International Journal of Business and Society, Vol. 21 No.3, 2020, 1296-1309

FINANCIAL ASSESSMENT OF SMALLHOLDER OIL PALM PRODUCTION IN UNSUITABLE AREAS OF SURAT THANI PROVINCE, THAILAND

Suthijit Choengthong[♣]
Prince of Songkla University

Suchart Choengthong
Prince of Songkla University

Nongnuch Aungyureekul
Kasetsart University

Saitip Soraj
Kasetsart University

ABSTRACT

This study was conducted to provide information on profitability, social status, occupations, sustainability, self-reliance, and risks in small-scale oil palm production in unsuitable areas of Surat Thani, by planted oil palm area Thailand's largest province. The data were collected from 25 farmers who have newly grown to 25 years old oil palm trees cultivated in unsuitable areas. The data were subjected to financial investment analysis, switching value test, sustainability, and self-sufficiency analysis. The investments in oil palm cultivation were assessed by net present value (NPV), internal rate of return (IRR), and benefit to cost ratio (BCR). The results show that most growers were senior citizens with primary school education, and the average number of family members was 4.1. They had self-invested and used family members as labor (on average 1.6 men/family). The average oil palm yield in unsuitable areas was 3.60 tons/rai/year. Based on 7% discount rate the NPV was equal to 71,215.17 Thai baht, IRR was 38.72%, and BCR was 2.25. These financial indicators show that the overall performance of oil palm cultivation in unsuitable areas is a worthwhile investment, although with high risks on the revenue side. The oil palm growers had moderate levels of sustainability and self-reliance.

Keywords: not suitable area, financial analysis, oil palm, sustainability, self-reliance, Surat Thani

Received: 31 January 2019
Accepted: 11 September 2020

1. INTRODUCTION

Dramatic increases in the demand of palm oil in food (cooking oil) and energy (biodiesel) as well as in other non-food uses have driven changes in the Thai government policies that encourage the

♣ Corresponding author: Faculty of Liberal Arts and Management Sciences, Prince of Songkla University, Surat Thani Campus, Surat Thani Province, Thailand 84000. Tel: 66-77-278873; Email: suthijit.c@psu.ac.th

production of oil palm. In the past ten years the planting area has increased from 3.20 million rais in 2007 to 5.19 million rais in 2017, an annual increase rate of 5.60% (Office of Agricultural Economics 2017). More than 90% of the planted area is harvested. Although Thailand is an appropriate area to grow oil palm, the land in Thailand can be classified according to soil suitability for oil palm cultivation. The four classes for oil palm zoning used by the Land Development Department are highly suitable (S1), moderately suitable (S2), marginally suitable (S3), and not suitable (N). This classification is based on soil quality and other factors affecting the growth of oil palm (Land Develoment Department, 2013)

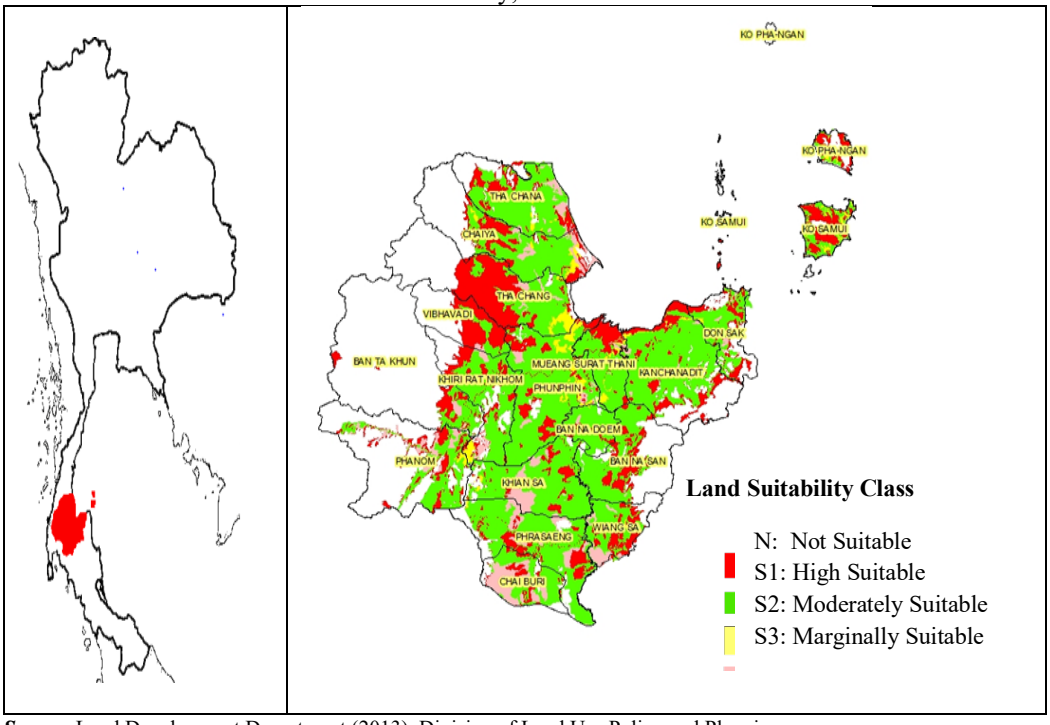
Surat Thani is the province with the most area (1.35 million rais) planted with oil palm (1 hectare = 6.25 rai), accounting for 23% of the planted area in Thailand. The amount of land available for agriculture in Surat Thani is approximately 6.01 million rais (Table 1), and the oil palm zoning by the Land Development Department (2013) is shown in Figure 1 with land suitability classes. As shown in Table 1, oil palm in Surat Thani is mainly cultivated in highly suitable and in not suitable areas. About 0.20 million rais of unsuitable land have been planted with oil palm, accounting for 15% of the total oil palm production area in Surat Thani. Meanwhile, the 2.35 million rais of remaining unsuitable area represents 50% of available agricultural land in Surat Thani. Further expansion of oil palm cultivation will necessarily use not suitable areas, where soil lacks fertility. This presents wider economic and social concerns. Therefore, it is imperative to know the financial returns from oil palm plantations in unsuitable areas, as well as the sustainability of occupation and self-reliance of small-scale oil palm plantation farmers. Self-reliance is a concept developed from the philosophy of sufficiency economy, emphasizing the lives of people at all levels of society (individual, family, community, and nation) in order to be resistant to and to keep pace with the outside world. This paper explores the economics returns, sustainability and self-reliance of oil palm smallholders in unsuitable areas of Surat Thani. The findings may be used for policy making affecting small-scale oil palm production in not suitable areas.

Table 1: Planted Area and Zoning Area for Oil Palm Cultivation according to Land Suitability in Surat Thani, Thailand

Suitability Category	Oil Palm Planted Area[1/] (Million Rais)	Available Area to Expand Oil Palm Plantation (Million Rais)	Total Zoning Area[2/] (Million Rais)	Percentage (%) of Category
Highly Suitable (S1)	0.97	1.96	2.93	48.75
Moderately Suitable (S2)	0.05	0.11	0.16	2.66
Marginally Suitable (S3)	0.13	0.25	0.37	6.16
Not Suitable (N)	0.20	2.35	2.55	42.43
Total	**1.35**	**4.67**	**6.01**	**100.00**

Sources: [1/] Land Development Department (2013), Division of Land Use Policy and Planning
[2/] Land Development Regional Office 11 (2016)

Figure 1: The Location and Distribution of Oil Palm Cultivation Area according to Land Suitability, Surat Thani



Source: Land Development Department (2013), Division of Land Use Policy and Planning

2. LITERATURE REVIEW

2.1 Financial Assessment

There are many prior studies with financial analysis of oil palm investment for individual farmers. Most of them used financial indicators to assess the financial viability of oil palm cultivation, for example, net present value (NPV), internal rate of return (IRR), benefit to cost ratio (BCR), and payback period (PB). These studies differ in study sites (Krabi, Ranong Chumporn, Surat Thani, Satun and etc.), plantation sizes (small, medium, large), study periods (20-25 years), discount rates (2.25-12%), and sample sizes (1-50 samples). All these studies, especially in southern Thailand, indicate that growing oil palm can be a profitable investment. The financial parameters showed positive NPV and BCR>1. The IRR ranged within 4-34%, whereas the payback period was about 4-13 years (Chaeronrat, Sarowbon, Klannurak, Pokprasert, Tangsakul, Limsira, & Jindapol, 2008; Chunsurat, 2005; Jaitheing, Sangpradap, Dowdoung, Riyapan, Chowna, & Sriku, 2008; Kanchanalai, Chaisit, Saifak, Sitsiri, Kanta & Jaichoen, 2009; Kangmak, 2016; Kerdsub, 2004; Leaosrirattanachai, 2014; Nillaket & Watanakul, 2014; Pedthong, 2011; Ploywilert, 2007; Promchaisri, 2013). It was also found that the return on investment was positively associated with plantation size: larger planting areas give higher returns (Arttayakul, 2004; Kaewpradit, 2010;

Lewsiriwongchareon, 2011). However, none of the prior studies has appraised investment in oil palm cultivation by land suitability category.

Office of Agricultural Economics (2017) evaluated the short-run production cost and return of oil palm cultivated in not appropriate areas of Surat Thani, including marginally suitable (S3) and unsuitable (N) areas, in the crops of 2016. The survey area was divided into groups according to age range of palm trees. The survey costs and returns data were collected from 20 sample plots, 5 plots from each age range, 5 from the young palm that have not reached yield stage, and the remaining 10 of mature palms with fruiting. The results showed positive profits of 7,361. 80 baht per rai, or 2.70 baht per kilogram at the selling price of 5.50 baht per kilogram. The total production cost was 7,618.6 baht per rai, or 2.80 baht per kilogram, having 5,007 baht variable costs and 2,611.6 fixed costs. The total yield was 2,723.70 kilograms per rai. The study revealed only positive short-run profits. Another study was done by Anuraksakornkul, Pleerak, Aiemsawad and Yongsiri (2016), who analyzed financial investment in medium to large-scale oil palm plantations in Chon Buri province, in the crop year 2013. The analysis of cost and return compared the most suitable areas with non-suitable areas in Chon Buri province. The estimated annual costs and returns in non-suitable areas covered a period of 25 years with 15 farm sizes. Based on the financial indicators (NPV, IRR, BCR), the results showed that the investment in oil palm was worthwhile in both types of areas, although the most suitable areas were more profitable than the non-suitable areas. Regarding the non-suitable areas, the average size of production area was 127.94 rais and the NPV was 74,547.78 baht per rai. The BCR was 3.52 and the IRR was 29.67%, exceeding loan interest rates by about 4 fold (Anuraksakornkul, et al., 2016).

A review of related research shows that although there are many published financial analyses of oil palm production, only few studies have done financial assessment by land suitability. There is no prior study on the financial analysis of small-scale oil palm cultivation in not suitable areas (N) of Surat Thani. In addition, due to the long productive life span of an oil palm tree (more than 20 years), it is difficult to collect all production costs and returns by age of the palm tree. Instead of using actual data, previous studies have made assumptions to allow estimating the costs and returns by age. This current study used a cross-sectional design to collect the primary data from individual smallholders who have from newly grown up to 25 years old oil palm trees in not suitable areas.

2.2 Sustainability and Self-reliance

The concepts of sustainability and self-reliance are used in accordance with the guidelines for the 11th National Economic and Social Development Plan (2012-2016). The concept of self-reliance is based on TERMS MODEL, for community analysis of five factors related to self-reliance (Aungyureekul, 2004). This model refers to 1) T: Technology self-reliance. To select the appropriate technology for the community and balance between modern technology and local technology, 2) E: Economic self-reliance. To have enough earnings and savings, shielding against financial risks, 3) R: Resources self-reliance. To use resources for maximum benefits and to conserve resources for sustainability. There must be a balance in the use and re-use of resources, 4) M: Mind self-reliance. To have self-conscious means of mind stability: living with sufficient lifestyle with no greed, supporting each other, taking into account the intention to overcome problems by unity of the community, and 5) S: Social self-reliance. To have stable and strong

community, society, and social organization. This includes having agreement to abide with cultural and social rules, as well as participation in community development and practicing generosity.

3. METHODOLOGY

3.1 Data Collection

The study focused on individual plots in Tha-chang district that has extensive oil palm plantations in unsuitable areas. The primary data were collected from 25 oil palm smallholders who cultivate oil palm on less than 50 rais, using survey type research with a cross-sectional design. The sample plots were purposively selected based on the age of oil palm trees and the willingness to provide financial data. To ensure that the sample plots were operated in unsuitable areas (accuracy assessment), the locations were recorded using GPS coordinates and compared with the soil suitability classification map produced by Land Development Department (2013). The survey involved an on-farm interview using a questionnaire covering financial aspects of oil palm cultivation. The production costs and revenues of oil palm were collected from newly grown up to 25 years old trees, in the crop year 2014. The social backgrounds of the farmers and their attitudes regarding sustainability of the occupation as well as self-reliance were explored in structured interviews.

3.2 Data Analysis

The data were subjected to financial analysis, switching value test, and sustainability and self-sufficiency analysis. Financial performance was evaluated in terms of Net Present Value (NPV), Benefit-Cost ratio (B/C ratio) and Internal Rate of Return (IRR) over the period of 25 years using a discount rate of 7%. The formulas for financial assessment were as follows (Aungyureekul, 2004):

a. Net Present Value (NPV) = PVB - PVC = $\sum_{t=1}^{T}\sum_{i=1}^{n}\frac{Bit}{(1+r)t} - \sum_{t=1}^{T}\sum_{j=1}^{m}\frac{Cjt}{(1+r)t}$

b. Internal Rate of Return (IRR) = $\sum_{t=1}^{T}\sum_{i=1}^{n}\frac{Bit}{(1+r)t} - \sum_{t=1}^{T}\sum_{j=1}^{m}\frac{Cit}{(1+r)t} = 0$

c. Benefit/Cost Ratio (BCR) = $\frac{\sum_{i=0}^{n}\sum_{i=1}^{n}\frac{Bit}{(1+r)t}}{\sum_{i=0}^{n}\sum_{i=0}^{n}\frac{Cit}{(1+r)t}}$

Where
PVB = present value of benefit, PVC = present value of cost,
B = the annual benefit, C = the annual cost,
r = the discount rate, n = the no. of items that constitute the benefits,
T = the duration of the project in year, m = the no. of items that make up the costs
The investment is worthwhile if NPV is positive, or BCR >1, or IRR > discount rate

d. Switching Value Test (SVT) used to analyze the risk by checking the size of cost and return reduction that would make the NPV = 0 and B/C ratio =1

$$SVT_B = \frac{NPV}{PVB} \, x \, 100 \qquad SVT_C = \frac{NPV}{PVC} \, x \, 100$$

Where

SVT_B = switching value test of benefit
SVT_C = switching value test of cost
PVB = present value of benefit
PVC = present value of cost
NPV = the net present value of project

A lower SVT_B reflects higher risks in returns, and a lower SVT_C reflects higher risks in costs.

4. RESULTS AND DISCUSSION

4.1 Social Background of Farmers

An overview of the 25 smallholders of oil palm plantations in not suitable areas of Tha-chang, Surat Thani, is given as follows. Most growers were senior citizens (past 50 years) with primary school education, and the average number of family members was 4.1. They were self-invested and used family labor (1.6 men/family). They have considered oil palm the main source of family income with rubber plantation being a secondary income source. They have previous been rubber farmers, then cultivating fruit trees. The major reason to cultivate oil palm is the idle areas that could be planted with oil palm, but currently oil palm offers better income than rubber. (Table 2) On an average, they have grown oil palms for more than 14 years. The dominant oil palm variety was Tenera. Sources of knowledge and assistance were the agricultural officers, the neighbors, and relatives. However, only 20% of respondents have received help from agricultural officers. In terms of finances, most growers (80%) used their own money to invest, and the rest received a loan from the Bank for Agriculture and Agricultural Cooperatives, of on average 730,000 baht with 10.2 % annual interest rate. The loans were mostly secured by title deeds over short and medium terms. The major problem of small-scale oil palm farmers in Surat Thani was price volatility, followed by poor yield.

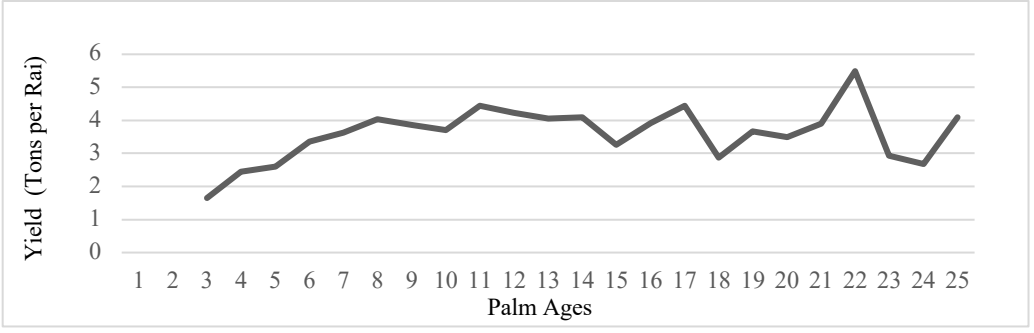
Table 2: Growers' Experience and Reasons for Growing Oil Palm in Not Suitable Areas, Surat Thani

Attribute	Average(n=25)	Percentage
Growing Oil Palm Experience (Years)	14.3	
Previous Use of Land Before Oil Palm		
Idel Areas	11	44.0
Rubber Plantation	11	44.0
Palm Plantation	2	8.0
Growing Vegetable or Fruit Trees	1	4.0
Reasons for Growing Oil Palm		
Idle Areas that could be Planted with Oil Palms	14	56.0
Better Income and Yield than Rubber	8	32.0
Flood in Rubber Plantation	2	8.0
Follow the Neighbors	1	4.0

4.2 Production of Oil Palm in Unsuitable Areas

Based on the interview data, the average planting area for oil palm was 18.30 rai/family, with the planting density of 22 trees per rai. The fertilizer application was 4.2 kilograms per tree or 92.4 kilograms per rai. Annual yield ranged within 1.65 - 4.45 and was on average 3.60 tons per rai. The actual annual yield according to the survey is shown in Graph 1.

Graph 1: Actual Annual Yield of Oil Palm Produced in Unsuitable Area, in Crop Year of 2014



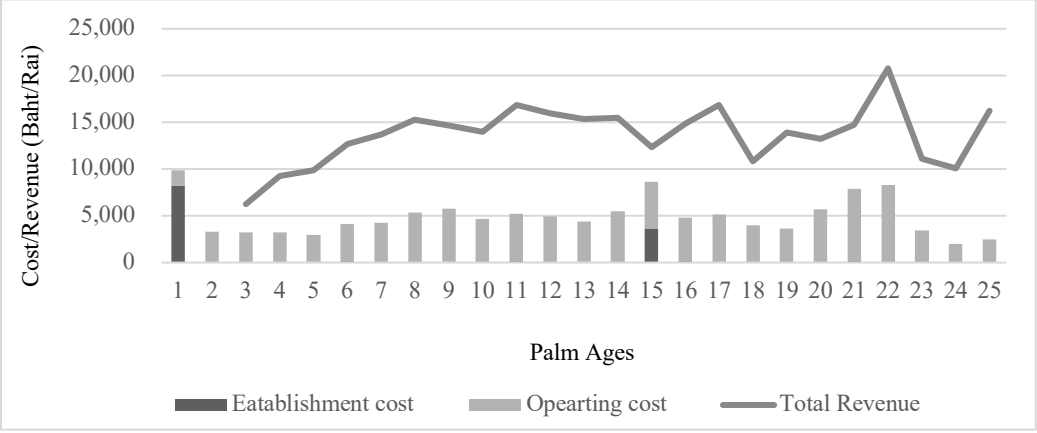
***Source**:* Choengthong, Choengthong, Aungyureekul, & Soraj, (2017)

As shown in Graph 1, the oil palm trees began to produce fresh fruit bunches (FFB) in the third year and thereafter the yield gradually increased. The annual yield was quite high when oil palm age was 8-17 years, after which it began to gradually decline. However, the yields fluctuated due to varying farm practices. The market price of oil palm used in this study was 3,784.60 baht per ton, which was the average price in the crop year 2017 that farmers received when the survey was conducted.

4.3 Financial Assessment

The establishment costs and operating costs were taken into account. Establishment costs are incurred during the first year of planting and include clearing and land preparation, holing, planting, planting materials, as well as equipment costs and replacement costs. The establishment cost was about 8,251.54 baht/rai, as shown in Graph 2. The operating costs included input costs such as materials (fertilizers, herbicides, pesticides, fuel, and electricity), labor, and other costs (maintenance, fees). Labor costs are incurred by fertilizing, pruning, weeding harvesting, and transportation. Graph 2 shows the pattern of annual costs and revenues in oil palm production throughout the 25 years surveyed.

Graph 2: Annual Costs and Revenues of Oil Palm Production, Crop Year of 2014-



Source: Choengthong et al., (2017)

As seen in Graph 2, the annual costs were split between establishment and operating costs. Costs are highest in the first year due to the massive establishment costs incurred in clearing, preparing and planting materials as well as initial equipment costs. They diminished dramatically in the second year, then gradually increased due to higher operating costs as annual yield increased. In addition to higher operating cost, the equipment at end of lifetime must be replaced annually. The replacement costs could occur in any year for some of the equipment, and there were significant replacement costs in year 15. However, the costs also fluctuated due to varying farm practices. On the revenue side, there was no revenue during the first two years because immature trees were not yet providing fruit. Revenue starts in the third year and the fresh fruit bunch (FFB) yield increases annually until the seventeenth year. Then it gradually declines due to the tree getting too old. In addition to revenues from the sale of palm oil, at the end of year 25 the residual value of all equipment is also considered part of the revenue. The annual cash flow generated by all costs and revenues was used to assess the financial viability of oil palm cultivation in not suitable areas. Table 3 provides details of the financial indicators.

Table 3: Financial Analysis of Smallholder Oil Palm Production in Not Suitable Areas

Financial Indicator	**Value**	**Unit**	**Meaning**
∑ PV of Net Benefit **(PVB)**	128,480.08	Bahts per Rai	
∑ PV of Net Cost **(PVC)**	57,264.91	Bahts per Rai	
NPV	71,215.17	Bahts per Rai	Worthwhile Investment
B/C	2.25	Times	Worthwhile Investment
IRR =	38.72	%	Worthwhile Investment Given the Discount Rate at 7%
SVT_B =	55.48	%	High Risk
SVT_C =	124.60	%	Low Risk

Applying a 7% discount rate, the present values (sum discount) of total revenue and cost, estimated over 25 years, were 128,480.08 and 57,264.91 baht, respectively. The NPV, BCR, and IRR for oil palm cultivated in not suitable areas were calculated. The results show positive NPV of 71,215.17 bahts, IRR 38.72 %, and BCR 2.25. All these indicators agree that the overall performance of oil palm cultivation in unsuitable areas was profitable. Switching value indicates by how many percent can the benefits be reduced, or the costs increased, to make BCR = 1 or NPV = 0. These switching values were SVT_B = 55.48 % and SVT_C = 124.60% , indicating higher risks on revenue side than on cost side. Therefore, farmers should closely monitor the changes in oil palm fresh fruit brunch prices and their yield.

4.4 Sustainability of the Occupation

The responses to query questions were taken on a four-point scale with 4 = definitely agree, 3 = agree, 2 = disagree and 1 = totally disagree. The average scores are shown in Table 4.

Table 4: The Opinion Scores on Occupation Sustainability of Small-Scale Oil Palm Farmers in Surat Thani

Sustainability of the Occupation	Average (n=25)	Meaning
1. An occupation that is smooth and easy in production	3.2	Good
2. An occupation that is smooth and easy to find a market to sell	3.1	Good
3. An occupation that has supports from government sectors	2.2	Moderate
4. An occupation that has supports from private sectors	1.8	Low
5. An career that establish groups to help each other	2.6	Moderate
6. A career that is stable	2.9	Moderate
7. A career with a future	3.0	Moderate
Average Score	**2.69**	**Moderate**

Note: 1.00 – 2.00 = Poor Condition or in Difficulty,
2.01 – 3.00 = Moderately Condition and
3.01 – 4.00 = Good Condition.

The sustainability of oil palm farming occupation was assessed among the oil palm growers. Overall, the respondents viewed the sustainability of the occupation moderate (2.69 of 4 points). They agreed on smooth and easy production and easy marketing. However, they faced difficulty in finding support from the government or from the private sector. In addition, they considered growing oil palm in not suitable areas as a career with moderately stable future. Their ability to form a group and assist each other's careers was moderate. Their main problems ranked in order of severity included fluctuating oil palm selling prices, low yields, oil palm plant diseases, floods, high fertilizer costs, and lack of water supply in the plantation.

4.5 Self-Reliance of the Occupation

According to the TERMS MODEL, the five categories Technology, Economics, Resources, Mind and Social were evaluated using sets of questions. The answers were collected in the range 1-4 points (4 = Yes, 1 = No). Higher scores showed better positive effect on the farmer from that factor. The average scores of individual factors are shown in Table 5.

Table 5: Query Results on Self Reliance in Oil Palm Production on Small-Scale Plantations in Surat Thani

TERMS Factor	Score	Meaning
1. Opinions on Technology Used in the Plantation (T)	**3.34**	**Good**
1) The use of modern technology advances that can be adjusted to fit their own needs.	2.80	Moderate
2) The use of adjustable technology with the integration of local wisdom.	2.80	Moderate
3) Learn more knowledge to get a higher yield	3.70	Good
4) The use of knowledge to managed in planning and producing	3.70	Good
5) The finely and properly producing and marketing of the good quality products	3.70	Good
2. Opinions on the Economics (E)	**3.60**	**Good**
1) The farmers have a self-sufficient living without wasteful spending	3.80	Good
2) The farmers do not over investment that may cause debts.	3.80	Good
3) People in the community can control and monitor the flow of cash and income.	3.40	Good
4) The farmers can survive with this single occupation.	3.00	Moderate
5) The farmers have the ability to repay the loan.	4.00	Good
3. Opinions on Resource (R)	**3.44**	**Good**
1) The farmers always keep the soil in the plantation fertility.	2.90	Moderate
2) The farmers always take good care of the water supply in the plantation.	3.00	Moderate
3) The farmers cooperate to ensure safety of agricultural products without polluting the environment.	3.80	Good
4) The farmers cooperate to maintain the environment, balance of ecosystem, existence of communities and occupations of people in the communities.	3.70	Good
5) The farmers make an effort in reconstruction, maintenance and strengthen the nature of the community.	3.80	Good
4. Opinions on Mind (M)	**4.00**	**Good**
1) The farmers take into account of mutual interests in their production activities.	4.00	Good
2) The farmers maintain the production activities carefully, taking into account the mutual and sympathetic reconciliation.	4.00	Good
3) The farmers are intended on cooperation for community growing.	4.00	Good
4) The farmers perform the production that are trustworthy to each other and to the community.	4.00	Good
5) The farmers perform production with no confusion between materialistic and idealistic needs.	4.00	Good
5. Opinions on Social Aspects (S)	**3.78**	**Good**
1) Cooperate in negotiating for the sake of the community	3.40	Good
2) Maintaining unity, reconciliation and generosity in helping each other without discrimination.	3.80	Good
3) Upholding the interests of the public.	3.80	Good
4) Creating a strong community network.	3.60	Good
5) Upholding the life style, culture and tradition to strengthen the sense of community	3.80	Good
6) Upholding pride in uniqueness, dignity and merit of human beings among people in the community.	3.80	Good
7) Restoring, preserving, enhancing and sharing local wisdom	4.0	Good
8) People struggle and seek way to make progress in life without abandoning their hometown.	4.0	Good
Average Score	**3.63**	**Good**

Note: 1.00 – 2.00 = the occupation was not sustainable and / or not self-reliant.
2.01 – 3.00 = the occupation was moderately sustainable and /or self-reliant.
3.01 – 4.00 = the occupation was sustainable and /or self-reliant to the great extent.

According to the TERMS model, the respondents believed that they had the ability to become self-reliant while growing oil palm on not suitable areas (good) with average score 3.63 of maximum 4. The strength of the factors in rank order was Mind, Social, Economics, Resources and Technology. The details of each factor are now discussed.

For mind self-reliance (M), growers believed that they could become self-reliant to a great extent. This was because they carried out activities with caution, taking into account the mutual benefits and sympathetic reconciliation. They had common intentions to make the community prosperous. They performed production activities with trust in each other and for the better of the community. They performed production activities with no confusion between materialistic and idealistic needs. In social self-reliance (S), oil palm farmers believed that they become self-reliant to a great extent by working together in negotiating for the wellness of the community, maintaining unity, reconciliation and generosity in helping each other without divisiveness. They could uphold the interests of the public, create a strong community network, and maintain lifestyle, culture and tradition to strengthen the sense of community. They endorsed the pride in uniqueness, dignity and merit of human beings among people in the community. The oil palm farmers could restore, preserve, enhance and share local wisdom. On economic self-reliance (E) side, growers realized themselves becoming self-reliant to a great extent. They had a self-sufficient way of living without wasteful spending. They did not invest excessively and get into debts. People in the community could control and monitor the flow of cash and income, and repay loans. However, they could not survive by doing only oil palm business.

In resource self-reliance (R), oil palm growers saw themselves becoming self-reliant to a great extent. They worked together to ensure safety of agricultural products without polluting the environment. They worked together in maintaining the environment, balance of ecosystem, existence of communities and occupations of people in the communities. They made an effort in reconstruction and maintenance, and to strengthen the nature of the community. However, they could take care of the water supply and soil in the plantation only moderately well.
In terms of technology self-reliance (T) in the production of oil palm, the growers in not suitable areas viewed the career as sustainable and/or that they were self-reliant at a good level. In detail, the growers believed that they pursue knowledge well to improve yields, and in management, planning, and manufacturing. They believe they manufacture and market good quality products. However, they have limitations in the deployment of modern technology and in its integration with local wisdom.

5. DISCUSSION

This study revealed that investment in oil palm cultivation in not suitable areas of Surat Thani province is profitable. The financial indicator NPV was 71,215.17 bahts per rai, BCR was 2.25, and IRR was 38.72%. This is consistent with the study of Anuraksakornkul et al. (2016), who analyzed financial investment in oil palm plantations in non-suitable areas of Chon Buri province, where NPV was 74,547.78 baht per rai, BCR was 3.52 and IRR was 29.67%, higher than the loan interest rate by about 4 fold (Anuraksakornkul et al., 2016). The results also corroborate the Office of Agricultural Economics (2017) that showed positive profits of 7,361. 80 bath per rai or 2.70 baht per kilogram from oil palm cultivation in not appropriate areas of Surat Thani, in the crop year 2016, at the selling price of 5.50 baht per kilogram (Office of Agricultural Economics, 2017).

All these studies confirm that growing oil palm in the unsuitable areas is commercially viable. The farmers have realized that financial returns from oil palm are better than from other crops, such as para rubber, so the farmers have incentive to put more of the idle land in use by planting oil palm. The switching value test indicated that oil palm growers face greater revenue risks than risks from costs. This is in line with the farmers indicating that their major problems stem from price volatility and low yields.

Land areas classified as unsuitable (N) for producing oil palm, due to soil quality, can give positive returns with good farm management. The farmers agreed on smooth and easy production and easy marketing. The oil palm provided benefit to them over keeping land idle. They perceive that growing oil palm is sustainable and has a moderately stable future.

6. CONCLUSIONS AND RECOMMENTDATIONS

Oil palm plantations have been receiving increasing attention due to increasing demand of palm oil and government policies. The expansion of oil palm farming in Surat Thani, the nation's largest province by oil palm production area, will use unsuitable idle areas because palm oil farming gives higher returns than other crops, such as para rubber. This paper explores the financial basis of oil palm cultivation in unsuitable areas of Surat Thani using primary data collected from 25 farmers who cultivate oil palm in unsuitable areas. The personal backgrounds of the smallholder oil palm plantation farmers sampled can be summarized as follows. The majority of these farmers were 50-59 years of age with a primary education. The households had 2-6 persons, on average 4.1 persons, of which about 39.0% were on-farm labor. The major household income came from the oil palm plantation. Farmers had grown oil palm for more than 14 years on average. About 80% of the respondents were self-sufficient in the investments into oil palm farming.

The financial assessment showed that investments by the smallholders in Surat Thani were profitable, as all financial indicators were favorable (BCR > 1, positive NPV and IRR greater than discount rate). It can be concluded that oil palm plantations in unsuitable areas are worthwhile economically, but the farmers need to closely follow changes in palm oil price and their farming yields, as the revenue side dominates their risks.

In addition to the favorable financial returns, the results of a preliminary exploration of sustainability and self-reliance of the oil palm smallholders in unsuitable areas were also evaluated. Regarding sustainability of the career, oil palm production appeared sustainable with moderate level future prospects. The farmers received assistance from the public sector at a moderate level and from the private sector at a low level. Their ability to form groups assisting each other in their careers was also moderate. Important sources of knowledge for the cultivation of oil palm were neighbors and self-study. Their major problems were the fluctuation of oil palm selling prices and yield losses.

The small-scale oil palm plantation farmers were self-reliant to a great extent, especially in the aspects of mind and social cooperation for common interests of the community. However, technology and resources as well as economic factors got lower scores. These were because only

oil palm business was not sufficient to provide for costs of living. They faced problems with the water supply and with soil infertility, as well as limitations with deployment of modern technology and its integration with local wisdom.

Based on this study, the recommendations included: Assistance by both government and private sector are requested. Assistance and support from the government should be granted regarding technologies that can be developed and customized for use by the farmers themselves, in introduction and transfer of new or advanced technologies to oil palm cultivation. Other areas of assistance could include provisions for improving land quality, intercropping, education and training to improve oil palm cultivation, use of fertilizers, and enrichment of agricultural soil to increase yields. The farmers should work in groups to manage the oil palm plantations and to enhance product quality, productivity, and negotiations with the palm oil industry. Alternative plants that are more appropriate in the unsuitable areas for oil palm could enable better use the arable land. Moreover, farm management should be actively encouraged to increase productivity as much as possible.

ACKNOWLEDGEMENT

The authors wish to thank Assoc. Prof. Dr. Seppo Karrila for assistance with manuscript preparation. The research was supported by grants from the Thailand Research Organization Network (TRON) and The Agricultural Research Development Agency (ARDA).

REFERENCES

Anuraksakornkul, P., N., Pleerak, K., Aiemsawad & P. Yongsiri (2016). Analysis of the Financial in Oil Palm Planting Investments in Chon Buri Province. MFU Connexion*: Journal of Humanities and Social Sciences, 5*(2), 108-145.

Arttayakul, N. (2004*). The Financial Analysis of Oil Palm Farming Investment in Chon Buri Province* (Unpublished master's thesis). Kasetsart University, Thailand.

Aungyureekul, N. (2004). *The Teaching Guide for the Management of Agroindustry. Department of Agricultural and Resource Economics* (Unpublished doctoral dissertation). Kasetsart University, Thailand.

Chaeronrat, S., N. Sarowbon, K., Klannurak, A., Pokprasert, S., Tangsakul, J., Limsira & J.Jindapol (2008). *Study on Opportunity and Threat of Important Economic Crops Production*. Research Report. Surat Thani: Office of Agricultural Research and Development Region 7.

Choengthong, S., S. Choengthong, N. Aungyureekul, & S. Soraj. (2017). *A Financial Investment Analysis and Optimum Replanting Age of Oil Palm of Smallholders. Surat Thani Province.* Research Report. Bangkok: Agricultural Research Development Agency.

Chunsurat, S. (2005). *Comparative Analysis of Financial Returns Between Rubber and Palm Oil Production in Thailand, the Crop Year of 2003*. Research Report. Bangkok: Office of Agricultural Economics.

Jaitheing, A., S. Sangpradap, R. Dowdoung, Y. Riyapan, C. Chowna, & S. Sriku. (2008). *Analysis of Return from Producing Oil Palm and Para rubber.* Report on research and development

in plants and agricultural technology. Research Report. Surat Thani: Office of Agricultural Research and Development Region 7.

Kaewpradit, K. (2010). *A Financial Analysis of Comparative Oil Palm Plantation as Classified by Size of Area in Tha Sae District, Chumphon Province* (Unpublished master's thesis). Prince of Songkla University, Thailand

Kanchanalai, W., P. Chaisit, P. Saifak, K. Sitsiri, K. Kanta, & A. Jaichoen (2009). *Land Use for Oil Palm Economics Crop*, Academic document no. 171/12/52, Bangkok: Land Development Department. Office of Land Survey and Land Use Planning. Ministry of Agriculture and Cooperatives.

Kangmak, K. (2016). *A Financial Comparative Analysis between Para rubber Farming and Oil Palm Farming in Tambon Tha Uthae, Amphoe Kanchanadit, Changwat Surat Thani* (Unpublished master's thesis). Kasetsart University, Thailand

Kerdsub, W. (2004). *An Analysis of Returns for Oil Palm of Smallholders in Amphoe Klomgthom* (Unpublished master's thesis). Ramkhamhaeng University, Thailand.

Land Development Department. (2013). *Oil Palm Plantation Zoning Management in Surat Thani*. Bangkok: Division of Land Use Policy and Planning, Ministry of Agriculture and Cooperatives.

Land Development Regional Office 11, Surat Thani. (2016). *Zoning Project for Oil Palm Plantation, Surat Thani Province, in year 2016*. Academic for land development.

Leaosrirattanachai, P. (2014). *Feasibility Study and Life Cycle Assessment of Oil Palm in Prachinburi Province* (Unpublished master's thesis). Kasetsart Universtiy, Thailand.

Lewsiriwongchareon, S. (2011*). Feasibility Study of The Investment in Oil Palm Production in Nong Suea district, Pathumthani Province* (Unpublished master's thesis). Kasetsart University, Thailand.

Nillaket, I. & Watanakul, T. (2014). Analysis of Potential Production of Oil Palms and Market Structure: Case Study of Nongkhai and Bungkan Provinces. *KKU Res J HS (GS), 2*(1), 60-70.

Office of Agricultural Economic. (2017). *Analysis of Important Agricultural Commodities, Surat Thani Province*. Academic Report. Bangkok: Ministry of Agriculture and Cooperatives.

Pedthong, S. (2011). *Cost-Benefit Analysis of Palm Oil Plantation: A Case Study of Sutthinan Farm in Nakhon Si Thammarat Province* (Unpublished master's thesis). Maefahluang University, Thailand

Ploywilert, O. (2007). *The study on Cost and benefit Analysis of Oil Palm and Jatropha Production in Northern Thailand* (Unpublished master's thesis). Chiang Mai University, Thailand.

Promchaisri, S. (2013). *A Comparative Analysis of Returns on Investments in Rubber and Oil Palm Plantations in Nakhon Si Thammarat* (Unpublished master's thesis). Ramkhamhaeng University, Thailand.