROCESSING BUSINESS IN KOLAKA DISTRICT SOUTH EAST SULAWESI

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Abstract

Business of *aren* sugar processing intends to providing alternative sweetener source to fulfill sugar demand for community. Nonetheless, every business has a risk particularly agricultural product in general, including *aren* sugar processing business in which the raw resources were obtained from *aren*.

The purpose of this research was to analyze the type and stage of risk related to *aren* sugar processing business in Kolaka District. Simple random sampling method was used to decide sample on this research. Quantitative descriptive analysis and coefficient of variance was used to analyze types and stages of risk in *aren* sugar processing business. The result of the research showed that there are six type risks on the extraction process, five type risks on *aren* cooking process, and one type risk on marketing. Risk types which have quantification value is analyzed for its risk stages, including raw material risk, production risk and price risk. Raw material risk had the highest stage of risk among other risks. Authority for endorsing continuity and development of *aren* sugar processing business was a based-risk development strategy, especially for raw material risk, as well as mentoring of production risk and marketing management.

Keywords. risk, profit, aren sugar processing business

INTRODUCTION

Sugar is one of the carbohydrate resources required by human every day. This substance can be found on various types of carbohydrate food (such as rice, bread, sweet potato, sago *aren*), fruits (such as apple, mango, banana, etc), or other sweetener sources (such as granulated sugar, *aren* sugar, and other artificial sugar).

The dependency of sweeter sources (especially granulated sugar) in Indonesia in general and Southeast Asean people in particular is quite high. According to The General Directorate of Agriculture (2014), there is 5.7 million tons of granulated sugar demand annually while its total production is only 3.7 tons. It shows a big opportunity for other sweetener

sources processing business to fulfill deficiency of sugar production.

Aren sugar as one of the *aren* sugars (sweetener source) produced by *aren* tree has a bigger potency because the raw materials are more available than other types of *aren* sugar and *siwalan* sugar. It is stated similarly to Abdullah (2014) that *aren* sugar could produce abundance of *aren* than other *arens* and adapt with many kinds of soil. Abdullah (2015) also stated that *aren* tree could produce *aren* sap as much as 30-40 liters each day compared to *aren* tree with only 2-4 liters each day.

Aren tree processing business intends to provide alternative sweetener source to supply the sugar demand. Kolaka District has 200 ha area for *aren* tree (the second widest area in Southeast Sulawesi), as the

main raw resource for *aren* sugar production. Therefore, *aren* sugar processing business in Kolaka District has a potency to be developed. Nonetheless, every business has a risk, particularly agricultural products in general.

Development achievement of *aren* sugar processing businesses need to be preceded by identifying risk types and measuring risk stages. It is important because risk of business with main raw material from agricultural product has a unique characteristic. Therefore, development strategy of risk-based *aren* tree processing business could be formulated in order to achieve target of sugar demand in the community by sweetener source diversification.

According to the explanation, the purpose of this research is to analyze the type and stage of risk of *aren* sugar processing business in Kolaka District.

LITERATURE REVIEW

Concept of Risk

Barlett (1984) stated that a risk is a situation when probability from various results that might be happened is known. Probability can be used for specifying a decision which will maximize long term objective achievements. Risk sample faced by farmers in production process is related to climate (rainfall). In this situation, the farmers have experiences in the rainfall pattern in their region. Production variability in rainy season is a risk. Agreed with Barlett (1984), Soekartawi, dkk, (1993) said that something is defined as a risk if the probability value of an incident is known. For instance, if there is a dry season next year and it is predicted that production will fall by 30%, indirectly, a probability of risk value will be 30% or 0,3. When the probability of risk is 0,3 which means that if the farmer continue to plant rice, they will

recognize and realize that the achieved production will fall to 30%.

Hasan (2002) said that a risk can generate several effects, such as.

1. Financial loss, means that by the existence of a risk, the positive impact that will be achieved or reached will decline from what it should be.
2. Unpredictably, it means that by the existence of a risk, it is impossible to decide positive impact that would be achieved because the risk can not be measured clearly.

In agricultural business, there are various types of risk that could be faced. Risk types need to be understood by agricultural businessmen. Beside this, it is also important to understand sources of the risk types.

Barry (1984) stated that there are five main resources of business risk in agricultural field, those are. production or technical risk, marketing or price risk, technological risk, law and social risk, and human resource risk.

- a) Production or technical risk is random variability in an agricultural production process. Weather, disease and pest are technical risks of agricultural and animal husbandry production. Fire, wind, robbing, and a situation by chance are sources of other production risks.
- b) Marketing or price risk could happen in the input purchasing and sold product. Short term fluctuation in input prices can cause loss of income and cash deficiency. Particular input availability is another marketing risk faced by farmers. In long term, consideration about input price, bank rate, and price relative mobility influence farmer decision regarding long lasting asset investment and other components in planning strategy.

- c) Technological risk is potency that recent decision can be balanced by technical improvement in the future. Long lasting asset investment can generate dramatically technological change. Development of transportation technology, processing, and other nonagricultural sectors could influence agricultural business income.
- d) Legal risk and social risk can increase in line by improving scale of farming and more dependent on sources except the farm. Marketing techniques that lead to the formation of the contract, in response to the risk of price variability may carry the risk of a new regulation. The Government policies affect the farming environment as well. For example, government policies on pricing and programs that support increasing revenues, such as tax, trade, credit, and environmental policies. The transformations that were not anticipated at all these policies are an important source of risk factors for farmers.
- e) Human resource risks are related to labor and management functions in the farm. Health problem of key operator can interfere with the performance of farming. Changes in individual goals and family members can influence farming progression.

Measurement of risk

Measurement of risk is a way to quantify risk. In order to quantify the risk, some conference participants A / D / C at CIMMYT, Mexico, as proposed by Roumasset (1979) in Soekartawi, et al (1993), have agreed to approve the three kinds of thoughts about the following risks.

- a. Risk as one of measurements of the dispersion in possible outcomes, such as variance.
- b. Risk as the probability that produces a particular decision.
- c. Risk is how much should be paid for by those who are reluctant to risk in order to avoid it.

RESEARCH METHODS

The population of this research is all of the *aren* sugar processor in Kolaka, that are 149 persons. Sampling technique used is *simple random sampling*, which determines the number of sample using Slovin formula so that it will be 60 persons as the sample.

The data collecting processes is carried out by survey technique, using list of questions that have been structured or questionnaire, and recording techniques; by recording data to support from the relevant agencies.

The types of risks was analyzed descriptively. The risk level was analyzed in a coefficient of variations (CV). Coefficient of Variation (KV) is used to ensure consistency of the processing business in the level risk of measurement and processing of *aren* sugar.

$$KV = \frac{V}{E} \times 100\%$$

information.

KV= Coefficient of Variation

V = standard deviation advantage in processing / marketing business of *aren* sugar;

E = the median value on processing / marketing business of *aren* sugar.

Standard of deviation (v) .

$$v = \sqrt{V^2} = \sqrt{\frac{\sum_{i=1}^n (E_i - E)^2}{n-1}}$$

Variance formula (V^2) .

$$V^2 = \frac{\sum (E_1 - E)^2}{n-1}$$

Median Value equaion (E) .

$$E = \frac{\sum_{i=1}^n E_i}{n}$$

information.

v = Standard deviation

V² = Variance

E = the median value on processing / marketing business benefits of aren sugar

E_i = processing / marketing business profit of aren sugar respondents to-i

n = the number of observations.

Criteria level of risk.

The higher the value, the higher KV experienced risks by processing / marketing business of aren sugar..

KF value indicates the magnitude of the possible risks of the rupiah (IDR 1) the expected profit.

Based on this KV formula, KV value ranges from 0-100%, therefore we can defined five levels of risk, which is very high, high, medium, low, very low, as showed in Table 1.

Table 1. Risk levels based on Value Coefficient of Variation (CV)

Risk Level	KV value (%)
Very high	80.01 – 100.00
High	60.01 – 80.00
Medium	40.01 – 60.00
Low	20.01 – 40.00
Very low	0.00 – 20.00

RESULTS AND DISCUSSION

Aren sugar processing business in Kolaka such as business in the field of agriculture are more friendly to risk uncertainty. Among the risks and uncertainties can only be distinguished by the absence of known chance occurrence. The risk of potential losses.

Risk identification is based on phases of activity in processing activities. In the processing of aren sugar, there are three phases of activities carried out by the processors of aren sugar, namely. tapping sap, cooking (boiling) sap, and marketing

(sales). Each stage of these activities has the possibility of risk and its consequences need to be considered, especially for the development of aren sugar aren processing business in the future.

Table 2. Risk in Phase Tapping aren juice

No	Source of Risk	Kinds of Risk	Possibility (%)	Concequency (IDR)
1	Pest	Morning Nira runs	10.00	81,000.00
2	Fatigue / health problems	Acquisition of sap is reduced to 50%	10.00	882,060.00
3	- Rainy season, - The lack of prudential processing (human error)	Work accident	10.00	1,032,060.00
4	Bunches of flowers have been aged > 7 months, wiretapping inability	Productivity bunches of flowers down	0.48	231,000.00
5	The weather was cold / rainy continuous, unhygienic Nira container shelters	The quality of Nira is not good	10.00	426,030.00
6	Aren trees have aged ≥ 20 years	Aren trees are not productive	1.37E-04	1,075,800.00

These risks should also be identified as the sources of risks to be managed appropriately. Sources and types of risk can be seen in Table 2.

Table 2 shows that there are six kinds of risk at the stage at tapping aren juice. Possible risk at the highest tapping stage is 10%. It happened on four types of risk, namely the risk of depleted sap, sap acquisition reduced, work accidents, and the quality of the juice is not good to have the possibility of the same events.

Endless morning sap can be caused by pests. Pests that are often found in Kolaka are rodents, bats, and monkeys, pests that usually drained the fresh content, or sap a container shed from its shelter.

A aren sugar processing tapping sap must be performed twice each day even though the weather was not good the harvest should be at the certain hours, between 6 am to 8 am and between 3 pm and 4 pm. As such these activities require stamina. The absence of a specific budget prepared by processing aren sugar to maintain fitness stamina sometimes make them tired or have health problems. As a

result, they were too late to go to tap. This can lower the quality of the sap that decrease the production of *aren* sugar that can be generated. Serious health disorders can cause brown sugar processors to lose all income daily because they have to give up other processors do the tapping on *aren* trees. This must be done because the *aren* bunches that are not tapped for 3 consecutive days off (*discharged the juice*) before the expiry of their productive age. During the rainy season, the processors of *aren* sugar to be extra careful to conduct wiretaps because of the condition of the tree or bamboo ladder is slippery. Things can happen in fatal even if the processor falled from the tree. Not only minor injuries and disabilities but also death can occur. Persistent rain can also reduce the quality of the juice. The content of sugar (sucrose) in the sap will be reduced so that the *aren* sugar produced will also be reduced. Instead the weather was very hot and prolonged can reduce the amount of juice that can be tapped. This is because of the high evaporation level that occurs due to the hot weather.

The risk at this stage of tapping further classified by their nature, based on whether it is transferable, and based on its origin. The six types of risk are classified as pure risk for consequential losses. Pure risks are risks that can be transferred to another party consequences, for example through insurance. The size of the risk transfer can be done based on the size of the consequences for each risk identified in Table 2.

Based on the original source of risk, the risk of early sap run out, unproductive *aren* trees belong to the type of external risks. This is because the source of risk comes from nature cannot easily managed by a processor. While the risk of acquisition of the juice is reduced to 50%, and the risk of

workplace accidents classified as internal risk types. This is because the source of risk comes from the ability of management or processing skills in tapping sap activity.

Risk productivity in the form of lowering growth of flowers and the quality can be classified as the internal or external risks depending on the source of the risk. Risk productivity bunches of flowers down if due to a lower operational life bunches of flowers then classified as external risks but if productivity bunches of flowers fell due to unskillfulness processing in intercepting the risk is classified as internal risks. Similarly, the risk of the quality of juice will not good due to cold weather/constant rain then classified the type of external risks but if due to the contamination in juice container, it is classified as internal risks.

The next stage in the *aren* sugar processing business of is cooking (boiling) roomie. At this stage, there can be identified to five types of risk, as shown in Table 3.

Table 3. Risk in Phase Cooking (Boiling) *aren* juice

No	Source of Risk	Type of Risk	Possibility (%)	concequence (IDR)
1	Limited availability of wood around the residence / place to cultivate sugar	Difficult to obtain firewood	10.00	500,000.00
2	Rain, and the type of wood used only depend on its availability around	The quality of firewood is not good	16.67	62,500.00
3	Indiscipline attention to hygiene container processing in shelters roomie, and imprecision size of lime	Nira difficult to coagulate into <i>aren</i> sugar	13.33	568,040.00
4	The lack of prudential control of processor in cooking (boiling) Nira	Scorched <i>aren</i> sugar	10.00	117,363.64
5	The lack of prudential control of processor in produce <i>aren</i> sugar	Work accident	16.67	15,000.00

Table 3 shows that the highest possible risk (16.67%) that can affect quality is firewood and accidents. The accidents is defined as is a hot melt

roomie in hand processing during the molding process of *aren* sugar.

Low quality of firewood can be the result of rain and diverse types of wood used. *Aren* sugar processing is very large depending on the nature condition to obtain firewood or anything that can be used to cook (boil) the *aren* sugar juice.

The lowest possible risk of production on the cooking (boiling) step is 10%. The risks are in the form of the difficulty of getting wood, and charring *aren* sugar. Meanwhile, the greatest consequences are at risk of a hard sap thickens into *aren* sugar.

Charred sugar causes sugar becomes bitter in taste. This should become a concern for manufacturer because type of risk is consequential on the decline in the price of *aren* sugar. Similarly, in the price of soft *aren* sugar. *Aren* sugar prices decrease are a result of declining consumer preferences towards product *aren* sugar that tastes bitter and mushy texture. This is similar to the results of research conducted by Baka (2014) that consumer preferences are closely related to *aren* sugar quality such as color, texture, taste, size.

Based on the source of the five risk the cooking (boiling) step juice is also classified as a pure risk because the consequences of each risk causes damage to the process. Whether it is transferable or not, five types of risk are classified as types of risks that can be transferred. Consequences of the risks identified in Table 3 can be used as a basis for the transfer of risk.

Based on the source, the risk is the difficult in obtaining firewood, and the low quality of firewood classified as external risks. This is because of the quantity and quality of wood that can be used for cooking process relies on the natural sap around. Meanwhile, the risk of a hard sap thickens into *aren* sugar, sugar scorched, and accidents

classified as internal risk types. This is because the source of the three types of risk is due to factors within process (*human error*).

The last stage in the processing business is the sale of *aren* sugar *aren* sugar. At this stage of this activity is identified only one type of risk, as shown in Table 4.

Table 4. Risk in *aren* sugar Sales

Source of Risk	Kind of Risk	Possibility (%)	consequence (IDR)
Processor as the recipient of price (<i>price taker</i>)	Price Fluctuation	6.67	78,242.42

Table 4 shows that only one type of risk identified in phase with the possibility of selling *aren* sugar and low consequence. The risk of price fluctuations occur because the sugar *aren* sugar *aren* sugar process do not have bargaining power. They are recipients of the price (*price takers*). Any prices are set by traders to be embraced by the processing of *aren* sugar. This is because the processing of *aren* sugar considers that regardless of the price of *aren* sugar is still profitable. This advantage is actually a false profit. The processor assumes that virtually no cost incurred in processing business of *aren* sugar. Juice as raw material *aren* sugar, and firewood as the main auxiliary materials derived from natural resources in their environment. Similarly, workers rely on their own strength and their family.

Among the various types of risks, were identified above the measurement of risk. In case this is the kind of risk that has value quantification, including the risk of raw materials (sap), production risk and price risk.

Analysis of the sugar processing business risk level is based on the value of the coefficient of variance (CV). This can be seen in Table 5, 6, and 7.

CV analysis is done by using the average amount of Nira data, the average production of *aren* sugar per 1,000 trees per day, and the average price per kg of *aren* sugar. The values are smaller CV indicateing variability in the average value of the distribution is lower. It describes the risk of raw materials, production, and prices smaller, and vice versa for a higher CV value.

Aren juice is the raw material in the processing of *aren* sugar derived from *aren* trees. Nira generated by each *aren* tree cannot be categorized the same. This can vary due to the pests, weather, variations in the age of the tree, soil fertility, and the skills to tap the sap of *aren* sugar processing. This is similar to the results of research by Rianse (2014) showing that the productivity of *aren* sugar is affected by age of *aren* sugar as well as the experience in the processing of *aren* sugar. Variations on average, median, and variance of the number of *aren* juice causes the difference in the level of risk juice as raw material *aren* sugar. This can be seen in Table 5.

Table 5. Risk Level Raw Material per 1,000 trees at Brown Sugar Processing Business in Kolaka District

	Value
Mean (liter)	1,323.33
Median	1,300.00
Variance	77,412.43
Standar Deviation	278.23
CV (%)	21.40

Table 5 shows that the level of risk of the raw material *aren* juice in Kolaka are at a low risk level category (interval value CV 20.01 - 40.00%).

This can be explained that the age of the *aren* trees of the *aren* sugar processing is high enough in variations. The age greatly affects the productive *aren* tree sap production. Process of *aren* sugar still tap along with the reducing productive age and at the same time to renew *aren* trees.

Meanwhile, *aren* trees planted last should be cut the owner also should tab the *aren* trees that are old. Young *aren* trees can grow around the *aren* trees that recently cut. Roomie maximum amount that can be obtained from a *aren* tree is as much as 40 liters per day and a minimum of 10 liters per day. Thus only allowing small variations in the range of the amount of sap. Statistically, it is explained that small variations the number of *aren* juice compared to his media resulting CV value were great.

The risk of production is one of the characteristics in the agricultural sector. *Aren* sugar production often fluctuate due to the influence of the variation in the quantity and quality of raw materials. *Aren* sugar production risk difference can be seen in Table 6.

Table 6 shows that the level of risk *aren* sugar production at a low risk level category (interval value CV 20.01 - 40.00%).

Table 6. Production on the Risk Level Processing Business *Aren* sugar in District Kolaka

	value
Mean	304.33
Median	300.00
Variance	5,462.22
Standar Deviation	73.91
CV (%)	24.64

Typical risks in agriculture is price risk. The lack of power in processing to determine the price of *aren* sugar and the prices determined by traders led to variations in the price of *aren* sugar at the rate of processing in the same area as well as the other central areas. Risks of pricing in *aren* sugar processing business in Kolaka were shown in Table 7.

Table 7 shows that the risk of the price of *aren* sugar are classified as very low risk category because the amount is not more than 10% (CV value interval 0.00 to 20.00%). This happens because this study is only

conducted by observation the prices in the short term (± 2 months).

Table 7. Risk Level Price on Brown Sugar Processing Business district Kolaka

	Kolaka
Mean	8,906.17
Median	9,090.91
Variance	160,914.24
Standar Deviation	401.14
CV (%)	4.41

Different things can happen if a study on price risk is conducted in a longer time (at least 1 year). It can be a high explained that within the period of one (1) year, fluctuation of price usually occurs in the fasting month (Ramadhan).

CONCLUSION

Based on the results and discussion of the risks involved in the business of processing *aren* sugar in Kolaka, it can be concluded.

- In the processing business of *aren* sugar, there are six types of risk at this stage (ie sap morning, Earned sap is reduced to 50%, work accidents, lowering *aren* flower Productivity low quality of juice is not good, *Aren* unproductive trees, five types of risk at the stage of cooking (boiling), roomie (hardly obtained firewood, or low quality of firewood, difficulty of Nira to be molded into *aren* sugar, *aren* sugar scorched, and workplace accidents), and one type of risk at this stage of the sale of *aren* sugar (price fluctuations).
- The risks that have analyzed the value of quantification of risk, including the risk that the raw materials, production risk and price risk. The risk level of raw materials is the highest among the three types of risk.

REFERENCES

- Abdullah, W.G., et al. 2014. et al. 2014. *Potency of Natural Sweetener. Brown Sugar*. AENSI Journals. Advances in Enviromental Biology. 10(4). http://www.aensiweb.com/old/aeb_October-2014.html
- Abdullah, W.G. 2015. *Manajemen Risiko Agribisnis Gula Merah*. Disertasi. Program Pasca Sarjana. Universitas Halu Oleo. Tidak dipublikasikan.
- Baka, et. Al. 2014. *Analysis of Correlation between Brown Sugar Attributes and the Consumer Preference*. Proceedings of the 2nd International Conference on Mathematical, Computational and Statistical Sciences (MCSS'14).367-374.
- Direktorat Jenderal Perkebunan. 2014. *Kebutuhan Gula Nasional Mencapai 5700 ton Tahun 2014*. <http://www.ditjenbun.pertanian.go.id/setditjenbun/berita-172-dirjenbun-kebutuhan-gula-nasional-mencapai-5700-juta-ton-tahun-2014>. Akses. Oktober 2015
- Barlet, P. F. 1984. *Agricultural Decision Making. Anthropological Contribution to Rural Development*. Academic Press, Inc.
- Hasan, I. 2002. *Pokok-Pokok Materi Teori Pengambilan Keputusan*. Ghalia Indonesia. Jakarta.
- Soekartawi, Rusmadi, E. Damaijati, 1993. *Risiko dan Ketidakpastian dalam Agribisnis. Teori dan Aplikasi*. PT RajaGrafindo Persada. Jakarta.