

## **Interlinkage between Agri-Production System and Livelihood in Songkhla Province, Thailand**

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### **ABSTRACT**

Due to rubber price fluctuations in Thailand, the rubber smallholders there have been forced to adjust their farming strategies to cope with the new economic, social conditions. The objective of this study is to analyse the livelihood system and factors influencing the sensitivity of livelihood system and show the relationship between the production management, and livelihood system in order to get the highest productivity and sustainable livelihoods of farmer households. The study area is Songkhla Province in Rathaphum (Tha Cha Mung), Na Thawi (Klongsai) and Khuan Niang (Rathaphum) districts selected using a purposive sampling method. Using a structured questionnaire interview, in-depth interview the key performance and focus group were used to collect data from 228 rubber farmer households. Sixty representative farms from three communities were selected evaluated based on their net farm income, comparing the farm type, again using a semi-structured interview and in-depth interviews. Key performance and focus group discussions were used to collect data, then analysed using content analysis, frequency, percentage, mean and multiple regression. The study found that the total income of monocrop system had the least. The highest was fruits (durian, mangosteen, rambutan, wollongong and banana). The livelihood of rubber smallholders practicing monocrop system reflected high economic capital but moderate social capital when compared to other rubber farming systems. Comparing all four rubber farming systems, integrated fruit estate offered the best interest for rubber smallholders.

*Keywords:* Agri-production system, rubber farming system, smallholders, sustainable rubber production management, livelihood

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## INTRODUCTION

Rubber is an important export crop in Southern Thailand not only as a crop but for livelihood of smallholders (Bahuguna, 2006). In Thailand 93.1% of total rubber plantation areas are owned by smallholders. In 1995, Thailand emerged as top world rubber producing country. The rubber production was around 87% (3.77 million tons) of total output (4.32 million tons), and it was for both domestic use and export whereby the former accounted for 13% of total output (541,003 tons). An annual income from the rubber export is almost 200,000 million THB per year (Office of Agricultural Economics, 2015). Following the economic crisis of 2011 in Thailand, the Rubber small holding farming system was forced to alter their farming strategies and ensure sustainability of farming (Manivong and Cramb, 2008).

Now, rubber production is vital for the welfare of many of smallholder households in southern Thailand, who earlier were depending on shifting rubber plantation for their livelihood (Reang et al., 2014). Two factors affect rubber productivity: controllable and uncontrollable factors. The controllable factors have direct effect on rubber smallholder farming plan and strategies, such as decision-making process, soil and farm management practice, fertiliser, labour and farm capital investment. On the other hand, the uncontrollable factors that have on indirect impact on rubber farm and strategy plans, marketing system, trend, climate and group dynamics (Somboonsuke et al., 2002). Thus, the rubber smallholder

have to identify factors involved in their farming system, for decision making and analyse how to control and manage. Thus, the government agency has been conducting training to the rubber small holders on latest cultivation technology and practice (Feder et al., 2014).

The rubber smallholders Thailand are facing income issues which have affected their quality of life. Additionally, they are challenged to adopt modern farming practices and use appropriate agricultural cultivation technologies (Nanda, 2011).

The rubber smallholding farm-household system consists of three basic sub-systems, which are inter-linked (Thungwa, 1998) and have an impact on farm productivity: the farm and its crop (rubber) and livestock activity providing employment cash, and food for farm family, the household decision-making unit and the off-farm component that is important to the well-being of rubber smallholder farming households (Renang, 2014). Thus, this study examines the economic performance of rubber smallholders, and other socio-economic factors that impact on their income (Ruthenberg, 2014). Then livelihood system and factors influencing the sensitivity of livelihood system are also analysed to determine the main constraints to rubber smallholders farm improvement and a solution to improve their farming methods. The results were synthesised to create a model that connected production management, and livelihood of small holders in Songkhla, for better farm productivity and sustainable livelihoods.

## METHODS

The study area is Songkhla Province in Rathaphum (Tha ChaMoung), Na Thawi (Klongsai) and Khuan Niang (Rathaphum) districts divided into 3 agro-ecozones (Conway, 1985, p.92). Using a structured questionnaire and in-depth interview methods with small focus groups, data was collected from 228 rubber smallhouseholds, in addition to 60 representative farms from three communities. They were selected and evaluated based on their net farm income and farm type using a semi-structured interview and in-depth interview. Their key performance indicators were measured and focus group data was analysed using content analysis, frequency, percentage, mean and multiple regression.

## RESULTS AND DISCUSSION

### **The Survival Livelihoods of Integrated Rubber Plantation Farming with Different Farming Systems in Songkhla, Thailand**

Table 1 shows the livelihood of farmer which shows that S2 system had highest achievement, whereas the sensitivity and vulnerability of this system was also highest, due to high risk from natural disaster. The human resources and natural asset of the S2 system had the highest average score, while the capital asset and social relationship had lower and lowest score respectively because rubber farmers did not have official representation and hence, did not have the power to negotiate the price. The S2 survival strategies were focused on productivity increasing, innovation and

capacity increasing, and also government support. For all 4 systems, the livelihood achievement under monetary, both capital and natural assets were very high, whereas food security and clothing, health and hygiene, and social relationship scores were all in the range of medium to high. These are similar to the findings reported by Thongyou (2014) in Rubber Cash Crop and Changes in Livelihoods Strategies in a Village in Northeastern Thailand. He reported that smallholders have to adjust themselves to the capitalist driven standardised farming practices and suffer due to unequal access to capital assets, particularly financial capital, changing socio-economic conditions and constrains related capital assets and access to them. The rural households have little choice but adopt integrated livelihood strategies.

### **The Analysis of Influential Factors towards Survival livelihoods of Integrated Rubber Plantation Farming with Different Farming Systems**

Table 2 shows S1 has the highest sensitivity and vulnerability factor at 98.10%, whereas S2, S3, and S4 has 32.50%, 38.50%, and 39.50% of sensitivity and vulnerability respectively. From overall influential factors towards survival livelihoods of integrated Rubber Plantation Farming with different farming systems, the analyses show sensitivity and vulnerability factor were the highest in S1 and the lowest in S2. Consequently, the Monoculture Rubber System (S1) had the highest risk for survival livelihoods. On the other hand, the Rubber-Fruit trees Integrated Farming System (S2) had the lowest risk

Table 1  
*The survival livelihoods of Integrated Rubber Plantation Farming with different farming systems*

Factors	S1	S2	S3	S4
Sensitivity and Vulnerability (Time/Year)				
Natural disaster	0.88	2.63	2.19	1.90
Flood	1.98	1.98	1.98	1.98
Draught	0.15	0.12	0.13	0.12
Wind/Depression	0.57	0.57	0.57	0.57
Trend of changing of:				
Price	65.54%	67.18%	67.41%	70.67%
Labour	87.23%	81.08%	84.21%	84.19%
Natural resources	79.06%	76.43%	84.10%	79.86%
Technology	85.18%	85.09%	70.35%	77.87%
Career	39.21%	40.45%	39.91%	52.86%
Market	59.87%	61.84%	64.66%	67.45%
Social	50.00%	62.37%	53.33%	65.94%
Human asset	65.20%	63.01%	75.29%	66.50%
Social assets	2.93	3.39	3.24	3.24
Physical assets	2.77	2.35	3.83	2.96
Natural assets	3.26	3.59	3.48	3.44
Capital assets	2.91	3.00	2.90	2.97
Structural and procedure	3.08	3.29	3.43	3.16
Supporting agencies farmer and Co-Op				
Bank:	80.25%	78.10%	69.55%	75.97%
Co-Op:	54.39%,	60.96%	25.88%	40.56%,
Saving group:	27.10%,	26.10%		29.10%
Positive impact and benefits for better livelihood	23.23%	23.23%		23.23%
Survival strategies	70.98%	81.58%	94.30%	88.45%
Productivity increasing (54.82%)	- Silviculture improvement (75.09%)	- Production diversification (60.53%)	- Productivity increasing (54.05%)	
Production diversification (52.86%)	- Effectivity of Productivity increasing (82.81%)	- Consumption Adaptation (61.05%)	- Production diversification (54.17%)	
- Consumption Adaptation (58.07%)	- Productivity increasing (67.55%)	-Social Adaptation (55.12%)	- Consumption Adaptation (59.49%)	
Livelihood achievement	Medium	Medium	Medium	Medium

Table 1 (continue)

Factors	S1	S2	S3	S4
Monetary				
Food security and clothing	High	Medium	High	High
Capital assets	Medium	Medium	Medium	Medium
Health and hygiene	High	Medium	High	High
Natural resources	Medium	Medium	Medium	Medium
Social relationship	Medium	High	Medium	Medium

Note: S1- Rubber monoculture; S2- Rubber-fruit tree; S3- Rubber-rice; S4- Rubber-livestock

Table 2

*The analysis of influential factors towards survival livelihoods of Integrated Rubber Plantation Farming with different farming systems*

Factor	S1	S2	S3	S4
Sensitivity And Vulnerability	0.981	0.325	0.385	0.395
Capital And Assets	0.358	0.534	0.235	0.282
Structural And Procedure	0.234	0.303	0.262	0.289
Survival Strategies	0.343	0.303	0.405	0.351

for survival of the farmers, due to having highest capital and natural assets with high structural and procedure applied, resulting in low requirement to adapt their survival strategies. This finding is in line with Somboonsuke (2003) in The Sustainable Livelihood of Rubber Small holder: A case study of Rubber-Fruit Tree Farming System in Kao Phra Community, The Southern Thailand who found social capital at middle level but financial capital at low level.

### **The Characteristics of Small Rubber Plantations Management in Different Farming Systems**

This study examined the economic performance of the rubber smallholders farming system and identify what socio-economic factors impact on their household income. Table 3 shows that all 4 integrated

rubber plantation farming systems are aimed at income generation with general characteristic of sandy-loam soil on flat plain, low hill, and highland area. The size of plantation was 1-2 ha. The age of the population under study ranged from 45-55 years old, with an annual income of 104,000 – 271,000 THB per household. Most of the farmers were male having elementary to vocational level of education. The average number of family members was 4, and between 2 and 4 of them were rubber farm. Most of the farmers (82.36%) received Replanting Fund from the Rubber Authority of Thailand (RAOT). Buddhism is the main religion. Their average debt ranged from 50,000 – 81,000 THB. The Agricultural Production System showed the proposed recommendations were to reduce production cost, price control, economic

multi-crops with rubber plantation, alternative income from other activities in integrated rubber farming systems, with supporting information about market access, and lastly to minimise exploitation of the middleman. The challenges faced by the farmers were drop in the price of rubber leading to decreased income, inability to adapt silviculture technique in different topography, lack of tapping skills, and labour shortage. The advantages the farmers had were land tenure (farmer own

their lands) and long experiences in rubber farming. The annual productivity of the rubber farming was 1,500 - 2,000 kg with 90,500 – 271,000 THB annual income from rubber farming, and average saving was 5,800 – 14,200 THB which corresponded to Reang et al., (2014) in determinants of small rubber growers' adaptation behavior in Dhalai district of Tripura, which showed the social capital was at middle level, and human capital was at low level.

Table 3  
*Characteristics of small rubber plantations management in different farming systems*

Factors	S1	S2	S3	S4
<b>Socio-Economic Factors</b>				
1. Annual income/household (THB/Year)	120,240.50	270,320.50	104566.00	180,050.25
2. Income from rubber farming (THB/Rai)	90,500.00	104,016.50	50,700.50	216,020
3. Average Rubber Productivity (Kg/Year)	2,040.15	2,217.77	1,410	1,380
4. Average Household Saving (THB/Year)	9,200.50	12,400.50	5,800.00	14,200.50
5. Average Household Debt (THB/Year)	50,000	68,500	62,500	80,500
6. Labour in Agricultural activities (No.)	2.70	3.30	3.10	2.10
7. Education	College	Primary	Primary	College
<b>Physical and Biological Factors</b>				
1. Average Rubber Plantation (Rai)	12.15	11.45	11.33	6.18
2. Rubber Clone				
- RRIM600	94.20%	100%	87.72%	95.32%
- RRIT251	5.80%	-	12.28%	4.68%
3. Number of Rubber Tree (Tree/Rai)	76	72	74	71
4. Spacing				
- 3×7 m <sup>2</sup>	75.50%	100%	4.68%	24.68%
- 3×8 m <sup>2</sup>	10.00%	-	-	4.68%
- 6×4 m <sup>2</sup>	14.50%	-	-	4.68%
- Others	-	-	95.32%	65.96%
5. Fertiliser (Kg/Rai)	240.50	252.10	244.5	269.23
6. Weeding				
- Machine	70.14%	80.00%	86.08%	73.68%
- Herbicide	4.68%	4.68%	4.68%	26.32%

Table 3 (continue)

Factors	S1	S2	S3	S4
7. Taping System				
- 1/3s 3d/4	90.75%	80.75%	94.60%	95.60%
- Others	9.25%	19.25%	5.40%	4.40%
8. Products				
- Fresh Latex	92.32%	100.00%	95.40%	91.80%
- Others	7.68%	-	4.60%	8.20%
9. Market				
- Local buyers	83.25%	92.50%	90.10%	90.10%
- Group/Co-Op	16.75%	7.50%	9.90%	9.90%
10. Human Resources	2.93	3.39	3.24	3.24
11. Social Assets	2.77	2.35	3.83	2.96
12. Physical Assets	3.26	3.59	3.48	3.44
13. Natural Assets	2.91	3.00	2.90	2.97
14. Capital Assets	3.08	3.29	3.43	3.16
15. Livelihood achievement				
- Monetary	Medium	Medium	Medium	Medium
- food security and clothing	High	Medium	High	High
- Capital assets	Medium	Medium	Medium	Medium
- health and hygiene	High	Medium	High	High
- Natural resources	Medium	Medium	Medium	Medium
- Social relationship	Medium	High	Medium	Medium
<b>The influential factors of survival livelihoods</b>				
1. Sensitivity and vulnerability	0.981	0.325	0.385	0.395
2. Capital and assets	0.358	0.534	0.235	0.282
3. Structural and procedure	0.234	0.303	0.262	0.289
4. Survival strategies	0.343	0.303	0.405	0.351

### Proposed Recommendations

(1) Regarding rubber and fruit market price fluctuation, the lowest price guarantee shall be applied.

(2) Set up the central market system for good governance for farmers. Integrated rubber farm for alternative income with food securities shall be promoted for additional income and healthy livelihoods.

(3) Group management training shall be provided for farmers to reduce market barriers imposed by local middlemen.

(4) Value-added of fruit production and innovation shall be promoted to farmers.

(5) Cost of living among farmers is very high. Therefore, they should be encouraged to use organic fertiliser, forming groups with other farmers for negotiation to buy/sell products, and access to fertilisers.

(6) The study showed natural and capital asset was low. Thus, it is important for the government to build capacity for farmers in rubber/marketing process and ensure the diversity of their income especially during periods where rubber and fruit price are low.

### **Suggestions for Further Research**

1. A detailed study of financial issues related to rubber plantations should be conducted to thoroughly analyse the livelihood of rubber smallholders.
2. A study on rubber plantation career should be conducted.
3. A comparative study on livelihood among rubber farmers across many areas should be conducted so that the derived data can be used for future farmer's livelihood planning.

### **CONCLUSION**

The study found that Songkhla province had an integrated rubber farming system (four vital farming activities). Most of the farmers in rubber plantation were adversely impacted by low price of rubber aggravated by increased cost of living which ultimately affected their livelihood. Additionally, the arrival of migrant workers for solving labour shortage in rubber plantations affected the employment of people in the area. It is recommended farmers shift from monoculture to hybrid rubber in response to changing economic conditions in the future. The current rubber farming systems in Thailand are monocrop, integrated fruit-estate, integrated rice-farming and integrated-animal-raising. The

rubber monoculture system has the lowest efficiency and diversity. The total income of each system shows that farmers practicing monocrop system had the least total income and the highest was the integrated fruit estate. The study also indicate moderate social capital among rubber smallholders but their economic capital is high. Comparing the livelihood of farmers in four systems, the study shows that the net income and the strategy of integrated fruit-estate has the best rating. Thus, the public sector or related agencies should focus on the increasing awareness on the importance of agriculture, to improve the conditions of rubber plantations to suit the type of land they have. Group farming and management training are important for rubber smallholder farmers to reduce market barrier due to the presence of local middlemen. Additionally, the government should provide lowest price guarantee and farmers should practise value-added in terms of fruit production and innovation. This new type of management can improve the farmers' quality of life, reduce poverty, and increase their standard of living.

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