

Risk Analysis of Cayenne Pepper (*Capsicum frutescens* L.) Farming in Wantulasi Village, Wakorumba District, North Buton Regency

Aspiah Endrika Sari¹, Fahria Nadiryati Sadimantara, & Yusna Indarsyih²

¹Student of Department of Agribusiness, Faculty of Agriculture, Halu Oleo University, Kendari, Indonesia

²Lecturer and Instructor at Faculty of Agriculture, Halu Oleo University, Kendari, Indonesia

Corresponding Author: aspiahendrikasari@gmail.com

Abstract

The study aims to know the risks that will be faced by ceyenne pepper farmers in Wantulasi Village, Wakorumba District, North Buton Regency. Respondent ceyenne pepper farmers were 38 people, identification of samples which was done using the census method (saturation sampling). The data retrieval using the questionnaire and the data analysis used is the coefficient analysis of variations. The results showed that the cultivation process of ceyenne pepper has a risk in its stage that is ranging from land processing, seed preparation, planting, fertilization, pest and disease and harvesting. While the risks of production of a coefficient variation (CV) of 0.013, the risks of price of a coefficient variation (CV) of 0.002 and then income risks from a coefficient variation (CV) of 0.012. It means that if the value of $CV > 0.5$ then the risk that the farmer is taking increases, whereas $CV \leq 0.5$ then the risk that the farmer is taking is smaller. The average income from the ceyenne pepper farmers in one year was Rp 8,787,684.

Keywords: *Ceyenne Pepper (*Capsicum frutescens* L) Farming, Farming Risks, Production Risk, Price Risk, Income Risk*

INTRODUCTION

Indonesia is a country that has many natural resources, one of which is rich in agriculture. The agricultural sector is still an attractive field for business. Business in agriculture is a mainstay sector in Indonesia. Many farmers depend on the fate of their lives and families on the success of their farms. Horticultural farming has been widely practiced in Indonesia including the problem of chili itself.

The chili commodity can be said to be a superior commodity produced and cultivated by most Indonesians. Southeast Sulawesi is one of the provinces that cultivates cayenne pepper plants. In Southeast Sulawesi, the average consumption of cayenne pepper per person per day produces 2,875 Kcal of energy, 0.131 grams of protein, 0.555 grams of carbohydrates, and 0.067 grams of fat. The average consumption of cayenne pepper per person in a week is 0.023 kg. The average expenditure per person for cayenne pepper in a month is IDR 2,914,000 (BPS Southeast Sulawesi, 2020). Cayenne pepper is an important crop for the people of Southeast Sulawesi because it has high economic value and is adaptable. The high selling price makes many farmers choose to grow cayenne pepper (Haki and Taena, 2017). In February 2022, the average price of cayenne pepper in Southeast Sulawesi was IDR 46,900 per kg and rose to IDR 63,150 per kg in March 2022 (National Strategic Food Price Information Center / PIHPS). Chili peppers often experience price fluctuations and even tend to experience a sharp decline or increase. This is also one of the factors that often affects farmers' interest in cultivating them.

Several districts in Southeast Sulawesi Province such as Buton, Muna, Konawe, Kolaka, South Konawe, Bombana, Wakatobi, North Kolaka, North Konawe, East Kolaka, Konawe Islands, West Muna, Central Buton, South Buton, Kendari, Bau-Bau and North Buton are parts of the area that cultivate cayenne pepper. The area and production of cayenne pepper crops can be seen in Table 1.

Table 1 Harvested Area, Production and Productivity of Southeast Sulawesi Cayenne Pepper Crops (tons) 2015-2019

No.	Year	Harvested Area (Ha)	Production (tons)	Productivity (Ton/Ha)
1.	2015	1.045	3.594	3,439
2.	2016	1.056	8.074	7,645
3.	2017	1.405	3.313	2,358
4.	2018	1.400	4.484	3,203
5.	2019	1.320	3.669	2,779
Average		1.245,2	4.626,8	3,885

Source: Central Bureau of Statistics and Directorate General of Horticulture

Table 1 shows that Southeast Sulawesi cayenne pepper production fluctuates. In 2016 the harvest area was 1,056 Ha with a total production of 8,074 tons and in 2017 the harvest area was 1,405 Ha with a total production of 3,313 tons, experiencing a decrease in production of 4,761 tons. In 2018, cayenne pepper production increased by 4,484 tons. In 2019, cayenne



pepper production decreased and was only able to produce 3,669 tons. The fluctuation in cayenne pepper production from 2016 to 2019 indicates that in the cultivation of cayenne pepper plants there are problems faced by cayenne pepper farmers.

North Buton Regency is an area consisting of 6 (six) sub-districts including: Kecamatan Bonegunu, Kulisusu, Kambowa, Kulisusu Barat, Kulisusu Utara and Wakorumba Utara with a land area of 1,923.03 km². (RPIJM: Long-Term Investment Development Plan, North Buton Regency, 2020). Wakorumba sub-district has an area of 245.26 km² or 24,526 Ha and consists of 11 villages, 2 sub-districts and 1 Transmigration Settlement Unit (UPT). Wantulasi Village is the village with the largest area compared to other villages, covering 33.28 km² or 13.57% of the Wakorumba Sub-district area, while Labuan Village is the smallest village, covering 4.57 km² or 1.86% of the Wakorumba Sub-district area (North Buton Central Bureau of Statistics, 2021). Wantulasi Village is one of the villages located in Wakorumba District, North Buton Regency, which is also one of the contributing areas to the production of cayenne pepper, and has a fairly large farming area.

Based on an initial survey, cayenne pepper began to be cultivated in Wakorumba District, North Buton Regency in 2017, but at that time only a few farmers planted it because the majority of farmers already had other businesses such as cashew, cocoa, and coconut, and some residents worked as fishermen. Over time, more and more people started cultivating cayenne pepper because it yields faster than plantation crops. Of the 11 villages and 2 kelurahan, only Matalagi and Wantulasi villages grow cayenne pepper, with Wantulasi being the most active. However, cayenne pepper farming is not free from risks such as pest attacks, price fluctuations, and income uncertainty, especially since the business is highly dependent on nature. Some farmers have tried to deal with pest attacks with pesticides or separating diseased plants, but these methods have not been effective. Farmers also reported a decline in production compared to previous years, and they are still facing pest and disease problems. In Kelurahan Wantulasi, the risk is heightened by the unpredictability of pest attacks, and the use of traditional technology and seasonal forecasting based on natural signs increases the risk due to uncertain weather changes.

This research needs to be done because based on the available data, it has provided information about the condition of the cayenne pepper production that is being cultivated is experiencing problems. From the problems faced by cayenne pepper farmers, it is necessary to analyze the risk of production, price and income to see the risks that farmers have to bear with the income obtained from the amount of capital invested in cayenne pepper farming in Wantulasi Village, Wakorumba District, North Buton Regency.



METHOD

This research was conducted in Wantulasi Village, Wakorumba North Sub-district, North Buton Regency from April 2022 until completion. The determination of this location was determined *purposively* with the consideration that the location experienced a decrease in cayenne pepper production. The population as well as the sample in this study were all cayenne pepper farmers totaling 38 people determined by the census method (saturated sampling). Data collection techniques were carried out by interviewing local residents on the topic of the problem that had been prepared beforehand, as well as recording.

Data analysis used to analyze the risk in cayenne pepper farming in this study is descriptive quantitative. The analytical tool used to measure the risk of cayenne pepper farming is *Coefficient Variance* (CV), where the formula used to determine the risk of farming is based on the formula of Hernanto, F (1991), namely:

Production Risk Analysis

$$CV = \frac{\sigma}{Q}$$

Price Risk

$$CV = \frac{\sigma}{P}$$

Income Risk

$$CV = \frac{\sigma}{Y}$$

Notes:

CV = Coefficient of variation

σ = Standard deviation (standard deviation)

Q = Average production

P = Average Production

Y = Average Income

To measure the value of the standard deviation, the following formula is obtained:

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (Xi - \bar{X})^2}{n-1}}$$

Where:

Income = TR - TC (Shinta, 2011)

TR = Y x Py (Soekartawi, 2016)

TC = TFC + TVC (Karmini, 2020)

Description:

TC = Total Cost (Rp)

TR	= Total Revenue (total revenue) (Rp)
Py	= Production Price (Rp/Kg)
Y	= Quantity of Production (Kg)
TFC	= Total Fixed Cost (Rp)
TVC	= Total Variable Cost/Total Variable Cost (Rp)
CV	= Coefficient Variance
σ	= Standard Deviation (standard deviation)
X_i	= Production, price and income data
$\bar{X}$	= Average production, price and income data
Σ	= Sigma
n	= Number of samples

If $CV > 0.5$ then the risk of production, price and income on farms borne by farmers is getting bigger, while the value of $CV < 0.5$ then farmers will be more profitable or break-even. Where the coefficient of variation is a measure of variation that can be used to compare a distribution of data that has different units.

RESULTS AND DISCUSSION

Identity of Respondent Farmers

The identity of the respondent farmers shown in this study is the age of the respondent farmers, the level of education that has been completed by the farmers, the experience (length) of cayenne pepper farming, the number of family dependents, the area of cayenne pepper land managed by farmers.

Table 2 Identity of Cayenne Pepper Farmers

Identity	Description	Number (Soul)	Percentage (%)
Age (Years)	≤ 15	0	0,00
	16 - 64	37	97,36
	> 64	1	2,63
Education	Not in School	6	15,78
	Elementary School	7	18,42
	Junior High School	9	23,68
	High School	15	39,47
	Bachelor	1	2,63

Family Dependents	1 - 3 people	17	44,74
	4 - 6 people	20	52,63
	> 6 people	1	2,63
Farming Experience (Years)	≤ 5	35	92,11
	6 - 10	-	-
	5	3	7,89
Land Area	< 0.5 Ha	-	-
	0.5 - 2 Ha	38	100
	> 2 Ha	-	-
Total		38	100,00

Based on table 2 above, the identity of cayenne pepper farmers in Wantulasi Village can be explained as follows;

1. That the average respondent of cayenne pepper farmers in Wantulasi Village is at a productive age, which ranges from 16-64 as many as 37 people or 97.36%. This proves that cayenne pepper farmers have a productive age which greatly affects the ability of the mindset and the ability of farmers to make decisions. According to BPS (2016), based on the composition of the population, age is grouped into 3 parts, namely 0-15 is considered an unproductive population group, the age group 16-64 years as a productive age group, and the age group 64 years and over as a population group that is no longer productive.
2. That the highest level of education is education (SMA) which amounted to 15 people or 39.47%, although the level of education of respondent farmers is sufficient, but can make a positive contribution in making a decision. The level of education completed by respondent farmers greatly influences the mindset and increased awareness of respondent farmers in increasing the productivity and income of cayenne pepper farmers. Education is a factor that can determine and increase one's knowledge to do something faster. The higher the education of a farmer, the higher the level of skill and function as a manager, farm laborer or head of household.
3. That the average respondent has family dependents of 4-6 people (52.63%) in the medium category. The number of family dependents in the small category amounted to 17 people (44.74%) which ranged from 1-3 family members and the largest number of family dependents reached 1 person (2.63%). The large number of family dependents of respondent farmers shows the magnitude of the economic burden that must be borne

by respondent farmers. Nurhidayah (2017) classified families into three (3) categories, namely families with 1-3 members (wife and two children) categorized as small families, families with 4-6 members categorized as medium families, and families with 7 or more members categorized as large families.

4. Most of the respondent farmers in Wantulasi Village have farming experience of ≤ 5 years. It can be concluded that the inexperience of respondent farmers will affect them in taking steps to prevent the occurrence of risk sources. Mubyarto (2000) explains that the grouping of farming experience is divided into three categories, namely ≤ 5 years means less experienced, 6-10 years means quite experienced, and > 10 years means very experienced in farming.
5. That all respondent farmers cultivate with a land area of 0.5-2 Ha and are in the medium category totaling 38 people or 100%. Indirectly the land area affects the amount of acceptance of cayenne pepper farmers so that it can influence their farming decision making. According to Hernanto (1991) there are 3 groups of land area groupings, namely < 5 Ha (narrow land), 0.5-2 Ha (medium land), and > 2 Ha (large land).

Risks of the Cultivation Process of Cayenne Pepper Farming

In the process of cultivating cayenne pepper farming in Wantulasi Village, Wakorumba District, North Buton Regency, there are several risks in its stages, namely as follows.

Table 3 Risks of the Cultivation Process of Cayenne Pepper Farming in Wantulasi Village, Wakorumba District, North Buton Regency in 2022

Variable	Cause	Risk	Result	Total
Land Processing	- Simple Tools - Without Safety Equipment - Lack of Skill - Lack of caution	Work Accident (injury)	It Takes Time Land Processing Delayed Additional medical expenses	9
Seed Preparation	- Scarcity of superior seeds - Lack of attention in the seeding process	Less than optimal seed/seedling growth	Seedling mortality Many small fruits	38
Planting	- Erratic weather - Land topography	Activity hampered	Dry Plants Vulnerable to Pests	38

			Takes Time	
Fertilization	- Weather conditions - Over or under dosage - Lack of knowledge	Unstable soil composition Disturbance to plants	Less than optimal growth Reduced production Plants wilt Plant death	35
Pest and disease control	- Limited knowledge - Most farmers take simple precautions - Prevention measures are not maximized	Pest and disease infestation	Leaf curling Fruit rot Aphids Stem rot Decreased production	38
Harvest	- Erratic weather changes	Harvest time delayed	Takes time Damaged fruit	38

Source: Primary Data After Processing Year 2023

Based on table 3 above, the risks of the cayenne pepper cultivation process faced by farmers can be explained as follows;

1. That at the land management stage, farmers can experience work accidents because they only use simple tools such as machetes and tembilang. As a result, some farmers were injured, work was delayed, and they had to spend extra money on medicine. A total of 9 out of 38 farmers (23.68%) experienced this risk.
2. At the seedling preparation stage, seedlings do not grow well because it is difficult to obtain quality seedlings. Seedlings can also die due to lack or excess water, as well as lack of attention from the farmer. All farmers (38 people or 100%) experienced this risk.
3. The risk faced by cayenne pepper farmers at the seedling planting stage is that planting is disrupted by extreme weather and uneven land. Continuous rain causes fruit rot or aphids, while long droughts make plants wither. All farmers (38 people or 100%) were affected.
4. The presence of unstable soil nutrients due to weather, improper fertilizer dosage, and lack of farmer knowledge. As a result, plants grow poorly, yields decline, and plants can even die. A total of 35 farmers (92.11%) experienced this risk.
5. That lack of knowledge about pests makes farmers only take simple precautions such as cutting the affected parts of the plant. The focus of farmers is only on fungi, so pests such

as aphids still attack and reduce yields. All farmers (38 people or 100%) experienced this risk...

6. Erratic weather, such as rain or extreme heat, delays the harvest and damages the fruit. All farmers (38 people or 100%) face this risk.

Cayenne Pepper Farm Income

Farm income is the difference between revenue and overall expenditure costs in a farming financing. Data on the average income of cayenne pepper farmers in Wantulasi Village can be seen in Table 4.

Table 4 Cayenne Pepper Farm Income in Wantulasi Village in 2022

No	Description	Physical Amount (average/year)	Unit price (Rp)	Value (Rp/year)
1.	Production	385	25.526	9.636.843
2.	Cost			
	a. Variable cost (VC)			
	• Harvest labor	0,2	5.263	101.315
	• Fertilizer			
	- Ecofarming	6	23.289	32.368
	- NPK	2	6.842	30.526
	- Vigor	1	19.736	45.394
	- Bio 88	1	21.052	52.105
	• Fungicides			
	- Antracol	0,4	33.684	42.763
	Total Variable Cost			304.473
	b. Fixed Cost (FC)			
	• Machete	3	58.684	172.631
	• Tembilang	3	79.342	138.684
	• Spray tank	3	181.578	181.578
	• Wicker basket	3	16.421	52.263
	Total Fixed Cost			544.763
3.	Total Production Cost			849.236

4.	Revenue			8.787.684
----	---------	--	--	-----------

Based on Table 4, it states that the total average production is 385 Kg / year with an average price of IDR 25,000 / year. The average total revenue received by cayenne pepper farmers is Rp 9,636,843 / year. This revenue is generated from the amount of cayenne pepper production multiplied by the price. And the total average income received is IDR 8,787,684/year which results from the average revenue minus the total average production cost of IDR 849,236/year.

Risk of Production, Price and Income of Cayenne Pepper Farming

In farming, farmers need to consider the risks and benefits of the capital spent. To minimize losses, cayenne pepper farmers in Wantulasi Village must understand the magnitude of the risks faced. Uncontrolled risks can lead to business failure. These risks include production, price and income, the distribution of which is difficult to predict. Risk measurement is done by analyzing the standard deviation and coefficient of variation (CV). Data on the risk of cayenne pepper farming can be seen in Table 5.

Table 5 Risk of Cayenne Pepper Farming in Wantulasi Village, Wakorumba District North Buton Regency in 2022

No	Risk Type	Value Rupiah/Year
1.	Price Risk	
	a. Average price	25.526
	b. Standard Deviation	41,472
	c. Coefficient of variation (CV)	0,002
2.	Production risk	
	a. Average production	385
	b. Standard deviation	5
	c. Coefficient of variation (CV)	0,013
3.	Income risk	
	a. Average income	8.787.684
	b. Standard deviation	96.473
	c. Coefficient of variation (CV)	0,012

Source: Primary Data After Processing Year 2023

Based on Table 5, it states that the average production price of cayenne pepper farmers in Wantulasi Village, Wakorumba District, North Buton Regency is IDR 25,526 / year, so it can be seen that the standard deviation value is IDR 41,472 / year and the coefficient of variation obtained is 0.002. The average amount of cayenne pepper production is 385 Kg / year. From the results of the production calculation, it can be seen that the standard deviation of cayenne pepper is 5 Kg / year. So that the coefficient of variation obtained based on calculations by comparing average production with standard deviation is 0.013. And it can also be known that the average income of cayenne pepper farmers in Wantulasi Village, Wakorumba District, North Buton Regency is Rp. 8,787,684 / year. *The coefficient value of variance* is less than 0.5 ($0.012 < 0.5$). From the analysis of the calculation of the calculation of income results, it can be seen that the standard deviation of cayenne pepper is Rp 96,473 / year. The results of the analysis show that the risk of production, price and income of cayenne pepper farmers in Wantulasi Village, Wakorumba District, North Buton Regency is classified as low risk. Based on Hernanto's statistical theory, it states that if the *Coefficient Variance* is greater than 0.5 ($CV > 0.5$), the risk of production / farm income borne by farmers is getting bigger, whereas if the *Coefficient Variance* value is smaller than 0.5 ($CV \leq 0.5$), farmers will always make a profit or break even.

The results of this study are different from research conducted by (Miswati et al., 2023) production risk and cayenne pepper farm income of 0.61 and 0.75 respectively or more than 0.5 indicates a high level of risk. Research conducted by (Marsaoly H.A and Ekaria, 2023) Cost risk with a coefficient of variation of 6.40 is due to the high cost of transportation. While the lowest level of risk with a coefficient of variation of 1.26 is due to the relative and stable selling price of production indicated by a lower level of production risk with a coefficient of variation of 1.60 compared to cost risk.

This research is similar to research conducted by Muhammad Siddiq et.al. (2021) entitled "Behavior and Household Strategies in Facing the Risk of Cayenne Pepper Farming on Lombok Island". In this study, the measurement of farm risk also uses the coefficient of variation. The known risks are production risk and price risk. The results showed that cayenne pepper farming had low production risk ($CV \leq 0.5$), while the price risk was high ($CV > 0.5$). Whereas in this study researchers will look at the value of risk in production, price and income using the coefficient of variation analysis. The results obtained show that the production risk and price risk of cayenne pepper farming are included in low risk ($CV \leq 0.5$). Likewise, the income risk faced by respondent farmers includes low risk ($CV \leq 0.5$). And what is different in these two studies is that research conducted by Muhammad Siddiq also conducted research on household behavior and strategies



in dealing with risk. Whereas in this study, researchers measured the risks that might occur in the process of cayenne pepper farming.

CONCLUSION

Based on the results and discussion, it can be concluded that the process of cultivating cayenne pepper farming in Wantulasi Village, Wakorumba Subdistrict, North Buton Regency has risks in its stages, namely starting from land cultivation, seed preparation, planting, fertilization, eradication of pests and diseases and harvesting.

The risk of cayenne pepper farming in Wantulasi Village, Wakorumba District, North Buton Regency, namely there is a production risk with a coefficient of variation of 0.013, price risk with a coefficient of variation of 0.002, and income risk with a coefficient of variation of 0.012. From the overall risk value obtained, the production risk, price and income value of the coefficient of variation is smaller than 0.5, which means that the risk borne by cayenne pepper farmers is included in the small risk.

REFERENCE

- BPS SULTRA. 2020. Harvested Area, Production and Productivity of Southeast Sulawesi Cayenne Pepper Crops (tons) 2015-2019. Central Bureau of Statistics and Directorate General of Horticulture, Southeast Sulawesi Province.
- BPS SULTRA. 2020. Consumption Expenditure of the Population of Southeast Sulawesi Province. Central Bureau of Statistics.
- Central Bureau of Statistics, 2016. *Statistics of Indonesia*. Central Bureau of Statistics. Jakarta.
- Central Bureau of Statistics, 2022. *Statistics Indonesia*. Central Bureau of Statistics. Jakarta.
- Haki, M.G. and Tena, W. 2017. Income Analysis of Cayenne Pepper Farming Red Chili in Tapenpah Village, Insana District, North Central Timor. *AGRIMOR*, 2(0): 57- 58.
- Hernanto F. 1991. *Farming Science*. Jakarta. PT Penebar Swadaya.
- Karmini. 2020. *Basics of Agribusiness*. Samarinda. Mulawarman University Press.
- Karmini. 2018. *Economics of Agricultural Production*. Mulawarman University Press. Samarinda
- Ministry of Trade of the Republic of Indonesia (KPRI). 2021. *Analysis of Price Development of Basic Foodstuffs in Domestic and International Markets*. Center for Domestic Trade Studies.
- Miswati et al., 2023. Risk Mitigation Strategy for Cayenne Pepper Farming: A Porter's Diamond Approach. *Journal of Agricultural Social Economics (J-SEP)*, Vol. 16 No. 116 (1): 95-110. ISSN: 1978-5437





- Mubyarto, 2000. *Introduction to Agricultural Science*. PT. Matahari Terbit. Jakarta.
- Nurhidayah, 2017. *Risk Mapping of Rice Paddy Farming in Labulu-Bulu Village, Parigi District, Muna Regency*. Thesis. Halu Oleo University. Faculty of Agriculture. Kendari (Unpublished).
- RPJMDes. 2022. Wantulasi Village Medium Term Development Plan. North Buton
- Siddik, M., Zaini, A., Dipokusumo, B., and Anwar. 2021. Farmer Household Behavior and Strategies in Facing the Risks of Cayenne Pepper Farming on Lombok Island. *Journal of AGRIMANSION* 22(1): 11-11. Volume 22 no. 1.
- Shinta. 2011. *Science of Farming Business*. Malang: UB Press. ISBN: 978-602-8960-73-1.
- Soekartawi. 2016. *Farm Business Analysis*. Jakarta: UI- Press

