MAPPING AND PREFERENCE OF MARKETING RISK OF ECO SWEETENER '*AREN* SUGAR'

WEKA GUSMIARTY ABDULLAH, USMAN RIANSE, RADEN MARSUKI ISWANDI,
SITTI AIDA ADHA TARIDALA, LUKMAN YUNUS, INE FAUSAYANA,
M. ARIEF DIRGANTORO, ILMA SARIMUSTAQIYMA RIANSE
Faculty of Agriculture
Universitas Halu Oleo
Kampus Hijau Bumi Tridharma Anduonohu, Kendari 93232
INDONESIA
wkgusmiarty09@yahoo.com, usman.rianse@gmail.com, marsuki_iswandi@yahoo.com,
aidataridala@yahoo.com, lukuyus@yahoo.com, inefausayana@ymail.com,
dirgantoro_m_a@yahoo.co.id, Ilma_lov3@yahoo.co.id   http://uho.ac.id

WEKA WIDAYATI
[2]Faculty of Technology and Earth Science
Universitas Halu Oleo
Kampus Hijau Bumi Tridharma Anduonohu, Kendari 93232
INDONESIA
weka_widayati@yahoo.com   http://uho.ac.id

Abstract: Aren sugar' is one potential alternative of sweetener environmentally friendly. *Aren* sugar business also face risk and uncertainty problems. The objective of this study were to mapping and analyzing the marketing risk level of eco sweetener eco sweetener '*aren* sugar' and to analyzing the preference of brokers and retailers towards marketing risk of eco sweetener '*aren* sugar' in the Kolaka District, Southeast Sulawesi. The research methods were qualitative and quantitative method (coefficient variation 'CV' and quadratic utilities function. The results of this study showed that there was six types of marketing risks mapping (3 types of risks in the purchase phase, two types of risk in the storage phase, one type of risk in the selling phase) in the marketing business eco sweetener '*aren* sugar', based on the likelihood and consequences. The type of risks with great possibilities and consequence was the risk of damaged packaging in the buying phase. The type of risk with small possibility and great consequences were *aren* sugar without packaging, brown sugar receivable by processing, damage packaging in the selling phase, and the length of time *aren* sugar sold out. Next, the marketing risks at the level of traders and retailers are at low risk category. Almost of Marketing risk preference of brokers and retailers was risk lover, only 25% of brokers that have risk neutral preference.

Key-Words: mapping, risk preference, risk marketing, eco sweetener, *aren* sugar

1. Introduction

Aren sugar' is one potential alternative that can meet the sugar needs of world community, especially in Indonesian. *Aren* sugar is sugar derived from *aren* tree sap. *Aren* sugar is a type of sweetener environmentally friendly. *Aren* sugar is a source of sweeteners that are important to health. The health benefits of *aren* sugar commodity is supported by the cultivation of *aren* tree *(Arenga pinnata (Wurmb) Merrill)* that tends to organic (grown naturally, do not use chemicals). Abdullah, (2014) explained that the *aren* trees as the main raw material source is a plant that does not require chemical fertilization (free of artificial fertilization) but can produce abundant juice. Abdulah (2015)

also explained that there was 10 to 30 liters of *aren* sap per tree in one day (each day for about 15 years), where 4.4 liters of *aren* sap will produce 1 kg of *are* sugar. *Aren* sugar can be called as an eco sweetener because the source of the raw material is free from chemicals as well as the manufacturing process.

Eco sweetener 'aren' sugar' is very important as a food flavoring and beverages sweetening. Typical food and beverages of Southeast Sulawesi needs eco sweetener 'aren' sugar', such as traditional cakes (*cucur*, *srikaya*, coconut sugar, *pisang epe*, and various other types of traditional cakes) and drinks (*sarabba*). Nonetheless, the marketing of *aren* sugar in Indonesia, and Southeast Sulawesi especially yet Boom at home and abroad. Kolaka District is the second biggest producer of *aren* sugar in Southeast Sulawesi (Abdullah, 2015).

However *aren* sugar is one of agricultural product that have specific characteristic (bulky, perishable, voluminous). This is due to the fact that *aren* sugar business also face risk and uncertainty problems. Some of these problems include; climate issues such as droughts, erratic rainfall, pests and plant diseases, disasters (floods, earthquakes, volcanoes), shortage of irrigation water or rain water, the quantity and quality of agricultural products, and the price fluctuations issue of input and output of agricultural products and its derivatives are an example that the agricultural sector are subject to risks and uncertainties aspects. Therefore there was be an important thing to study about marketing risk of eco sweetener 'aren' sugar'.

Understanding of the marketing risks can improve the distribution of eco sweetener 'aren' sugar' from producers to consumers with the assuredness of product quality. Further, the understanding of the risk preferences of marketing actors (brokers and retailers) will useful to help them manage risk based on their characteristics of risk preference. Salvatore (1993) said that in theory, there is identified three preferences towards risk, namely: risk averse, risk seeker or risk lover, and risk neutral.

The problem in this study, namely:
a. How about the risk in the marketing of eco sweetener eco sweetener 'aren' sugar' in the Kolaka District, Southeast Sulawesi?
b. How the preference of brokers and retailers towards marketing risk of eco sweetener 'aren' sugar' in the Kolaka District, Southeast Sulawesi?

2. Literature Review

Nelson, et al., (1978) suggested that risk factors in agriculture comes from the production, price, and market, business and finance, technology and damage, social and legal, as well as humans. Furthermore, Kay (1986) says that in the field of agriculture, the risks can be caused by several factors, among others: (a) the use of technology in farming which are able to increase production generally, (b) the fluctuations price of agricultural production seasonally, (c) financial influenced by price and agricultural production, (d) government policy, and (e) the nature of individual farmers, especially in relationships with outside parties. In line with that,Barlett (1984) said that the risk is a situation when the probability of various possible outcomes of an activity known.

The term risk in agriculture tend to be risk in on-farm sub system in agribusiness system. Off-farm sector both in the upstream and downstream also face various risks but it more known as business risk. According to Siahaan (2007) the broadest sense definition of risk management is a process through which a person or organization to ensure that risks are actually going to happen to him is a risk that it needs to be disclosed in order to achieve the main objectives and maximize the value of (the company). Meaningful risk management as all series of activities related to risk, which could include: (1) planning, (2) assessment, (3) identifying and analyzing, (4) handling, (5) risk monitoring.

Salvatore (1993) explained that in theory, there is indentified three preferences towards risk, namely avoiding the risk (risk averse), look for risk (risk seekers), and neutral towards risk (risk neutral). The concept of risk analysis is based on probability theory and utility theory because the utility is the description of a person's

behavior related to the choice of some alternative activities. The act election this activity can be described into a utility function based on probability distribution (Anderson, et al., 1977). Next, Anderson, et al., (1977) argued that the concept of utility that connects business efficiency analysis with behavioral of entrepreneurs (farmers) was known as Bernoulli's theorem or commonly known as utility theory (expected utility theorem).

3. Problem Formulation

The research methods were qualitative and quantitative method. Qualitative method was used to mapping the types of risk marketing of eco sweetener 'aren sugar'. Quantitative methods, such us Coefficient Variation Analysis (CV), and quadratic utilities function. Levels of risk marketing of sweetener 'aren sugar' was analyzed by Coefficient Variation Analysis (CV), and the preferences of brokers and retailers towards risk marketing of eco sweetener 'aren sugar' was analyzed by quadratic utilities function. Formula of Coefficient Variation Analysis (CV) and Quadratic utilities function as follow.

$$CV = \frac{V}{E} \text{ x } 100\%$$

where:
KV = Coefficient of Variation
V = standard deviation of profit in marketing business of eco sweetener 'aren sugar;
E = the median value on marketing business of aren sugar.

Standard of deviation (v):

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

Variance formula (V^2) .

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

Median Value equaion (E) .

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

where:
v = Deviation Standard
V^2 = Variance
E = the median value on marketing business benefits of aren sugar
E_i = marketing business profit of aren sugar respondents to-i
n = the number of observations.

Criteria level of risk

The higher the value, the higher CV experienced risks by processing/marketing business of aren sugar. CV value indicates the magnitude of the possible risks of the rupiah (IDR 1) the expected profit. Based on this CV formula, CV value ranges from 0-100%, therefore we can defined five levels of risk, which is very high, high, medium, low, and very low, as showed in Table 1.

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

Risk Level	CV value (%)
High	66.67 – 100.00
Medium	33.34 – 66.66
Low	0.00 – 33.33

Formula of Quadratic utilities function, as follow:

$$U = \gamma1 + \gamma2 \, M + \gamma3 \, M^2$$

where:
U = utility value, (util)
M = Revenue in the equilibrium point of choise alternative in certainty ekuivalent (CE), (IDR)
γ1 = intersep
γ2 dan γ3 = risk preference coefficient

criteria:
γ3 = 0 : risk neutral
γ3 < 0 : risk averse
γ 3 > 0 : risk lovers

4. Problem Solution
4. 1. Risk Mapping in the Eco Sweetener 'Aren Sugar'

Marketing risks mapping of eco sweetener 'aren sugar' were began with identifying all risks in the business of processing and marketing of eco sweetener 'aren sugar' by stages activities. Here, The types of risk in the business of eco sweetener 'aren sugar' processing is called production risk of production and the risk in the business of eco sweetener 'aren sugar' marketing is called marketing risk. Identifying risk carried out by stages of activities in the processing and marketing activities of eco sweetener 'aren sugar' .

In the marketing of eco sweetener 'aren sugar', there are three activities stages that are

carried out by the eco sweetener 'aren sugar' brokers and retailers, namely: buying, storaging, and selling. Various kinds of marketing risk can be seen on Table 2, 3, and 4.

Table 2. Marketing Risk in Eco sweetener 'aren sugar' Buying Phase

No	Sources of Risk	Risk List	Possibility (%)	Consequence (IDR)
1	- Eco sweetener 'aren sugar' farer do not have packaging labour - There is no incentive for the eco sweetener 'aren sugar' farmer to perform packaging	Aren eco sweetener 'aren sugar' was not packed	100.00	2,191,200.00
2	- Eco sweetener 'aren sugar' packaging is not neat - Packaging materials are brittle - The long journey of eco sweetener 'aren sugar' from eco sweetener 'aren sugar' to brokers or retailer	broken Eco sweetener 'aren sugar' package	40.00	1,460,800.00
3	- The urgency of the daily need of eco sweetener 'aren sugar' farmer, - Lack of good faith from the eco sweetener 'aren sugar' farmer to pay their debt - No debt agreement was officially	Debts receivable by eco sweetener 'aren sugar' farmers	13.33	5,000,000.00

Table 2 shows that the risk of *Aren* eco sweetener 'aren sugar' was not packed. It has the greatest potential risk (100%). The risks experienced by eco sweetener 'aren sugar' brokers. Meanwhile, the highest consequences were at the debt risk of receivables risk by eco sweetener 'aren sugar' farmer.

Table 3 shows that the possibility of the risk of damaged packaging of *aren* eco sweetener 'aren sugar' was highest risk during storage phase. It could cause declining quality that affect the price of the eco sweetener 'aren sugar'. The price will be lower because of its worse quality. It is because the quality of eco sweetener 'aren sugar' (color, texture, flavor, and size) related to the of consumer preferences

eco sweetener 'aren sugar', closely (Baka, 2014).

Table 3. Marketing Risk in Eco sweetener 'aren sugar' Storage Phase

No	Sources of Risk	Risk List	Possibility (%)	Consequence (IDR)
1	bad quality of eco sweetener 'aren sugar'	Eco sweetener 'aren sugar' crumble Aren eco sweetener 'aren sugar'	10.00	21,909,090.91
2	- Fragile packaging materials, - Bad technique of storage	Damaged packaging of *aren* eco sweetener 'aren sugar'	13.33	1,460,800.00

Table 4 shows that the possibility of the length of time of *aren* and coconut eco sweetener 'aren sugar' sold risk both at 6.67% within 1 month. The length of time the risk of sold extremely rare. It occurred only if rain occurs continuously which causes eco sweetener 'aren sugar' consumer reduce their purchasing frequency in the market.

Table 4. Marketing Risk in Eco sweetener 'aren sugar'Selling Phase

No	Sources of Risk	Risk List	Possibility (%)	Consequence (IDR)
1	- Rainy season, - The emergence of competitors broker or retailer	The length of time the eco sweetener 'aren sugar' sold *Aren* eco sweetener 'aren sugar'	6.67	181,818.18

Marketing risk of *aren* dan coconut eco sweetener 'aren sugar' on the buying, storage, and selling phase can be mapped as shown in Figure 1.
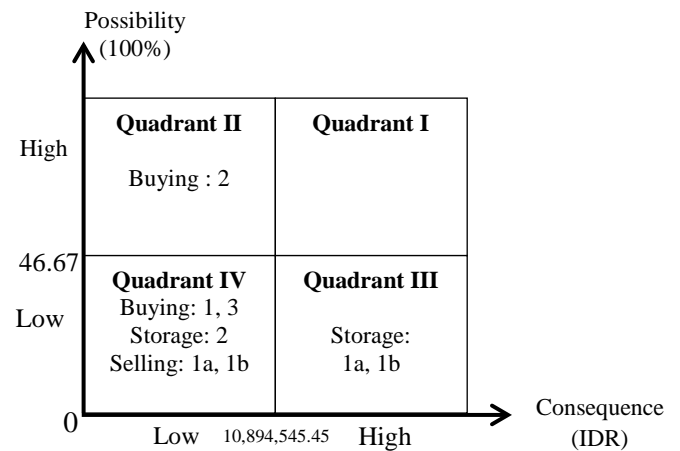

Figure 1.
Marketing Risk Map at Eco Sweetener '*Aren* Sugar' Marketing Business

4.2 The Level of Marketing Risk of Eco Sweetener '*Aren* Sugar'

Marketing risks of eco sweetener '*aren* sugar' was showed by the risk of profits. In the previous discussion has identified the risk of price fluctuations on marketing business of eco sweetener '*aren* sugar'. It has an impact on the variation of trader's profits of eco sweetener '*aren* sugar'. This risk occurred to the brokers and retailers. The risk level was indicated by the value of coefficient variation (CV) of their profit. CV analysis conducted using the average profit per 1,000 kg of eco sweetener '*aren* sugar'. The marketing risk level of this can be seen in Table 4 and 5.

Table 4. The Level of Marketing Risk per 1,000 kg of Eco Sweetener '*Aren* Sugar' in the Level of Broker in the Kolaka District

	Kolaka District
Mean	1,175,057.84
Median	1,257,757.30
Varians	59,024.429,910.94
Deviation Standard	242,949.44
CV (%)	19.32
(category)	(low risk)

Table 4 showed that the marketing risk of eco sweetener '*aren* sugar' in Kolaka, were at low risk level categories (CV value interval was 0-33.33%). It could be explained that the lack of price variations that occurred at the time of the study. Special conditions that occurs in *aren* sugar business are considerable price variations occur only between intervals before and during the month of Ramadan. Another thing that contributes to the broker's profit were transportation costs. However, transportation costs were borne by the eco sweetener '*aren* sugar' per unit was about IDR 100 – 200, only. The variation was not wide due to the distance traveled by brokers from production centers to the market of *aren* sugar merchantability or to the retailers did not vary, also. The average distance was taken approximately 30-45 km.

The other actors in marketing businesses of eco sweetener *aren* sugar' was the retailer. Marketing risks at the level of retailers were also analyzed in this study. It could be seen in Table 5.

Table 5. The Level of Marketing Risk per 1,000 kg of Eco Sweetener '*Aren* Sugar' in the Level of Retailer in the Kolaka District

	Kolaka District
Mean	1,629,759.13
Median	1,711,174.24
Varians	161,920,498,591.37
Deviation Standard	402,393.46
CV (%)	23.52
(category)	(low risk)

Table 5 showed that the marketing risk of retailers in Kolaka were at a low risk category (CV value interval 0 – 33.33%). It could be explained that the market structure of *aren* sugar tends to perfect competition. There were many retailers in the same market. Besides, there was uniformity *aren* sugar traded, from the shape, taste, texture, and aroma. Thus there was a small variations of price *aren* sugar's price in Kolaka market. Retailers did not have the power to determine the price. It caused a small variation of the profit among retailers in the market Kolaka. Less variations in the price of *aren* sugar was also due to the implementation of this research was only at one time and not over time.

The results of the analysis of the marketing risk level was lower than the risk level of production eco sweetener '*aren* sugar' as proposed by Abdullah (2015). It was consistent with the results of research Santoso (2005) against the mango agro-industry, which showed that the risk is highest in the aspect of procurement of raw materials. Suitability Santoso research results can be used as a reference for the characteristic equation of raw materials in the agricultural sector. The high risk agricultural sector was also put forward by Su, et al (2011).

4.3 The Preference of Broker and Retailer of Eco Sweetener '*Aren* Sugar' toward Marketing Risk

The preference for marketing risk assessment of eco sweetener '*aren* sugar' business was carried out separately to brokers

and retailers. The preferences of brokers or retailer toward their business risk could be seen through the analysis of quadratic utility function. This analysis has also been done on research in the agricultural sector, such as the research by Darmadi (1997), Abdullah (2007), Saptana (2011), Brol, Welzel, and Kit (2013).

The preference Brokers of eco sweetener 'aren' sugar' toward marketing risk could be seen in Table 6.

Tabel 6. Preference Brokers toward Marketing Risk

Preference	Kolaka District	
	Quantity (People)	Percentage (%)
Risk Neutral	2	25.00
Risk Lover	6	75.00
Total	8	100.00

Table 6 showed that two kind preferences of *aren* sugar brokers toward marketing risks, such as risk neutral and risk lovers. Risk lover Preferences dominated the broker (75%). Brokers who have risk lover preferences have the marginal satisfaction lower than its marginal revenue in conducting *aren* sugar marketing business ($\Delta U < \Delta R$). This situation could be explained that the increase of weekly revenue variation will be offset by broker with lower expectations on the next year weekly revenue. It could be explained that brokers realized that their revenue variations affects their marketing costs. Thus they assumed that it was better to lower expectations of revenues and paid attention to variations of marketing costs that must be spent to obtain certain profit that were targeted.

Aren sugar Brokers have profit-oriented so they expects higher revenues to obtain a larger difference with their marketing costs. In this condition, brokers ventured out of their comfort position in order to expansion their business scale although there was a risk of credits by processor of *aren* sugar. Brokers also dare in raising their production costs by packaging *aren* sugar and adding labor to do the packaging, also marketing labor to further increase their profit.

Percentage of risk neutral preferences of *aren* sugar brokers in Kolaka, below 5%. The brokers in risk neutral preference categories will offset the increased their revenue variation by raising or lowering their weekly revenue expected in the next year. The revenue variation that dominantly increases will increase their revenue expectations to the next year, and contrary.

Aren sugar retailers of eco sweetener 'aren' sugar' also showed a trend the same preferences to the brokers. It could be seen in Table 7. Table 7 showed that (100%) all retailers have risk lover preference toward marketing risk (100%).

Tabel 7. Preference Retailers toward Marketing Risk

Preference	Kolaka District	
	Quantity (People)	Percentage (%)
Risk Neutral	0	0.00
Risk Lover	10	100.00
Total	10	100.00

Domination of risk lover preference due to commercial properties owned by retailers. In other words, retailers have the entrepreneur's mentality so that they will always strive for better conditions for their business. It means that in conducting marketing business of *aren* sugar, retailers were motivated by internal factors such as growth needs.

The *aren* sugar retailers as brokers have the marginal satisfaction lower than their marginal revenue in conducting retail marketing business ($\Delta U < \Delta R$). This situation could be explained that the increase of variation weekly revenue will be offset by retailers by lower expectations of their weekly revenue in the next year. The high expectations of revenues and profits in the next year was avoided by retailers because it could increase their comfort condition. Recognized by the retailers that comfortable conditions could allow them drift off in accounted the risks that should be faced for its business survival.

5. Conclusions

Based on the results and the previous discussion it can be concluded some of the following:
a. There were six types of marketing risks mapping (3 types of risks in the purchase phase, two types of risk in the storage phase,

one type of risk in the selling phase) in the marketing business eco sweetener 'aren sugar', based on the likelihood and consequences. The type of risks with great possibilities and consequence was the risk of damaged packaging in the buying phase. The type of risk with small possibility and great consequences were *aren* sugar without packaging, brown sugar receivable by processing, damage packaging in the selling phase, and the length of time *aren* sugar sold out.

b. Marketing risks at the level of traders and retailers are at low risk category.

c. Almost of Marketing risk preference of brokers and retailers was risk lover, only 25% of brokers that have risk neutral preference.

References:

Abdullah, W.G. 2007. *Studi Komparatif Perilaku Petani terhadap Risiko Usahatani Padi Semi Organik dan Organik di Kabupaten Sragen Provinsi Jawa Tengah*. Tesis Ekonomi Pertanian Sekolah Pascasarjana. Universitas Gadjah Mada. Yogyakarta.

Abdullah, W.G. 2015. *Manajemen Risiko Agribisnis Gula Merah*. Disertasi. Program Pasca Sarjana. Universitas Halu Oleo. Unpublished.

Abdullah, W.G., 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

--------------------,. 2015. *The Risk of Aren* Sugar *Processing Business in the Kolaka District Southeast Sulawesi*. International Journal of Sustainable Tropical Agriculture (IJSTAS). 2(1): 45-52.

Anderson, J. R., Dillon, J. L, and Hardaker, J. B. 1977. *Agricultural Decision Analysis*. *The IOWA State University Press. AMES, IOWA*.

Baka, W, 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.

Barlet, P. F. 1984. *Agricultural Decision Making. Anthropological Contribution to Rural Development*. Academic Press, Inc.

Broll, U., P. Welzel, K.P. Wong. 2012. *Price Risk and Risk Management in Agriculture*. Contempory Economic. DOI: 10.5709/ce.1897-9254.79:17-20.

Darmadi. 1997. *Perilaku Petani terhadap Risiko pada Usahatani Lombok (Studi Kasus di Kecamatan Cangkringan Sleman)*. Tesis Ekonomi Pertanian. Sekolah Pascasarjana Universitas Gadjah Mada. Yogyakarta.

Kay, R. D. 1986. *Farm Management. Planning, Control, and Implementation*. McGraw-Hill International Book Company. New York.

Kern, D., R. Moser, E. Hartmann, M. Morder. 2012. *Supply Risk Management:Model Development and Empirical Analysis*. International Journal of Physical Distribution and Logistic Management. 42(1):60-82.

Kountur, R, D. 2004. *Manajemen Risiko Operasional. Memahami cara Mengelola Risiko Operasional Perusahaan*. Seri Manajemen Strategi No.6. PPm. Jakarta.

Nelson, A. G., G. L. Casler, and O. L. Walker. 1978. *Making Farm Decision in a Risky World: A Guide Book.* South Eastern Agricultural Extention, USDA, Oregon State-Cornell-Oklahoma State Universities.

Panyakul, V., 1995. *Aren Sugar: The Indigenous Sweetness*. Green Net, ILEIA Newsletter, 2 (13): 19-20.

Salvatore, D. 1993. *Managerial Economics in A Global Economy*. Second Edition. McGraw-Hill. New York.

Saptana. 2011. *Efisiensi Produksi dan Perilaku Petani terhadap Risiko Produktivitas Cabai Merah di Provinsi Jawa Tengah*. Disertasi. Sekolah Pascasarjana IPB.

Siahaan, H. 2007. *Manajemen Risiko. Konsep, Kasus, dan Implementasi*. PT Elex Media Komputindo. Jakarta.