Journal of Management, E-Business & Entrepreneurship Research
Vol. 1. No. 1, 2021

# Comparison Analysis of Land Productivity of Rice and Cocoa Plant in Kampung Kandeapi Lembang Sarapeang, Rembon District, Tana Toraja Regency

**Daniel Lallo Pakiding[1)], Abner Tahendrika[2)]**
[1,2)] Management Department, Universitas Atma Jaya Makassar
Jl. Tanjung Alang No. 23, Makassar
Email: daniel_pakiding@lecturer.uajm.ac.id[1)], tahendrika@lecturer.uajm.ac.id[2)],

## ABSTRACT

This study entitled: Comparative analysis of the productivity of lowland rice and cocoa plantations in Kandeapi Village, Lembang Sarapeang, Rembon District, Tana Toraja Regency, which aims to analyze the comparison of lowland rice and cocoa productivity which is profitable for farmers. The data collection technique used in this study was a field research method by interviewing 30 respondent farmers. The analytical method used in this research is descriptive, productivity comparison, and the two-average difference test with a small sample ($n < 30$). The results showed that the productivity of lowland rice farming was less than one. This means that the input used in lowland rice farming is more than the output produced by respondent farmers, meaning that lowland rice farming suffers losses. While the productivity of cocoa farming is greater than one, it means that the input used in cocoa farming is smaller than the output produced by the respondent farmers, this means that cocoa farming is profitable for farmers. According to the results of the two different tests on average, it shows that there is a difference in productivity, which means that the results of lowland rice farming and cocoa farming results.

**Keywords: Comparison of Productivity, Lowland Rice Farming, Cocoa Farming**

## 1. INTRODUCTION

Productivity measures the efficiency of a person, machine, factory or system in converting inputs (inputs) into desired outputs (outputs). Inputs in this productivity can be in the form of resources used such as Capital, Labor, Materials, and Energy while output can be in the form of the number of product units or income generated. The measure of productivity is usually expressed by a ratio that compares the output to the input used in the production process.

Heizer and Render (2015) say that: Productivity is the ratio of results (goods and services) divided by inputs (resources such as labor and capital). Increasing productivity means increasing efficiency which can be done in two ways, namely reducing inputs while keeping yields constant or increasing yields while keeping inputs constant (Haizer and Render, 2015). Measurement of productivity is a great way to reduce the ability of a business to increase a standard of living can be improved. In addition, it is only through increased productivity that labor, capital, and management can get additional payments (Haizer and Render, 2015).

To increase production and farm income, farmers must try to utilize the land and adjust crops that can produce productive or profitable products and eliminate the habit of

activities that are less profitable. Like farmers who still maintain the habits of their parents from generation to generation by planting rice on hilly agricultural land and the results are unproductive or unprofitable. This is because the land is hilly so that the space or area of rice fields planted with rice is relatively small compared to the space or area of land that is not planted with rice.

The process of processing activities for paddy fields can go through several stages every year or each planting rice can include: The first stage is cleaning or cutting grass after the rice fields are clean, then followed by hoeing or digging the soil if it cannot be hoeed. Because the area of rice fields cannot be tractored because the size of the land area is relatively small because the land is hilly. After the paddy fields are hoeed or dug, then each paddy field is made a bund so that water remains stagnant in the paddy field. The second stage, if each paddy field has been made a bund, the paddy field is stopped for approximately 10 days so that the grass decomposes or rots, after that it is continued by smoothing the bunds and cleaning the grass that is still growing around the paddy fields to be planted with rice seeds by using a hoe and land area The rice fields are leveled well so that the water is evenly flooded in the fields to be ready for planting rice seeds. The third stage is planting rice seedlings after the rice fields have been planted with rice seeds, then the water is often controlled so that the water does not dry out, it could be caused by landslides because if there is dry it can cause the rice to die. After the rice seeds have been planted for about 20 days, it is continued to clean the grass that is on the sidelines of the rice and the grass that grows around the fields. If the rice is eaten by rats, then the activities of tying the rice trees are continued by using each of the rice leaves and then the rice fields are dried. The fourth stage, after the rice has been planted for about 90 days, the rice is harvested, after harvesting the rice is piled around the rice fields for 4 days, then the rice is dried in the sun to dry and then transported to the house. According to participants, the process of processing rice fields until the rice is transported to the house takes about 35 working days for a 0.5 ha rice field, every year or every time you plant rice. The yield of rice produced for 0.5 ha of rice fields ranges from 158 to 165 kg of rice each harvest or every year when conditions are normal. If this rice plant is still growing, the dry season continues or it is eaten by rats, the yield can be less than 100 kg of rice, even if the results are not there at all or the harvest will fail. So that when compared to the time and costs incurred with the income obtained, it is not comparable or suffers a loss. Farmers like this always think that the important thing is rice or rice in terms of rice farming activities carried out for generations and farmers do not realize that the work they have done so far is detrimental to themselves.

Cahyanto (2017) said that: hilly land is not good for planting rice. For one hectare of paddy field, it can produce about 8 tons of dry grain under normal conditions (Soim, 2019). For one hectare of paddy field, it can produce about 4.7 tons of dry grain under normal conditions (Utami, et.al. 2016).

If people experience difficulties or ignorance in running their businesses, universities should be present to find solutions so that businesses run by the community can increase income or be profitable. If the average community's income increases, it is possible that their children can continue their education to higher education, so that universities will also have no trouble getting students.

Cocoa in Latin "Theobroma Cacao L. is one of the plants that is suitable for the soil culture and climate in Indonesia, because cocoa in various regions in Indonesia, including the trading area, precisely at the foot of the Wilis mountain, has become a superior product for the community (Cahyanto, 2017). ). Cocoa trees are one of the plantation commodities with high economic value, because cocoa is the raw material for chocolate, it can bear fruit throughout the year regardless of the season, there is no need to wait a long time to harvest cocoa from the tree, the harvesting process can be done every day, if needed. there is already an old or ready-to-harvest cocoa (Cahyanto, 2017). Chocolate is now almost a necessity for many people, every food and drink,

chocolate has also begun to penetrate the world of pharmacy, cosmetics, and beauty because of this I believe that the prospect of cocoa cultivation in the future can be said to be very bright (Cahyanto, 2017). One of the cocoa farmers from Segulung Dagangan Village. "People in Segulung usually use hilly gardens by planting cacao and cloves. Usually they plant intercropping, considering the land is not good for rice cultivation. Uniquely, if cloves can only be harvested once a year, then this cocoa tree can be picked almost every day, if the cocoa tree has reached the age of 3 years and over (Cahyanto, 2017).

Cocoa trees are very good, if they are developed with upright or protective trees, According to Cahyanto, (2017) that: The people of Segulung Village usually cultivate cocoa with clove trees. The tall and large clove tree is one of the ideal upright trees. In addition to shade tree cloves which are commonly used, including lamtoro, gleresidae, and albasia trees, cocoa trees are ideally suited to be developed in hilly areas (Cahyanto, 2017). This Kandeapi village has hilly land conditions and there are farmers who have planted cocoa in the area, the growth is good and produces good cocoa pods. Chandra (2017) said that: for one hectare of cocoa plantation land, around 300-600 kg of dry cocoa beans can be produced in one harvest. For one hectare of cocoa plantation, it can produce about 300 kg of dry cocoa beans in one harvest if converted in one year is about 1 ton.

### Formulation Of The Problem

Based on the description that has been stated in the previous background that for farmers who are still cultivating land from generation to generation or still following the habits of their parents to maintain paddy fields planted with rice, the area is relatively small because the land is hilly. Because they do not realize that the rice farming that has been produced so far is not profitable and even suffers losses. While on the other hand the same soil conditions and land processing activities are not complicated and can increase production and expensive prices and provide more profitable income. In connection with the above description, the main issues that are interesting to study are: Is the comparison of land productivity of cocoa crops different from productivity of lowland rice crops?

## 2. THEORETICAL BASIS

### 2.1. Rice Plants

Rice plants are food ingredients that produce rice or grain which is then processed into rice. Rice is the staple food for the Indonesian population throughout the year. In general, the Indonesian population consumes rice so that the demand will still reach the limit so that all residents are met with the need for rice for their continuation of life. Rice plants in Indonesia were originally cultivated in dry land areas with a field system until now without irrigation. So people try to increase the results of their efforts by irrigating areas with less rainfall, while hilly areas if they want to be used as rice fields, the land is leveled by making embankments or embankments so that water remains stagnant in the rice fields. With the development of technology, irrigation canals are made so that water flows into the lowlands where rice plants will be planted, it is called lowland rice plants (AAK, 1990). Rice Outlook 2016 data from the Ministry of Agriculture shows that the productivity of rice plants can produce up to 5.7 tons of rice per harvest under normal conditions (Katadata.co.id, 2016). Cahyanto (2017) said that: hilly land is not good for planting rice. Soim (2017) said that: for one hectare of paddy field, rice can produce about 8 tons of dry grain under normal conditions. For one hectare of paddy fields, rice can produce 5-8 tons of dry grain when conditions are normal.

### 2.2. Cocoa Plant

Cocoa (Theobroma Cacao L.) is one of the plantation crops suitable for cultivation in tropical areas such as Indonesia. Cultivation of cocoa plants in Indonesia is one of the business

opportunities that have promising prospects, because the community's need for cocoa is very high, in addition to Cocoa has a high economic value.

Cocoa is one of the mainstay commodities of plantations whose role is quite important for the national economy, especially as a provider of employment, a source of income and foreign exchange. Besides that, cocoa also plays a role in encouraging regional development and agro-industry development. Cocoa is more often referred to as chocolate fruit because cocoa beans that have undergone a series of processing can produce cocoa powder. Cocoa in powder form is widely used as an ingredient to make various kinds of food and beverage products, such as milk, jam, bread, etc. Apart from being used as food and drink, chocolate also has many health benefits.

Farmers who used to cultivate rice farming land were then converted into cocoa plantations, starting with making gardens and then planting cocoa seeds along with other crops such as peanuts, corn, and various vegetables, chilies, and tomatoes. This plant is adjusted to the level of soil fertility until the cocoa tree is 3 years old (cocoa has started to bear fruit). Even then, if the cacao tree is fruitful, it can still be planted with various kinds of vegetables. There is also a farmer who used to be a rice farm, then he turned it into a cocoa garden, starting with making holes to plant cacao seeds, then spraying the grass with a roundup. After the grass dies, besides being planted with cocoa seeds, corn, vegetables, Lombok and tomatoes can also be planted. After the cocoa is two years old and over, it is very easy to maintain, while the rice fields are processed the same every year from year to year. For a land area of 0.5 ha, cocoa plantations are around 460 kg of dry beans per year for 3-year-old cocoa.

Chandra (2017) in saying that: for one hectare of cocoa land that is 3 years old, it can produce about 300 kg of dry cocoa beans in one harvest when converted in one year it is about 1 ton of dry cocoa beans. Alexander is a cocoa farmer from Kaloktok village, Sabbang District, North Luwu Regency, South Sulawesi who is quite successful and has become a byword among cocoa farmers in South Sulawesi (Mongabay.co.id). In web worldbank.org (2012) Rahayu, a farmer from the Cocoa Field School fostered by Swisscontact, through the Aceh cocoa economic improvement program, for 1 ha of cocoa plantations can produce dry cocoa beans between 500 – 700 kg for one harvest.

According to Syahrul Yasin Limpo revealed that South Sulawesi Province continues to spur the development of cocoa production in order to meet market demand, for 2012 the cocoa production is targeted to reach 300 thousand tons or an increase of 130 tons from the previous year of 170 thousand tons in 2010 (Koran Tempo, 28 July 2011). Syahrul Yasin Limpo revealed this when he appeared at the "National Workshop on Sustainable Cocoa Development" held at the Grand Clarion Hotel, Wednesday, July 28, 2011. The workshop was coupled with the signing of a Memorandum of Understanding (MoU) on cocoa development, which was the result of cooperation between the South Sulawesi Provincial Government and PT Nestle Indonesia (Koran Tempo, 28 July 2011) President Director of PT Nestle Indonesia Arshad Chaudhry said that his party will launch a public and private partnership program with cocoa stakeholders to develop sustainable cocoa in Indonesia (Koran Tempo, 28 July 2011). Farmers should plant productive crops that can provide a better standard of living.

## 2.3. Productivity

Productivity is a fundamental factor that affects the ability to compete in producing products or services. The increase in the level of productivity is correlated with the time required to complete the work and will directly affect the amount of costs required, especially from the reduction of costs consumed by the worker.

According to Daryanto (2012) that productivity is a concept that describes the relationship between results (amount of goods, funds or services produced) with sources (amount of labor, capital, land, energy, etc.) to produce the desired goods or services. Handoko (2011) says that productivity is the relationship between inputs and outputs of a productive system. In theory it is

often easy to measure this relationship as the ratio of output to input. If there are more outputs with the same amount of inputs, then production will increase. Likewise, when fewer inputs are used for the same number of outputs, productivity also increases. According to Smith and Wekeley (1995) Productivity is the production or output produced in a unit time for input. According to Sinungan (2000) productivity is the relationship between real and physical results (goods or services) with actual inputs. Ravianto (1985) says that productivity is a concept that shows a link between work results and the unit of time needed to produce a worker's product.

Productivity shows that the ratio of output to input. Inputs can include production and equipment costs, while outputs can consist of sales, revenue, market share and damage. Productivity is the ratio between the effectiveness of achieving goals at a certain quality level (output) and efficient use of resources (input). Productivity is a combination of effectiveness and efficiency, so it can be formulated (Gasperst, 2009)

$$\text{Productivity} = \frac{Output}{Input} \quad \text{or} \quad = \frac{Efectivety}{Eficiency}$$

Measurement of productivity that only takes into account one resource as an input variable is known as single-factor productivity. Meanwhile, productivity measurement that takes into account all input variables (labor, material, energy, capital) is known as multifactor productivity or total factor productivity (Heizer and Render, 2015).

Productivity calculations help company managers assess how well they are doing. Multifactor productivity measures provide better information in the calculation between factors, but there are some problems in the calculation (Heizer and Render, 2015). Factor productivity is the key to determining the optimal combination, or proportion of inputs that must be used to produce a product that refers to the low of variable proportion (Heizer and Render, 2015).

## 3. RESEARCH METHOD

### 3.1. Location

This research was conducted in Kandeapi Village, Lembang Sarapeang, Rembon District, Tana Toraja Regency. Because the land of Kandeapi Village is hilly, so if it is used as paddy fields, the results are unproductive or unprofitable. This area is a coffee and cocoa commodity region because the condition of the soil is suitable for planting coffee and cocoa and the results are good.

### 3.2. Research Variable

The variables that will be studied in this research are:

a. Respondent farmers are farmers who still maintain rice fields which are relatively small and hilly and the results are not profitable.
b. Rice farming is a farmer who cultivates paddy fields to produce unprofitable rice (the activity process is measured by working days (HK) and land area in Hectares (Ha).
c. Cocoa farming is a farmer who used to also cultivate rice fields which were relatively small in size and hilly and then this land was converted into cocoa plantations.
d. Product is the total yield of rice and cocoa farming which is calculated in kg.
e. Productivity is a measure that states how well resources are managed and utilized to achieve optimal results (Herjanto, 2019)
f. Productive is something that usually produces or generates large or large profits (Cahyono, 1996).

### 3.3. Population and Sample

The population is a generalization area consisting of objects or subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions (Sugiyono, 2016). The population in this study were farmers who used to cultivate paddy fields with relatively small land area and hilly conditions, then these farmers converted into cocoa plantations as many as 100 farmers.

The sample is part of the number and characteristics possessed by the population (Sugiyono, 2016). The sampling technique in this study is purposive sampling, which is a deliberate sampling technique. Of the 100 farmers who have converted their paddy fields into cocoa plantations, a sample of 30 farmers were taken as respondents. Because the treatment of farmers in managing their farms, both cocoa farming and lowland rice farming, is the same every year or homogeneous land processing.

### 3.4. Method of Collectig Data

The data collection method used by the researchers in this study was an interview which aims to collect information containing personal opinions and experiences about farming, farmers who used to cultivate rice fields and then convert them to cocoa plantations.

### 3.5. Data Analysis Method

The data that has been collected is then processed using descriptive analysis, Productivity, and the two-average difference test.

## 4. RESULT AND DISCUSSION

### 4.1. Farming Area

The area of the respondent's farming land varies, both rice farming and cocoa farming. The area of agricultural land will affect the amount of yield or production obtained by farmers, meaning that the wider the area planted, the more results or production obtained or the greater the profit, but lowland rice farming What happened in Kandeapi Village was inversely proportional to the wider area of rice fields, the more losses. In contrast to cocoa plants, the wider the cocoa plantation area, the higher the profits obtained by farmers. For more details regarding the farming area of the respondent farmers, it can be presented in table 1 below:

**Table 1**
**Farming Area**

| No | Area (Ha) | Respondent | Percentage (%) |
|---|---|---|---|
| 1 | 0,10 | 2 | 7 |
| 2 | 0,20 | 3 | 10 |
| 3 | 0,25 | 2 | 7 |
| 4 | 0,30 | 4 | 12 |
| 5 | 0,40 | 5 | 17 |
| 6 | 0,50 | 8 | 27 |
| 7 | 0,60 | 6 | 20 |
| **Total** | | 30 | 100 |

*Source : data collected for the study*

Based on table 4. 3 above, the respondent's farm area varies in size which includes farmers who have a land area of 0.10 Ha as many as 2 people or 7%, land area of 0.20 Ha as many as 3 people or 10%, land area 0, 25 as many as 2 people or 7%, land area of 0.30 as many as 4 people

or 12%, land area of 0.40 as many as 5 people or 17%, land area of 0.50 as many as 8 people or 27%, and land area of 0.60 as many as 6 people or 20%.

## 4.2. ANALYSIS OF FARM COSTS AND INCOME OF RESPONDENT FARMERS

### 4.2.1. Analysis of Costs and Income of Lowland Rice Farming

Analysis of costs and income of lowland rice farming, the calculation of costs in this study which includes the process of processing activities of rice fields, cutting rice and drying to transporting rice to the house, all of these items use the size of working days (HK) multiplied by the daily wage (Rp) per day. valid at the time of the study (as an input variable) while income is calculated based on the production or yield of lowland rice (kg) obtained by the respondent farmers multiplied by the price of rice (Rp) prevailing in the market at the time of conducting the research (as an output variable). To analyze costs and income researchers take the example of calculation of both lowland rice farming and cocoa farming with an area of 0.50 Ha with the reason that the most respondents. For more details, it can be presented in table 2.

**Tabel 2**
**Cost Analysis for Rice**

| Description | Ha, Kg) /year | Price/ Cost (Rp) | Cost (Rp) | Total (Rp) |
|---|---|---|---|---|
| Sales | 163 kg (rice) | 8.000 | - | 1.304.000 |
| Cost | - | - | - | - |
| Planting Cost | 30 HK | 80.000 | 2.400.000 | - |
| Harvesting Cost | 5 HK | 80.000 | 400.000 | - |
| Seed | 5 kg | 5.000 | 25.000 | - |
| Transport Cost | - | - | 45.000 | - |
| Total Cost | | | | 2.870.000 |
| Lost | | | | (1.566.000) |

Source : Data analysis

Based on table 2 above, it shows that of the 8 respondent farmers who have a land area of 0.50 Ha of lowland rice plants, an average loss of Rp. 1,566, 000. per year.

### 4.2.2. Analysis of Costs And Income of Cocoa Farming

Analysis of costs and income of cocoa farming, with the calculation of costs in this study which includes: pruning cocoa branches, cleaning grass that grows around the cocoa plantation, picking / drying, and transporting home, all of these items are measured by working days (HK) multiplied with wages prevailing at the time of the study (as an input variable). Meanwhile, income is calculated based on the amount of production or the number of yields (kg) obtained by the respondent farmers multiplied by the cocoa price (Rp) prevailing in the market at the time of the study (as an output variable). To analyze costs and income, the researcher took the example of calculating cocoa farming land with an area of 0.50 Ha, with the reason that the most number of respondents. For more details, it can be presented in table 3 below:

**Tabel 3**
**Cost Analysis for Cacao**

| Description | Ha, Kg/ per year | Price/Cost (Rp) | Cost (Rp) | Total (Rp) |
|---|---|---|---|---|
| Sales | 460 Ha | 26.000 | - | 11.960.000 |
| Cost | - | - | - | - |
| Planting Cost | 12 HK | 80.000 | 96.000 | - |
| Harvesting Cost | 32 HK | 80.000 | 2.560.000 | - |
| Seed | 15 HK | 80.000 | 1.200.000 | - |
| Total Cost | | | | (4.720.000 ) |
| Profit | | | | 7.240.000 |

Source : Data Analysis

Table 3 above shows that of the 8 respondent farmers who have a land area of 0.50 ha of cocoa plantations, the average profit is IDR 7,240,000 per year.

Productivity Analysis of Rice Field Farming and Cocoa Farming of Respondent Farmers. Productivity is a measure that states how well resources are managed and utilized to achieve optimal results. Daryanto (2012) said that productivity is a concept that describes the relationship between the results of the number of goods and or services produced and the source (amount of labor, capital, land, energy, and so on). According to Heizer and Render (2015) that productivity is the ratio of results (goods and services) divided by inputs (resources, such as labor and capital). A broader view of productivity is multifactor productivity which includes all inputs (eg capital, labour, materials, energy). Multifactor productivity is also known as total factor productivity. Multifactor productivity is calculated by combining input units (Heizer and Render, 2015) with the following formula:

$$\text{Productivity} = \frac{\text{Output}}{\text{Labour} + \text{Material} + \text{Energy} + \text{Capital} + \text{Miscelaneous}}$$

Based on the respondent farmers, as many as 30 people manage paddy rice farming land. To calculate the productivity of lowland rice farming, it is based on working days (HK) starting from the process of processing paddy fields to transporting lowland rice products to the house. To calculate the input is the number of working days (HK) per day multiplied by the wages per day (Rp), this work wage per day applies at the time of conducting the research plus the cost of seeds (Rp) per year plus the cost of transporting rice to the house (Rp). Meanwhile, to calculate the output, namely the average rice obtained by the respondent farmers (Kg) multiplied by the market price of rice (Rp) this price was obtained at the time of conducting the research.

Respondent farmers have varying sizes of lowland rice farming land which include respondent farmers who have a land area of 0.10 Ha as many as 2 people have an average input of RP 655,000; and an average output of IDR 272,000; Respondent farmers as many as 3 people who have a land area of 0.20 Ha with an average input of Rp 1,187,000; while the average output is Rp 504,000; Respondent farmers as many as 2 people who have a land area of 0.25 Ha with an average input of Rp 1,475,000; while the average output is Rp. 600,000; Respondent farmers as many as 4 people who have a land size of 0.30 Ha with an average input of Rp 1,762,500; while the average output is Rp. 736,000; Respondent farmers as many as 5 people who have a land area of 0.40 Ha with an average input of Rp 2,295,000; while the average output is Rp. 992,000; Respondent farmers as many as 8 people who have a land area of 0.50 Ha with an average input of Rp. 2.870.000; while the average output is Rp. 1,304,000; and respondent farmers as many as 6 people who have a land area of 0.60 Ha with an average input of Rp. 3,440,000; while the average output is Rp. 1,616,000;

Based on the explanation above, productivity can be calculated based on the size of the land area owned by the respondent farmers, for more details it can be presented in table 4 below.

**Table 4**
**Rice Average Productivity Mean**

| Rice Area (Ha) | Output (Rp) | Input (Rp) | Productivity |
|---|---|---|---|
| 0,10 | 272.000; | 655.000; | 0,42 |
| 0,20 | 504.000; | 1.187.500; | 0,42 |
| 0,25 | 600.000; | 1.475.000; | 0,41 |
| 0,30 | 736.000; | 1.762.500; | 0,42 |
| 0,40 | 992.000; | 2.295.000; | 0,43 |
| 0,50 | 1.304.000; | 2.870.000; | 0,45 |
| 0,60 | 1.616.000; | 3.440.000; | 0,47 |

Source : Data analysis collected for the study

Based on table 4 above, it shows that of the 30 respondents the average productivity of lowland rice farming is less than one. This means that the input issued is more than the output obtained, so this respondent farmer on average experiences a loss in lowland rice farming. Farmers who still maintain lowland rice farming say that maybe we experience losses in terms of labor or cost calculations compared to income, but there is still land that is managed every year and we feel proud that its value cannot be measured if there is rice stored either in the barn or in the barn. house all year round. Moreover, the person who owns the barn always tries to keep rice or unhulled rice in the barn all year round, because this is self-respect.

Based on the respondent farmers as many as 30 people who used to cultivate paddy fields and then converted them into cocoa plantations. To calculate the productivity of cocoa farming, the formula proposed by Heizer and Render was used previously. This input calculation is based on working days (HK) which starts the process of cleaning the grass around the garden and trimming cocoa branches that are considered wild or making the cocoa tree too thick so that it can cause the cocoa tree to not bear fruit, pick/peel, dry and transport it to the house. To calculate the input is the number of working days multiplied by the wage per person per day applicable at the time of the study, while to calculate the output, namely; the average yield of dry cocoa beans multiplied by the price of cocoa prevailing in the market at the time of conducting the research.

Respondent farmers who have varying sizes of cocoa farming land can include: Respondent farmers who have a land area of 0.10 Ha as many as 2 people have an average input of Rp. 1,600,000; while the average output is Rp 2,340,000; Respondent farmers who have a land size of 0.20 Ha as many as 3 people with an average input of Rp 2,240,000; while the average output is IDR 4,680,000; Respondent farmers who have a land area of 0.25 Ha with an average input of Rp. 2.880.000; while the average output is Rp. 5,980,000; Respondent farmers who have a land area of 0.30 Ha with an average input of IDR 3,520,000; while the average output is Rp 7,020,000; Respondent farmers who have a land area of 0.40 Ha with an average input of IDR 4,080,000; while the average output is Rp. 7,930,000; Respondent farmers who have a land area of 0.50 Ha with an average input of IDR 4,720,000; while the average output is Rp 11,960,000; Respondent farmers who have a land area of 0.60 Ha with an average input of Rp 5.280.000; while mean of output was Rp 14.300.000;

**Table 5**
**Cacao Average Productivity Mean**

| Ha | Output ( Rp ) | Input ( Rp ) | Produktivity |
|---|---|---|---|
| 0,10 | 2.340.000 | 1.600.000 | 1,46 |
| 0,20 | 4.680.000 | 2.240.000 | 2,90 |
| 0,25 | 5.980.000 | 2.880.000 | 2,10 |
| 0,30 | 7.020.000 | 3.520.000 | 2,00 |
| 0,40 | 7.930.000 | 4.080.000 | 1,94 |
| 0,50 | 11.960.000 | 4.720.000 | 2,53 |
| 0,60 | 14.300.000 | 5.280.000 | 2,71 |

Source: Analysis Data collected for the study

Based on table 5 above, it shows that of the 30 respondent farmers, the average productivity of the output is greater than the input, meaning that these 30 respondents on average earn a profit. Profits depend on the area of land and the level of fertility of the soil planted by the cocoa farmers. To analyze the difference between cocoa farming and lowland rice farming, it can be calculated by t-test using the paired data formula (Suharyadi and Purwanto, 2016), namely:

$$t = \frac{\bar{d}}{sd/\sqrt{n}}$$

and Standard Deviation

$$S = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

**Table 6**
**Standard Deviation**

| Cacao Productivity | Rice Productivity | D | d 2 |
|---|---|---|---|
| 1,46 | 0,42 | 1,04 | 1,08 |
| 2,90 | 0,42 | 2,48 | 6,15 |
| 2,10 | 0,41 | 1,69 | 2,86 |
| 2,00 | 0,42 | 1,58 | 2,50 |
| 1,94 | 0,43 | 1,51 | 2,28 |
| 2,53 | 0,45 | 2,08 | 4,33 |
| 2,71 | 0,47 | 2,24 | 5,02 |
| Total | | 12,62 | 24,22 |

Source : Analysis data collected for the study

$$S = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}} = \sqrt{\frac{24,22 - \frac{(12,62)^2}{7}}{7-1}} = 0,49$$

$$to = \frac{12,67/7}{0,49/\sqrt{7}} = \frac{1,803}{0,185} = 9,75$$

## 4.3. Conclusion

Because to = 9.75 t = 1.943 then Ho is rejected Ha is accepted at the 95% confidence level. This means that there is a significant difference between cocoa productivity and lowland rice productivity.

## 4.4. Discussion

This research was conducted in 2020 with a sample of 30 respondents who used to manage lowland rice farming land and then converted it into cocoa farming land. Of these 30 respondent farmers, the size of the land area varies which can include: 0.10 Ha, 0.20 Ha, 0.25 Ha, 0.30 Ha, 0.40 Ha, 0.50 Ha, and 0.60 Ha.

This study analyzes or measures the average productivity according to the size of the land owned by the respondents, both for lowland rice farming and cocoa farming.

Farmers who have converted their farming land are generally educated from junior high school and above and there are also farmers who only graduated from elementary school but have experience of being overseas.

The process of processing paddy fields every year is the same for all farmers with the following process, which starts with hoeing or digging when there is land that cannot be hoeed, after that each rice field is made of bunds and then the soil is leveled so that water remains stagnant in the rice fields and at the same time the grass cleared around the paddy fields. After that, the second stage of work was carried out, namely all the rice fields whose bunds were smoothed so that water would not penetrate if there was grass growing around the rice fields, they were cleaned, after that, rice seeds were planted. After the paddy fields are planted with rice seeds for approximately 3 weeks, the rice is again cleaned of grass that grows around the paddy fields. After the seeds are planted for approximately 3 months, the rice is harvested. While the process of processing cocoa farming activities is the same for all farmers every year, starting with cleaning the grass that grows around the garden and trimming the wild cocoa branches, picking the fruit, peeling it, and drying it to dry.

This study uses input measures for lowland rice farming which include working days (HK) multiplied by the working wage (Rp) per day prevailing at the time of the study, materials (seeds/kg) multiplied by the price of rice (Rp) prevailing at the time of the study. While the output is the amount of rice (kg) per year obtained by the respondent farmers according to the size of the paddy field they have multiplied by the price of rice (Rp/kg) in effect at the time of the research, assuming the amount of rice produced by the respondent farmers is in normal conditions. The input size for cocoa farming uses working days (HK) in the process of handling cocoa plantations multiplied by the working wage (Rp) per day in effect at the time of the study. While the output is the number of dry cocoa beans (kg) per year obtained by the respondent farmers multiplied by the price (Rp/kg) prevailing at the time of the study, assuming normal conditions.

Based on the results of the calculation of the average productivity of 30 respondents, it can be explained that all respondent farmers' average productivity is less than one, meaning that the input issued is greater than the output obtained every year. However, there are respondents who say that we may lose if we calculate it in terms of energy and costs to the results achieved. But we are proud that it is difficult to measure the value if there is rice stored in the barn or at home, moreover, the people who own the barn always try to keep the barn always filled with rice or unhulled rice throughout the year because it is part of their pride. The respondent farmer further said that if we lose energy or money, we still have the land to be cultivated every year, in contrast to a trading business, if it loses every year, the capital may run out or the money will eventually go bankrupt.

The average productivity of cocoa farming from 30 respondent farmers is greater than one, meaning that the inputs they sacrifice in their farming are smaller than the output produced every year. This means that the respondent farmers on average get profits from cocoa farming, the

amount of profit obtained depends on the area of land or the level of soil fertility owned by the farmers.

Based on the two difference test, the average result is to = 9.75 > t = 1.943, then Ho is rejected and Ha is accepted at the 95% confidence level, meaning that there is a significant difference between the average productivity of cocoa farming and the average productivity of lowland rice farming.

## 5. CONCLUSION AND SUGGESTION

### 5.1. Conclusion

Based on the results of research and discussion that have been stated previously, the following conclusions are drawn:

- Respondent farmers who have converted lowland rice land into cocoa plantations are influenced by their level of education and experience in overseas. Based on the calculation of the average productivity of lowland rice farming, which is less than one, this means that the respondent farmers suffer losses on average every year. However, some farmer respondents said that we might lose in terms of cost and labor every year. But we are proud that its value is difficult to measure, if there is rice that is stored either in the barn or in the house all year round. Moreover, the person who owns the barn always tries to keep the barn with rice or grain stored throughout the year, because this includes self-esteem.
- According to the calculation, the average productivity of cocoa farming is greater than one, meaning that the average farmer gets a profit every year. The amount of profit depends on the area of land or the level of soil fertility owned by farmers.
- Based on the calculation of the difference test of the two averages, the result is to = 9.75 > t = 1.943 at the 95% confidence level. It means that cocoa productivity is not the same as lowland rice productivity.

### 5.2. Suggestion

The results of this study can be used as input for the Head of Lembang Sarapeang to invite the community to cultivate crops according to the condition or level of soil fertility owned by farmers which can generate profits for the welfare of family members of farmers.

Farmers can think critically in managing their land, meaning that they do not always follow the habits of their parents, farmers must be able to see plants that are suitable for planting on land owned by farmers and can generate profits.

## REFERENCES

AAK. 1990. *Budidaya Tanaman Padi*. Yogyakarta: Kanisius

Anonim. 2018. Lembang Sarapeang dalam Angka, Kantor Lembang Sarapeang, Kecamatan Rembon, Kabupaten Tana Toraja.

Cahyanto, Ahmad. 2014. Budidaya Kakao dan Perhitungan Analisa Usaha. https://www.slideshare.net/wartawirausaha/budidaya-kakao-dan-perhitungan-analisa-usaha, diakses 23 Januari 2020

Cahyono, Bambang Tri. 1996. *Manajemen Produksi*. Jakarta: Badan Penerbit IPWI

Chandra, Wahyu. 2017. Mengenal Cocoa Doctor, Petani Kakao Penggerak di Sulawesi. Mongabay.com, 25 November 2017

Daryanto. 2012. *Model Pembelajaran Inovatif*. Yogyakarta: Gava Media
Gaspersz, Vincent. 1998. *Manajemen Produktivitas Total: Strategi Peningkatan Produktivitas Bisnis Global*. Jakarta: Gramedia Pustaka Utama
Gilar Ramdhani. 2019. Peran Generasi Petani Milenial di Era Pertanian 4.0. Liputan6.com, 9 Agustus 2021
Handoko, T. Hani. 2011. *Sumber Daya Manusia dan Produktivitas Kerja*. Bandung: Ilham Jaya
Heizer, Jay dan Barry Render. 2015, *Manajemen Operasi Manajemen keberlangsungan Rantai Pasokan*. Edisi 11. Jakarta: Penerbit Salemba Empat
Herjanto, Eddy. 2019. *Manajemen Operasi*. Edisi Ketiga. Jakarta: Grasindo
Kata Data. 2017. Produktivitas Padi Indonesia di Bawah Vietnam. https://databoks.katadata.co.id/datapublish/2017/07/31/produktivitas-padi-indonesia-di-bawah-vietnam, diakses 24 Januari 2020
Koran Tempo. 2011. 2013: Target Produksi Kakao 300 Ribu Ton. Koran Tempo.co, 28 Juli 2011
Polbangtan Gowa. 2019. Dedi Nursyamsi: Pemuda Milenial Menjadi Penentu Kemajuan Pertanian di Masa Depan. Makassar Terkini.id.com, 22 April 2020.
Ravianto, J. 1985. *Produktivitas dan Manajemen*. Jakarta: Lembaga Sarana Informasi Usaha dan Produktivitas
Saputro, Christophorus Aji dan Hasballah. 2014. Menggiurkan, Budidaya Kakao Beromset 16 Juta/Bulan. Jitunews.com, 24 Oktober 2014
Sinungan, Muchdarsyah. 2000. *Produktivitas Apa dan Bagaimana*. Jakarta: Bumi Aksara
Smith, Henry C. and Wakeley, John H. 1995. *Psychology of Industrial Behavior*. United States of America : Kingsport Press, Inc.
Soeratno dan Lincolin Arsyad. 1995. *Metodologi Penelitian, untuk Ekonomi dan Bisnis*. Yogyakarta: UPP AMP YKPN
Soim, Ahmad. 2019. Petani Milenial Riyanto, dari Nol hingga Beli Sawah Rp 100 Juta. Tabloidsinartani.com, 16 Januari 2019
Sugiyono. 2016. Metode Penelitian Bisnis. Bandung: Penerbit CV Alfabeta
Suharyadi dan Perwanto. 2016. *Statistika untuk Ekonomi dan Keuangan Modern*. Jakarta: Penerbit Salemba Empat
Utami, Sri Nuryani Hidayah, Achmadi Priyatmojo dan Subejo. 2016. Penerapan Teknologi Tepat Guna Padi Sawah Spesifik Lokasi di Dusun Ponggok, Trimulyo, Jetis, Bantul. *Indonesian Journal of Community Engagement, Vol.01, No. 02*
World Bank. 2012. Indonesia: Menanam Kakao, Membangun Industri. http://web.worldbank.org/archive/website01363/WEB/0__-4218.HTM, diakses 23 Januari 2020