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Rice Production in Rattaphum District, Songkhla Province, Thailand

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Abstract: Since the prices of agricultural products have decreased, especially rubber and rice which are the major exported products of Thailand, farmers who have limited agricultural areas have had to make important decisions regarding investing in farming for their self-living. This research is aimed at comparing the costs and returns of rubber and rice production in Rattaphum district, Songkhla province, Thailand. A three-stage random sampling technique was employed to obtain primary data from 50 farmers who work on rubber plantations and 50 farmers who grow rice, the total is 100 people with the aid of a well-structured questionnaire. The data were collected by conducting interviews with the participants during the crop year in 2015-2016. The data were analyzed using descriptive and inferential statistics such as mean, frequency count, percentages and compare mean. The study revealed that most of the farmers owned around 6 Rai of agricultural land. Farming was done by them. The studied costs in this research consisted of, firstly, the costs of rubber production. During 1-19 years of rubber trees, there were the average fixed costs of about 285.42 Baht per Rai per year and the average variable costs of about 6,797.91 Baht per rai per year. The total costs were 7,083.33 Baht per Rai per year. Then the revenue of the rubber production from selling the fresh latex, 51 Baht per kilogram on average, was about 12,510.61 Baht per Rai per year. Also the returns of the rubber productions were about 5,427.28 Baht per Rai per year. Secondly, the costs of rice production were the average fixed costs of about 303.37 Baht per Rai and the average variable cost of about 4,623.04 Baht per Rai. The total costs were 4,926.41 Baht per Rai. Then the revenue of the rice production from selling the paddy, 7 Baht per kilogram on average, was about 3,163.16 Baht per Rai. The revenue of the rice productions from selling the rice, 35 Baht per kilogram on average, was about 11,071.06 Baht per Rai. Also the returns of the rice productions were about -1763.25 Baht per Rai per year and 6,144.65 Baht per Rai, respectively. The comparison between the costs of rubber and rice productions revealed that the costs of rubber were higher than the costs of rice. Also, the returns of the rubber productions were higher than the rice, for selling the paddy. In contrast, the returns of the rice productions were higher than the rubber, for selling the rice.

Keywords: Costs and returns, Rubber, Rice

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INTRODUCTION

Rubber and rice are agricultural products with an export value of Thailand's number one and number two respectively. The value of exports of goods continued to decline in both species (Center for Information Technology and Communications, Ministry of Commerce, 2016) and tends to have lower production volumes. The prices of natural rubber and rice have fallen steadily. In addition to rice exports of Thailand, Thailand rice in the way of life that ties together a long time causing culture that vastly improved whether it is in a container of food rituals which is a grain spirit to life by way of Thailand. Woodwork tools, according to conventional wisdom, show the belief in ritual to grow rice for the first time in some areas, there are rituals according to traditional beliefs. Thailand's rice consumption is very methodical and follows specific processes such as rice for consumption by cooking in various ways. Whether it's cooking, steaming python is why there is use of different containers including used cooking served with rice. There was a culture that invented it together. Rice was introduced to the culture of the language as a stylistic comparison aphorism or proverb (Economic Development Agency of Biodiversity, 2016).

In the south during the last decade, the area planted to rice in the South declined steadily from 2,437,041 rai (389,926.56 hectares) in year 2002 down to 1,223,934 rai (195,829.44 hectares) in 2013 during the 12th annual paddy that dropped to 1,213,107 rai (194,097.12 acres) in return areas, fruit trees and perennials growing steadily in year 2002 with an area of 17,547,454 rai (2,807,592.64 hectares) and

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rose to 19,160,130 rai (3,065,620.8 hectares). In 2013 the area planted with fruit trees and perennials increased to 1,612,676 rai (258,028.16 hectares) within 12 years, especially rubber (Office of Agricultural Economics, 2016).

The price of rubber rose steadily from 2003 until February 2011. Rubber quality showed third highest increase in the price up to 174.44 baht per kilogram and latex price rose up to 154.87 baht per kilogram, most farmers in the South turned to rubber instead of rice. Rubber prices are likely to decline steadily. Until January 2016, rubber prices dropped to 36.95 baht per kilogram. The price is the lowest in 10 years and the price is lower than production costs (Central Rubber Market, 2016).

From the scenario mentioned above, it is interesting that the adaptability of farmers investing in agriculture in increasing in order to survive in such conditions. Farmers should decide on agriculture. The researcher is interested to study and compare the costs and returns of rubber and rice production grown in the same area as farmers in Rattaphum, Songkhla, Thailand mainly rubber and some farmers growing rice amounted to 9,726 households and rubber 1,463 households. The current government is encouraging farmers to plant other crops instead of rubber (Ozyurek & Uluturk, 2016; Khakimyanov & Khusainov, 2016).

LITERATURE REVIEW

Rubber Production

The study concluded the means of production to the production of rubber latex as below (Rubber Research Institute of Thailand, 2012.

Planting Preparation

Site preparation for the reconditioning of area suitable for rubber plantations with the overthrow of the old rubber or perennial species must burn wood chips and serve to keep the area weeded out as much as possible. There are two ways to cut poplar:

1. Cutting down by machine as a way to topple the tree and trees with an old tractor rubber pressure fall in the same way with the roots up. Cut a small piece of wood with the use of converters to burn roots and small branches and tillage at least two times.
2. How to cut a tree stump to rest, which is not dead. These need to break the stumps to death and decay rapidly to facilitate the work of farmers. And prevent roots from using chemical paint on the stump 30 cm from the ground before the first cut, then cut the rubber. Keep weeds and small branches off to serve tillage burned at least two times.

Orientation plant

Orientation is set to grow rubber in any direction. To minimize the damage that happens to the rubber, preventing soil erosion in practice care and harvesting practices are as follows:

1. Define spacing of rubber-term that has effect on the growth of the tree. For rubber to grow well, there must be space for a minimum of 20 square meters spacing right in plateau region.

Original rubber should be 2.5 × 8 meters or 3×7 meters of trees, 80 trees per rai or 76 per rai, respectively. Rubber in the planting of new rubber should be 2.5×7 meters or 3×7 meters of trees, 91 trees per rai or 76 trees per rai respectively.

2. Define the line determining a row of trees. Rows should be placed along the main east-west, blocking the flow of water to prevent soil erosion. The main set of rows should be away from the area of the old plantation by at least 1.5 meters and digging ditches along the garden to prevent root and the struggle for nutrients after orientation, planted with trees planted along the wood sticks with spacing defined. For more than 15 degrees, the space can be planted along the alignment and ladder.
3. Dig a hole in the ground on either side of wood stick throughout. Drill hole of size Length x Width x Depth 50x50x50 cm. Soil should be dug into a pile on the ground floor, two on one side. Lower soil piled to one side should be exposed to the sun for about one week till the soil gets dry. Sub-soil should be placed thoroughly enough into the soil at the bottom of the hole, followed by mixing with rock phosphate (Formula 0-3-0, 20-25% Total P2O5) at the rate of 170-200 grams and approximately 3-5 kg of organic

fertilizer into the hole and put it on top. For repairing the dead rubber, repair should be planted as soon as grocery bags are placed with rubber trees during the rainy season. Repair should not grow on trees older than two years. For pruning and creating a canopy, pruning of a tree should be done over the soft rubber prep area to suit the trunk to make room for higher rubber without branches and gnarled. It also leaves more space resulting in increased rubber trunk size.

Weeds found in rubber plantations are annual weeds such as pink grass foot grass, bamboo grass, Malaysia grass, Rattan, grass Khmer Ageratum grass rubber and weeds over the years.

How Herbicides do the following:

1. Planting leguminous ground cover, including Caloocan Poco alloy Centro commemorated Perry mold Maria and Liam's hole about 2 meters away from the rows of rubber trees.
2. Use mulch, these waste materials include rice straw, corn cob nut shell or newsprint. The rubber mulch trees are along rows spaced fairly that do not touch the base of the tree.
3. Workers dig die cutting or cutting weeds in the rows of trees and should be done before flowering weeds Fertilizer, timber type of fertilizer is divided into two major categories (Rubber Authority of Thailand, 2016).

- Inorganic fertilizer is made from non-living things such as fertilizer science.
- Organic fertilizer is made from living things such as compost, manure or green manure.

Fertilizer use is divided into the two bottom holes fertilizer and manure treatment.

1. Fertilizer bottom hole has popular uses including rock phosphate. A fertilizer that accelerates root proliferation and spreads quickly making the tire is in its early stages as well. Building strong root systems needs fertilizing of bottom hole. Most soils for planting rubber have very few nutrients. Phosphate fertilizers are sold now as 0-3-0 fertilizer produced locally.
2. Putting the manure as fertilizer to accelerate and maintain the rubber's size by tapping faster. Rubber did not care fertilizing as it will be cut at the age of 8 years old or older. But the rubber fertilizer is used to nourish and grow a small slit at the age of 5 years and a half to six and a half years.

Time and rate of fertilizer application

Before opening rubber tappers in the period should be from the start to the planting of rubber trees aged about 17 months to grow rapidly. The need of fertilizer is often in quantities sufficient to meet the needs of the tire after the tire lasts longer than 17 months to be fertilized two times per year. The rubber is tapped two times at the rate of 1 - 1.2 kg of fertilizer per tree per year.

Rubber refers to the yield of latex from rubber trees. The plantation owners should study and practice properly. This will yield a more sustainable rubber crop not to damage the tree tapping to last long with better growth of the rubber. Wood prices have started to topple the new plant. High-yielding rubber varieties need to be treated. The result will be worth the use of methods such as open cut method to sharpen a knife and rubber tapping system is required to maintain the rubber in order to sharpen up (Agricultural Research Development Agency, 2016).

The secondary latex is collected when tapped from rubber trees. There is need to prepare hand to use secondary water. And the latex is provided with (Encyclopedia Thailand, 2016).

1. Minor groove latex is a small body made with Zinc with the size of the spoon handle. For the next notch cut the secondary water to flow into the cup.
2. Water cup should be a fixed object as commonly used glazed pottery cup size within the capacity of 200-500 cc.
3. Place the wire cup water to place the cup conveniently. Latex must have a wire loop attached to the cup with a rubber.
4. Water storage tanks, rubber and latex, as well. When the rubber latex takes about three hours to stop (some varieties may also run for the next 1 - 2 hours), the tank size should handle such a large capacity to carry 10-15 liters when full latex is already included in the tank. There are many different ways depending on the ease of transport as part of a tank to some zinc or aluminum as a perfect place to end a bicycle or motorcycle. And some narrow mouth will not spill if the rubber is carried in large trucks to transport it away by pouring into the main tank which is shaped like a cylinder or the tanker car.

Latex is natural latex tapped from rubber trees with a milky white liquid. Fragrant, slightly contains two parts: 1. The rubber is about 35% and 2. Parts of water and other substances around 65%.

Production costs of Timber

Production of rubber based on past costs incurred in the production processes. The scholars have argued that the cost of natural rubber is as follows:

Rubber Replanting Aid Fund (2009) has a production cost of small scale rubber plantations.

Cost of rubber production = costs of rubber before tappers + costs of maintenance tapping rubber
+ costs of collecting latex and rubber sheets
+ costs of rubber pieces production
+ cost of land + the opportunity cost of investment.

Costs of rubber before tappers = costs of rubber tree + fertilizer + labor wage (fertilizer) + labor wage

Costs of maintenance tapping rubber = fertilizer + labor wage (fertilizer) + chemical

Costs of collecting latex = costs of equipment + labor wage (tapping latex and rubber sheets)

Costs of land = land tax + cost of land rental

Opportunity cost of investment due to the cost of producing rubber model is based on cost. The cost of borrowing money to invest by borrowing from banks is the interest rate of 5 percent per year and a rate of charge which is included in the cost (Punsak, Pakdee & Orasa, 2009).

Meechai (2009) analyzed the costs and returns of Para rubber planting in Tombol Cham, Amphoe Kantaluk, Changwat Si Sa Ket. The cost of the rubber costing can be classified into two parts.

1. Costs of rubber before tappers = costs of planting + costs of maintenance before tappers
+ depreciation of equipment maintenance before tappers Costs of planting = land preparation + digging a hole and orientation
+ rubber tree + labor wage (planting and fertilizing bottom hole) + fertilizer in the bottom hole.

Costs of maintenance before tappers = the equipment maintenance + fertilizer+ labor wage (fertilizer)
+ pesticides and labor wage of spraying
+ labor wage for maintaining rubber

2. Costs range tapping latex = costs of implementing after tappers + products processing
+ depreciation of equipment + amortization expense

Costs of implementing after tappers = fertilizer + labor wage (fertilizer) + pesticides and labor for spraying
+ labor wage for carrying rubber + chemical catalyst latex + equipment + labor wage (tappers) + shipping

Costs of privatization of rubber = housing + rolling machines + water tank + filtered rubber+ rubber tank

Depreciation of equipment based on the depreciated using the Straight line Method The cost of investment amortization is incurred from 1st to 6th year such as the cost of the transplant. The cost of maintaining the park before opening rubber tapping is a cost to pay for timber growth and can yield. The cost must be amortized as the rubber begins to yield by the time this project is 10 years old, so the costs incurred since the 1-6 is the average cost amortization in the year 7-10, based on the average yield per rai each year that can be determined from

$$\text{Cost of 1-6} = \frac{\text{Total Cost of 1-6} \times \text{amount of total product kg.}}{1}$$

Analysis of return of rubber by analyzing the return on the account;

The returns for the accounting which can be obtained from the income received from investments less expense which is net income give the rate of return from the account.

$$\text{Average of revenue} = \frac{\text{increase revenue} - \text{expand cost and depreciation}}{\text{Project Budget}}$$

Marginal revenue is the income farmers receive from the sale of products that can be found in the average yield per hectare per year multiplied by the price of natural rubber. The costs used to calculate the cost of rubber occurring in 7-10 years are not included in the tools and equipment in the rubber. The cost of processing productivity is the amortization expense from 1 to 6 years.

Investment in the project is investment expenditure, including the costs paid to farmers for planting. The cost of maintaining the pre-cut (including engine maintenance before the start tapping) equipment in the rubber is the cost of processing productivity. It is capital expenditure.

Chansungnoen (2011) studied Costs and Productivity of Labor in Rubber Plant in Surin Province. Calculated the costs and benefits of the rubber as follows:
Total cost = investment costs + operation costs
Investment costs = cost of investment in the area (penalty area
+ dig a hole orientation) + cost of equipment
Cost of equipment = spray machine + spades + knives machetes + scissors +cup water + rubber tongue + hanging wire + water tank + rubber spatula + cart + knife rubber + flashlight
Operation cost = cost of materials + equipment maintenance
Rubber material cost = rubber tree + fertilizer + herbicide + pesticides + hormones

Namyotha (2012) studied Production and Marketing Management of Rubber Sheet of Farmer in Kranaun District, Khon Kaen Province.
Total cost = variable cost + fixed costs
Variable costs = labor wages + inputs + marketing costs + transport + interest rate of loan
Fixed cost = opportunity cost of land + investment opportunity + depreciation cost of housing materials
Return = yield x price

Mikanate (2012) analyzed Costs and Returns of Para Rubber cultivated in Surin Province.
Cost = cost of rubber before tappers + costs range tapping latex + cost of raw rubber sheets
Costs before tappers = variable cost + fixed costs
Variable cost = cost of cultivation + maintenance costs
Fixed costs = value local taxes
Costs range tapping latex = variable cost + fixed costs
Variable cost = Cost of maintenance (fertilizer + labor costs + the protection
and pesticides + the workers to pesticides) + labor cost of tapping latex
Fixed Costs = local taxes + tapping equipment
Returns = (revenue of rubber - the cost of raw rubber) / latex production costs

Keeratiwiboon (2012) studied costs and incomes from Planting Rubber in the form of System of Simultaneous Equations: A case Study of Pa Phayom District, Phatthalung Province and Thung Song District, Nakhon Si Thammarat Province.
Cost = Fixed costs + variable costs
Fixed cost = purchase price of rubber/land + land clearing/wage plow + orientation/pit
+ rubber tree + planting + fertilizer bottom hole + the cups/water tube/rail
+ cup wire supporting the rails stick / rubber cups water + labor pruning
Variable cost = land tax + fertilizer + chemical accelerated + knife
+ labor wage (fertilizer) + labor wage (storage latex)
+ labor wage (herbicide) + herbicides.
Revenue = Price x yield

Rice

Rice has been critical in Thailand since ancient times so far, with the Royal Ploughing Ceremony. The inauguration of paddy rice crop is done each year for the prosperity of the population rice. The King will be given by staff as the first ruler of Agriculture to plow and sow grain. Farmers will collect seed and combine with the seed he planted. It is considered a great fortune.

How to grow rice

Farming means planting rice in Thailand that can be divided into the following three ways. Rice farming means growing rice on upland. And there is no standing water in the cultivation area. This type of rice is called upland rice as the mountain is often no level rise and cannot plow tillage. And adjustable thumb as a flat area so farmers often grow drops. The first step is to cut the grass and small trees. Clean the area to be planted then the wood-tipped drill a small hole in the soil about 3-4 cm deep hole that is wide enough. Sowing rice seeds in 5-10 holes that are spaced about 25 cm apart will be sowing seeds immediately.

After drilling holes and sowing the seeds, take the soil from the hole. When rain provides grain with moisture, it will germinate and grow rice. Since Don has no water and no irrigation Rice growers have to use rainwater alone. The rice fields are dried from ground water immediately. So at the end of the rainy season, rice growers have to use lighter varieties. By planting in the rainy season and to be harvested at the end of the rainy season, rice farmers must keep weeds because weeds are often more upland bog. The area used to grow rice in Thailand. They are few in number and grown in North, South and Northeast. Central upland rice is very low.

Transplanted paddy rice, which means that the plant can be divided into two sections, the first such fall courage in small plots and the second includes the removal of seedlings. Remove the rice in a large tract.

1. Prepare the soil with a plow in regular furrows for the second time, and the harrow plow roughly for the first time by regular plowing and tillage transplanted often using a cattle farm or small. This is because the transplanted area “Khan-na” has been a barrier to small farm size. 1-2 Khan-na is for water retention or discharge from the field transplanted thus forcing water levels in some medium before plowing to wait for the soil to moisten enough for plowing. Normally have to wait for the rain. The flooding of farmland or sluice into the fields wets the soil to plow roughly for the first time, referring to the plow, the first to break the weeds in the field and overturned soil. Then leave it for about one week, so the plow can be done in regular furrows for the second time, which means plowing plow roughly for the first time to cut a notch. Roy makes plow roughly for the first time broken into small pieces. It weeds out of the ground the plow in regular furrows for the second time more than once depending on the water level of the field as well as the type and quantity of weeds. When the plow results in regular furrows for the second time and is instantly rake is to remove weeds from the farmland and the area is not a plain tie.
2. The fall courage means to sow the seeds to germinate and grow seedlings. In order to remove the black lace the fall cannot be achieved in several ways, such as not to fall in wet soil. Fall in dry soil and fall on the cover.
3. When the rice seedlings for about 25 -30 days of wet soil in the fall courage or fall in dry soil. It is enough to pull out the black lace, first remove the seedlings from the plot and bind together in a small bundle. Cut the leaves left if the seedlings are very small; do not cut the leaves off. For seedlings derived from the wet soil in the fall courage. You have to wash the soil off the roots, and then remove the black lace. Local farms have prepared Paddy rice that should be used with water for about 5-10 centimeters, because crops can be folded down by the wind in the field. No water at all if the water level in it is very deep. The rice crops may drown in the early stages and might need to stretch more than normal crops. As a result, fewer tillers require the black lace to have high turnout. Transplanting should be in a row and the distance between clumps should be enough. The black lace general typically 3-5 per clump of seedlings or planting rice will be long between rubber trees and about 25 cm between rows.
4. The rice sowing by removing the seeds sown into the field to plow tillage them. Soil preparation is the usual farmer plow in regular furrows for the second time to plow roughly for the first time and begin to plow rice sowing since April for sowing the paddy rice. Khan-na is divided into small plots. So it’s easy to plow a large tractor however, there are many farmers who use the cattle for plowing. Rice sowing is done in a variety of ways, such as sowing dandy, harrow plowing or sowing after plowing, and sloughing. Maintaining the growth of crops after sowing seeds to grow rice, sowing the seeds for seedlings of rice and sowing of rice sowing are needed. Crops need water and fertilizer for growth and also need

weeding, fertilizing and spraying. The rice is ready for harvest after flowering approximately 30-35 days for farmers in the North, Northeast Central and sickle harvesters for multiple grains of rice while the farmers in the South used to pay for individual grains harvest. The threshing means to remove grain from the stalk. Then clean to separate the grain and straw crops withered away leaving only the seed paddy required. The first step is to dry the grain before it is dried for a heap of ways. But the main focus is on the mound. Be orderly if a disorganized pile of rice is bound to rise. Farmers often pile into a triangle orderly in order to keep the humidity gradually reduced, and then the strength of the grain will gradually add more. When the rain water cannot flow into the rice, it is transported to the floor and then arranged in layers to form a circle. Farmers are threshing rice after being exposed to dry for 3-5 days the paddy seed moisture content of about 13-15 percent. There will be approximately 20-25 percent humidity; it forces farmers to massage animals like cattle to trample to crush the kernels off the ears of corn. The ears of corn seeds, he called out the straw, is one way. Of the threshing combine the fact that there are several ways such as massaging overhand grip rice. Massage the people trampled Massage the cattle trampled. Massage using energy-saving tool. Seed cleaning grain derived from massage. The impurities such as sand, gravel, clay, straw and grain blighted make selling price low, so farmers have to make clean grain before the grain is stored in the barn or sold to merchants. Cleaning means removing the seed paddy from other impurities, which is achieved by using methods such as throwing rice, or threshing grain using thresher. The rice is dried to preserve grain quality standards for a long time after the massage and cleaning the seeds. You need to take the grain to dry again before it is taken to keep it in the barn, however, to get grain. The dried bark and a moisture content of about 13- 15% of grain in the barn, where humidity is higher to prevent heat from deteriorating quality of rice also makes various fungi attach to the seed species. It can ruin a lot paddy. In this phase, the airing of rice not dried on the patio can spread. Distributing grain to be everywhere, and should be exposed to sunlight for approximately 3-4 rounds of sunbathing. Storage of grain should be done after drying the grain. With approximately 13-15% moisture in seeds, the farmers would store grain in barns. The consumers divide the rice and sell when prices are high and the other part is divided into peasant varieties. The area planted to rice in the southern ocean is flat between the mountains and the plains. Most of the water is used in farming. And the rain will come later than other sectors. For this reason, a farm in the south lags behind other sectors. Farmers in this sector grow rice in the wet season as well as the majority. Minority irrigated province of Phatthalung and Songkhla have planted rice. Planting and farming upland areas and the top of the mountain farmers planting rice crops such as rice, rubber sam, etc. However to harvest in the south different from other sectors, farmers apply to the harvest by keeping one ear and then the other clutching a bundle usually harvested in November and February.

Costs and returns from rice production

Production of rice, which was discussed above, includes costs resulting from the production process, from planting to harvest. Researchers and scholars think of costs and returns from rice production as follows: Tonpanya (2011) studied the cost and return on Investment from Rice farms of Farmers at Moo 5, Hua Dong sub-district, Mueang, Phichit. Costs and returns of rice production are as follows:

Costs = raw materials+ labor wage + costs of production

The materials cost = rice

Labor costs = sowing wages + fertilizer spreaders wage + seizures spray + household wages

Production costs = plow wages + fertilizers + pesticides + herbicides + hormones nourishing rice + fuel + depreciation of devices + harvesters' wages + lease land Variable costs = rice + sowing wages + manure wages + spray wages + seizures groove wage

+ household wages + plowing wage + fertilizer + pesticides + herbicides

+ hormones nourishing rice + fuel + harvesters' wages

Fixed cost = depreciation of devices + land rental

Net income = gross income - (selling cost + cost of raw materials + labor wage + cost of production + cost of operating + finance costs)

Phokphoemdee (2012) studied the Costs and Benefit Analysis of

off-seasoned Rice Production of Farmers in Surin Province.
Analysis of Cost and Benefit of Rice is as follows:
Rice production costs = variable costs + fixed costs
Variable costs = labor wage + materials + other cost
Labor costs = preparation ground wages + pumping wages + grow wages
+ fertilizer wages + spraying herbicide wages + spraying pesticides wages
+ harvest wage + packaging and transport wage
Material costs = rice+ fertilizers + herbicides + pesticide + fuel for tillage + fuel for pumping
Other expenses = lunch + repair of agricultural machinery + repair equipment + transportation
Fixed cost = land tax + land rental + depreciation of machinery and equipment Depreciation of machinery and equipment = depreciation of tractors + sprayer protection and pesticides + depreciation of pipe
Return = yield x price per kilogram

Thongkham (2012) studied Production Economic and Marketing of Paddy Rice in Phattalung.
Analysis of Cost and Benefit of Rice is as follows:
Cost analysis of rice production is split into two parts: the cost of cash and non-cash costs.
The cost includes cash
1. Prepare the soil (wages machinery, fuel cost of household equipment).
2. Sown seedlings
3. The costs of inputs (seeds, herbicides + fertilizers + pesticides).
4. Labor costs
5. Harvesting costs (harvesting wages + labor transport) Non-cash costs include
1. Labor wage households 2. Household equipment rental 3.
Opportunity cost of land
Total cost = variable cost + fixed costs
Variable costs = labor costs + inputs
Fixed costs = depreciation of devices + the opportunity cost + land cost.
Labor costs = household wage + machinery wage
Returns = revenue - total cost
Ketpirune (2013) conducted a study on Comparison of economic costs and returns structure of chemical and organic rice cultivation: A case study in Nong Sano sub-district, Phichit province.
The cost and return of rice production are as follows:
Total cost = variable cost + fixed cost.
Variable cost = labor + raw material + fuel + hired.
Labor = water drawing + land preparation + planting + fertilizer + herbicide + harvest + transportation
Raw material = seed + fertilizer + herbicide.
Fuel = water drawing + land preparation.
Hired = land preparation + harvest + transportation.
Fixed cost = land renting + depreciation.
Returns = Income costs

Klinchan (2014) studied the costs and return of Organic Rice Cultivation in Phetchabun
The cost and return of rice production are as follows:
The cost of rice per rai = variable cost + fixed costs
Variable costs = wages plow before planting + seeds + organic fertilizer raw materials + making the ingredients in the pesticides + fuel + land rent + repair equipment
Labor cost = tiller prepared the land + sown the seeds + withdraw the rice
+ preparation plant + planting+ fertilizer and pesticide + maintenance + harvest + transportation
Fixed costs = VAT + value of depreciated assets
Return on investment = (Net profit (loss) / assets tangible) *times* 100

METHODOLOGY

Research assumption

Costs and returns from the production of rubber and rice in Rattaphum Songkhla are different

Modeling volatility

The cost of producing timber, using data from surveys and data from the various agencies
Rubber cost = fixed costs + variable costs
Fixed costs = Land tax + depreciation + opportunity cost of equipment investment
Variable costs = labor wage + material cost inputs.
Labor wage = clearing wage + plowing wage + lining and digging
+ Planting wage + branch training wage + manure wage
+ labor wage (weed killer) + Sap collecting (labor wage)
+ Sap accelerators (labor wage)
+ cups/spoon (tubes)/cup handle wire (labor wage).
Material cost inputs = sprout rubber + fertilizer + cover crop seed + weed killer + Cups / spoon (tubes) / cup handle wire + sap accelerators. + Tapping knives

Returns from timber production, using data from surveys and data from the various agencies
The average yield per rai per year = income from the sale of natural latex - the average cost of production per rai.
Average revenue per acre per year = dry latex per rai per kg per day × the number of days per year

The cost of rice production

Rice cost = fixed costs + variable costs.
Fixed costs = Land tax + depreciation + opportunity cost of equipment investment.
Variable costs = labor wage + material cost
Labor wage = preparation + wages + wages seedlings harvested. Material cost = the cost of chemical fertilizer + fuel + other Returns from rice production, using data from surveys and data from the various agencies.
The average yield per rai per year = income from the sale of paddy or rice - the average cost of production per rai
Average revenue per rai per year = volume price per kilogram per rai *times* number of farming.

Information and data collection method

The data used in the research are secondary and primary data. The information is already collected from studies and research papers on the production profile tires, from rice production methods and parameters, production volume, export volumes, growing areas, production data in Rattaphum Songkhla theories, as well as research related costs and returns.

The document reports, term papers, research papers, journals and academic papers and so on. The research from local sources such as Agriculture Office in Rattaphum as well as data collection via the Internet of organizations such as the Office of Agricultural Economics and the Rubber Research Center (Office of the Permanent Secretary Ministry of Commerce, 2016).

The data were collected in the field survey using a structured questionnaire interview. The details are as follows: The population in this study were the rubber and rice planters in Rattaphum District, Songkhla Province, Thailand, with the number of farmers growing rubber equal to 9,726 households and those growing rice were 1,463 households including 11,189 households.

The sample in this study are the growers of timber from 50 households and farmers who grow rice, a total of 50 sample households by using Multistage sampling by Rattaphum including five sub-districts, including Kamphaeng Phet, Kao Phra, Tha Chamuang, Kuan Roo and Kuha Tai under stage 1 Sampling of sub district using random sampling and Cluster random sampling by selecting specific. Select a district with both rubber and rice in the same area in Khuan roo and Kuha Tai. Sampling procedure 2 using a stratified sampling system by the sub district as an example of the steps with one primary unit

and the village as Secondary sampling units, each village of the sub-district. The village has both rubber and rice growing areas in the sub-district to select one village in each sample, then the quota limit. Data analysis and preliminary analysis are obtained from descriptive statistics such as frequency, percentage, average, standard deviation and compare mean.

RESULTS

The general condition of the household sample

The farmer of rubber plantation sample survey showed that most of the farmers are female, accounting for 62.50 percent, 59.40 percent of agriculture with a degree in elementary education. All sample households do farming in their own land and use their own funds to manage their farming about 81.30 percent. Their average age is 47.19 years, with the number of members in the household 3-4 people with an average income per year at 211,181.25 baht divided into revenue from the agricultural sector, average of 76,256.25 baht and income from non-farm, average of 143,893.33 baht. Most farmers plant rubber of RRIM 600, with space to grow rubber on the average of six rai of their rubber plantation growing an average of 73 trees per rai, and start tapping the rubber at the age of seven years.

The farmers use mainly nurturing the rubber trees with chemical fertilizer one-time per year, price of chemical fertilizers as average kilograms cost is 16.53 Baht. Using chemical fertilizers at the age of 1-6 years, 30-40 kg per rai after starting tapping until year 7-19 the chemical fertilizer is used for 70 kg per rai and for weeds using herbicides Glyphosate costs 230 baht per year, the first time of killing weeds is the age of 1-6 years, 0.3-0.4 liters of solution is used per rai for rubber tappers years after starting tapping year 7-19 chemical using 0.5 liters of solution. Farmers are selling rubber in the form of latex at the average of 5.53 kg per rai per day for 171 days a year.

The farmer sample survey showed that most farmers are female accounting for 61.1 percent. 72.2 percent had primary education background who do their farming on their own land. 77.8 and 11.1 percent of land leasing used their own capital in farming at 88.90 percent recovering the investment from the Bank for Agriculture or cooperative farming of 11.20 average age of 57.83 years, a 3-4 person household with an average income per year of 276,245.56 baht revenue from the agricultural sector 108,270.56 baht per year and income from non-farm 181,338.24 liabilities (77.80 per cent), most farmers make crop at one time, starting farming in September and harvesting in February.

The average farm size is 7.39 rai with 88.90 percent seeded and transplanted with 22 percent of 20 paddy seed varieties; Chiang Phatthalung, Sangyod Brown Rice, Malay rice and Leb Nok Rice of 30-50 kg is used per rai. Use of irrigation water and rainwater nourishes the crops sown by the farmer. Fertilizer is given two times a year by the average price per kg of chemical fertilizer at 14 baht, most farmers do not use chemical pesticides.

Agricultural labor households in farming distribution yield in their paddy field. The rice is sold to the middlemen with the average yield of 451.88 kg per rai, 7 baht per kilogram. The price of paddy and rice prices is 35 baht per kg rice, 1 kg of brown rice will be about 600-800 grams of parts supplied in the form of rice, 18 baht per kg. 88 kg per rai, 7 baht per kilogram price of paddy and rice prices by 35 baht per kg rice, 1 kg of brown rice will be about 600-800 grams of parts supplied in the form of rice, 18 baht per kg. 88 kg per rai, 7 baht per kilogram price of paddy and rice prices by 35 baht per kg rice, 1 kg of brown rice will be about 600-800 grams of parts supplied in the form of paddy seeds sold at 18 baht per kg.

Cost of return in the manufacturing of rubber and rice in Rattaphum Songkhla, Thailand

Cost returns from timber production

Rubber production in Rattaphum with the average cost of 7,083.33 baht per rai per year is divided into 2 parts: the fixed cost at 285.42 baht per rai per year includes the land tax 8 baht per rai per year, 266.86 baht depreciated equipment and opportunity cost of the investment, wages, land clearing and variable costs of THB 6,797.91, or 10.56 baht per rai per year which include labor costs of THB 4,897.16 per rai per year and the material means of production of THB 1,900. The wage of 75 baht per rai per year is paid to the unpaid labor preparing the area to grow the rubber in the first year. The average wage

per rai in total of 2,290 baht for plowing plate 3 and plate 7 for 776 baht per rai. Wage for orientation and digging holes. Orientation to the rubber to plant in a row. Length and width between rows and a wooden stick as guideline for the hole digging. The orientation of Rubber land, the wooden stick pit of 70-80 wells per rai cost 500 baht per rai wages.

The average cost per rai is 370 baht, a variety of rubber tires come from planting cuttings in a bag. Labor and plant repair labor include pruning rubber, pruning rubber to the tire two meters from the base of the tree branches to sharpen within three years, the average cost per rai is 533.50 baht labor cost and fertilizer to nourish at 224.10 baht per rai per year.

The wage for workers collecting the latex is average 565.71 baht per rai per year. Weeding average wage is at 406.99 baht per rai per year. The average wage for rubber is 281.92 baht per rai per year and the cost of inputs in the first year, the number of rubber trees for 80 per rai, the cost of each tree is 15 baht. The total costs are 1,200 bath. Fertilizer vice holes, the average cost per rai to plant the seeds, mulching 256.37 baht. The ground cover plant is a legume to reduce weeds preventing soil erosion and add nitrogen to the soil.

The average cost per rai for 572.38 baht, get a cup of latex/conduit (pipe)/wire supporting Cup. The average cost per rai is 793.69 baht. Wage for mounting rail (pipe)/rubber cup water is 397.50 baht. The average cost per acre fertilizer to nourish the tree is 1,116.33 baht per rai per year. The chemical catalyst latex is average at 214.00 baht per rai per year. The rubber knife average is 286.20 baht per rai per year. The herbicides average is 348.38 baht per rai per year.

The farmers' yield per rai of rubber plantations is at 5,427.28 baht per year with the revenue from sold product in the form of latex. The average price is 51.41 baht per kg, average revenue 12,510.61 baht per rai per year, the number of days that can be tapped at an annual average of about 171 days by selling to middlemen. The rate of production sharing ownership, the owner is 50 percent: 50 percent of the rubber tappers have an average of 5.53 kilograms per rai with an average of 30 percent latex.

Cost returns from rice production

Rice production in Rattaphum with the average cost 4,926.41 baht per rai per year is divided into 2 parts: the fixed cost of 303.37 baht per rai per year includes the land tax of 8 baht per rai per year, 101.11 baht depreciated equipment and 202.26 bath for opportunity cost of the investment, wages, land clearing and variable costs of THB 4,623.04 baht per rai per year which include labor costs of THB 3,053.53 per rai per year and the material means of production of 1,569.51 baht per rai per year on the unpaid labor for preparing the field.

The average cost per rai for a total of less than 2,631.62 baht wage plow roughly for the first time and 776 baht per rai plow in regular furrows for the second time and the baler and from 500 baht per rai paddy transplanted cases made transplanting rice and 937.50 baht per rai for harvesters' wage. The harvesters' cost was 500 baht per rai inputs.

The rice was 500 baht per rai, fertilizer to nourish used 1,069.51 baht per rai per year including the fuel in transport. Farmers returned to the disposal of paddy rice -1,763.25 and 6,144.65 baht per rai per year, respectively with revenues from sales of products in the form of paddy. The average price per kg was paid 7 baht per rai with 3,163.16 baht per year, with revenues from sales of products in the form of rice. The average price per kg was paid 35 baht per rai with 11,071.06 baht per year, primarily agricultural sold to middlemen.

Comparison of costs and returns from the production of rubber and rice from the rice and rubber production in the year 2015/2016 production costs due to higher production of rubber and the production cost of rice. However, no significant difference was shown when tested by t-test at the 0.05 level of significance and benefits of higher production of rubber produced when rice farmers sell rice in a paddy form. In contrast, a higher yield in the production of rice and rubber is found when farmers sell rice in milled form.

Table 1: Costs and returns of rubber and rice

Costs and Returns	Rubber	Rice
Variable costs(baths/rai/year)	6,797.91	4,623.04
Labor wage	4,897.16	3,053.53
Material costs	1,900.75	1,569.51
Fixed cost	285.42	303.37
Total costs(baths/rai/year)	7,0833.33	4,926.41
Yield(kg./rai)	5.53	451.88
Revenue	12,510.61	11,071.06
Returns(baths/rai/year)	5,427.28	6,144.65

DISCUSSION AND CONCLUSION

The data of rice and rubber production in the 2015/2016 production year at Rattaphum Songkhla showed the costs of rubber higher than costs of producing rice. The total cost of producing rubber was 7,083.33 baht per rai per year. The cost of production of rubber was based on the cost of labor at that time, fertilizers nourishing the tree, equipment maintenance and tapping latex. The total cost of producing rice was 4,926.41 baht per rai per year and the cost of rice production was based on labor wage, equipment of harvest as well as the seed and the fertilizer. The return on sales in the form of rubber latex was 12,510. 61 baht per rai per year considered as higher return on sales in the form of paddy rice however, lower sales of rice in the form of rice. Return on rubber plantations and rice is based on price change and amount of productivity.

The results of this research suggested that farmers in Rattaphum should develop rice seeds and know-how to reduce costs. Development of production and distribution in order to maximize the returns from farming was encouraged. There are problems of workers when workers are less the wages go up high. In return, rubber production is without distinction of producing rice. Rice is the staple product of Thailand. The relevant authorities should allocate space on the farm to be sold and consumed in sufficient district. Space in a rubber suits the needs of the market in accordance with the King's sufficiency economy philosophy (Based Economy Development Office, 2016).

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— This article does not have any appendix. —