

Small Holders of Rubber-based Farming Systems in Songkhla Province Thailand : Problems and Potential Solutions

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ABSTRACT

In dealing with the economic crisis of 1997, rubber-based small holders, along with many other farmers in Thailand, looked for ways to ease their problems. A variety of approaches were found, but a number of constraints in implementing these solutions were also encountered, which reduced farm productivity and decreased the farmers' ability to implement these solutions. Constraints included low production quality, low selling price (the most serious problem), deficient capital for investment, disease and pest problems, deficiency of input factors, and also high cost, inefficient local marketing systems, a generally low level of knowledge of agricultural production in general, shortage of water resources in many areas, low soil fertility, shortage of family labor, and poor local government extension services. Proposed solutions to these constraints include price insurance, a local capital investment fund, better technology transfer, an improved farmers' credit system, and improved infrastructure and financial incentives.

Key words: rubber-based farming system, small holding farm problems, small holding farm constraints

INTRODUCTION

The economic crisis of 1997 resulted in many changes to the rubber industry in Southeast Asian. The small holding sector has become increasingly

prominent in both hectare and production. More than 70% of the world's NR production comes from small holding sector (Kok, 1996), and in Thailand, Malaysia and Indonesia, 72%, 74% and 76% respectively of total rubber production comes from

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the small holding sector using various cultivation patterns (Burger and Smith, 1999). In Thailand, there are some 800,000 rubber growing farms, of which some 744,000 are small holdings (RRIT, 1999). The major effect of the economic crisis was to change the main production from Ribbed Smoked Sheet (RSS) to Rubber Block to meet market and industrial requirements. And also, under economic crisis, small holding farms in Thailand, as in Malaysia and Indonesia, have faced many constraints due to price fluctuation, capital inefficiency, shortage of labor, lack of access to credit facility, inefficient market system and inefficient small holders group in local area (Penot, 1999), It is indicated that small holders in Southeast Asia's rubber producing countries, especially, Thailand acting on their own, are apparently unable to help themselves and also, to improve farm efficiency and productivity.

Objectives of the study

This research has attempted to:

- (1) determine the main constraints to small holders attempting to improve their farms, and their causes;
- (2) examine possible solutions for the small holder's adoption of better growing methods, and
- (3) suggest possible solutions to increase the productivity and income of rubber small holdings.

METHODOLOGY

The twenty-six representative small holding rubber-based farms in six main types, as described by Somboonsuke and Shivakoti (2000) were selected

by purposive sampling from three communities in Songkhla province, Southern Thailand, Khao Phra, Phijit and Klong Phea communities, using the following criteria: (1) all communities were a target area of the provincial rubber development plan, according to the rubber development strategic plan 1999-2003; (2) they all had at least several rubber-based farm types; (3) each community had a large number of smallholdings, more than 70% of which were involved with rubber production; (4) there was appropriate topography for comparison of farms between agro-ecozones; and (5) small holders, in all three communities, faced various constraints from the production system (Department of Agricultural Extension, 1999). The functioning of rubber small holdings was studied through both secondary data and Rapid Rural Appraisal (RRA) with a semi-structured interview form (Trebuil *et al.*, 1983: Conway, 1985), identifying constraints to rubber production and their causes that the small holders have faced in their operation, and also, identification of the potential solutions to these constraints. Problem Tree Analysis Techniques with a farms group, secondary data, and Strategic Factor Analysis Summary (SFAS) Techniques were used (Turban and Meredith, 1981).

RESULTS AND DISCUSSION

1. The current system of smallholding rubber-based farms

In the southern region, Thailand, there are six main types of small holding rubber-based farming systems, as classified by Somboonsuk & Shivakoti

(2000), based on their study of three communities: Khao Phra, Phijit and Klong Phea in Songkhla Province, Thailand. Their classification was based on the criteria of the individual farm's agricultural production activity, the socio-economic structure of local rubber small holders and agro-ecozone of rubber cultivation as suggested by Trebuil et.al in 1993 and Conway in 1985. They described the characteristics of the main small holding rubber-based farming systems as following (summarized also in Table 1):

1.1 Type R₁: smallholding rubber-monoculture farming system

Rubber production is the major occupation of the farmers. In the study area these farms comprised 21.3% of the total of 807 farm households studied. Rubber Replanting is supported by the government, and high technology is usually used such as breeding, plantation technique, and management. High yield

varieties of rubber are grown, i.e. RRIM600, BPM24 and Songkhla 36 (Nissapa et.al., 1994). There is low efficiency due to the diversity in management, lack of labor especially during tapping period, high cost of production and off-farm employment opportunities. However, most of the small holders of this type still maintain their rubber holding because growing rubber has been a tradition lifestyle for many years in southern Thailand (Ivanoff and Roux, 1989).

1.2 Type R₂: smallholding rubber-intercrop farming system

The majority of farmers in this farm type are those who have participated in The Office of Rubber Replanting Aid Fund's (ORRAF) replanting program. The support is provided during the initial unproductive period (0-36 months). Approximately 26.36% (1,007 farms) of the surveyed farms fall into this category. Normally, crops as intercrops are pineapple, rice, corn, vegetables, and other annual crops (Laosuwan,

Table 1 The number and percentage of small holding rubber-based farms, Songkhla province, Southern Thailand, 1999.

Farming system type	Agro-ecozone I Khao Phra community		Agro-ecozone II Phijit community		Agro-ecozone III Khong Phea community		Total no.of farms	Percentage
	No.of farms	Percentage	No.of farms	Percentage	No.of farms	Percentage		
	1. Rubber-monoculture farms (R1)	434	22.60	149	16.30	224		
2. Rubber-intercrop farms (R2)	578	30.00	196	21.40	233	23.20	1,007	26.36
3. Rubber-rice farms (R3)	374	19.40	466	50.90	447	44.60	1,287	33.69
4. Rubber-fruit tree farms (R4)	376	19.70	16	1.70	32	3.30	424	11.09
5. Rubber-livestock farms (R5)	31	1.60	14	1.50	30	3.00	753	1.96
6. Rubber-integated farms (R6)	130	12.70	75	8.20	15	1.50	220	5.77

Source: Field survey by Somboonsuke, and Shivakoti (2000)

1987; Bulanathum, 1999). The decision to intercrop depends on a number of factors such as soil and terrain conditions, marketing and labor availability. When rubber plants become more than 36 months old small holders change the farm's cultivation pattern to other types of rubber-based farming for a sustainable family income (Thungwa, 1995).

1.3 Type R₃: small holding rubber-rice farming system

These comprise 33.69% (1,287 farms) of the total small holding farms. Normally, there are two patterns: (1) rice is grown between immature rubber rows, as intercropping; and, (2) rice is grown in a different sector within the rubber plantation. Normally small holder's experience in rice farming is derived from their ancestors and uses both high-yield and indigenous rice strains, and the rice is used for family consumption only. In the future, this type may decline due to many constraints such as shortage of family labor, high cost of input factor and uncertain price (DOAE, 1998).

1.4 Type R₄: small holding rubber-fruit tree farming system

Intercropped fruits are economically valuable fruits of southern Thailand, which include Durian, Rambutan, Rongkong, Champada, etc. Normally several types of fruit are grown. These represent 11.09% (424 farms) of the total rubber growers and can be classified in two patterns of plantations: (1) fruit trees are cultivated in the same plot of rubber, that is, grown between rubber rows, called rubber multi-cropping (Nissapa et al., 1994). The objective

is to get fruit production at the same time as rubber production, although farmers tend to postpone the rubber collection if the price of fruit is higher than rubber; and (2) fruit trees are grown in a different section of the rubber plantation. These farmers are normally more experienced and skilled in fruit tree cultivation than farmers in the previous pattern and this pattern is more like a normal business. This type requires higher capital investment and family labor. The constraints of this type include the shortage of water and its management and deficiency of capital investment. However, this type has yielded the highest economic performance due to greater farm income than other farm types.

1.5 Type R₅: small holding rubber-livestock farming system

A very small proportion, some 2% (75 farms), of the total rubber farmers use this system. Livestock is normally reared within both immature and mature rubber areas. Types of livestock include cows, poultry, swine, goat and sheep. The main constraints are the high cost of production and a deficiency of farm labor and feed. In immature rubber, the rubber plants normally must be above 2m in height and at least 18 months old for livestock raising. Usually, the average number of livestock ranges between 6-8 animals per hectare. Small holders of this type normally have many years of experience in livestock raising, however livestock under rubber is only a supplemental occupation to enhance the family income (RRIT, 1999).

1.6 Type R₆: small holding rubber-integrated farming system (or rubber-integrated activity farming system)

These comprise 5.77%, or 220 farms. There are four patterns: rubber-fruit tree-livestock, rubber-rice-livestock, and rubber-rice-fruit tree and rubber-fruit tree-fish. The main constraints facing these farms are the shortage of family labor, fluctuating prices, deficiency of capital for investment and lack of management skills. However, this is one of the better alternatives for increasing family income due to its excellent economic performance.

2. The functioning of small holding rubber-based farm agricultural production systems

For the comparison of smallholding APS between the six identified types of smallholding rubber-based farming systems, we can identify them in terms of farm objectives, farm implementation strategies, and farm constraints (Table 2).

2.1 Farm objectives

All small holdings have the main objective of increasing productivity. Increased yield and biodiversity are also important in rubber-fruit operations. Such objectives are aided by the use of new farming practices and technology. Sustainability is also a concern of most.

2.2 Farm implementation strategy

All of small holding farms use the similar fertilizer for rubber in formula 15-15-15 due to the fact that it is widely founded in local area. And also

they use this formula in fruit tree. For crop breed, all of small holding farms have been used high-yielding breed of rubber. However, there has been used indigenous breed of rice due to its appropriate for local area (resistant to disease in local area). Small holding rubber-livestock farming system, it was founded that small holding farm has been used in both high yielding breed and indigenous breed. Majority of systems used chemical treatment thus especially, cattle, goat and poultry. The result showed that the more farm's biodiversity, the more opportunity use chemical especially in small holding rubber-fruit tree farming system and small holding rubber-integrated farming system due to they have to more management practice than other systems. All small holdings use natural sources of water such as rain or underground pools, since irrigation is not available in their area. In small holding rubber-fruit tree farming system, the mixed fruit tree crop is most widely found in the study area, since small holders can harvest them all year, and this system is more profitable than other systems (Somboonsuke and Shivakoti, 2000). In the small holding rubber-rice farming systems, especially in different plots of the rubber area, there are two patterns of planting - transplanting of paddy seedlings and broadcasting of seed. For small holding rubber-integrated farming system (which some call a small holding rubber-integrated activity farming system), there were found four main types of farming system: (1) rubber-fruit tree-livestock, (2) rubber-rice-fruit-livestock, (3) rubber-fruit tree-fishery and (4) rubber-rice-fruit tree, respective.

Table 2 Comparison of small holding rubber-based farms' APS in Songkhla province.

Rubber farming system	Farm purposes	Farm implementation strategies	Farm constraints
R1 Small holding rubber-monoculture farming system	<ul style="list-style-type: none"> ๓ Increase farm income and maximize farm production 	<ul style="list-style-type: none"> ๓ The fertilizer is formula of 15-15-15 two times/year ๓ the membership of farmer's group for bargaining price in local market ๓ Use chemicals for weed control 	<ul style="list-style-type: none"> ๓ Low product price (rubber) ๓ Insufficient capital for farm investment ๓ Disease and pests (non-resistant rubber species such as RRIM600 GT1)
R2 Small holding rubber-intercrop farming system	<ul style="list-style-type: none"> ๓ Increase farm income and maximize use of farm area 	<ul style="list-style-type: none"> ๓ The fertilizer is formula of 15-15-15 and also, use manure ๓ Use chemical control ๓ "Crop as intercrop;" pineapple, corn, rice, vegetable and mung bean ๓ Use natural water resource, rainwater 	<ul style="list-style-type: none"> ๓ Insufficient capital for Investment ๓ Disease and pest ๓ Deficient input factor ๓ Low production price and quality ๓ Deficient production knowledge
R3 Small holding rubber-rice farming system	<ul style="list-style-type: none"> ๓ Increase farm income and maximize farm product toward sufficient standard of living 	<ul style="list-style-type: none"> ๓ The fertilizer is fomular of 15-15-15 for rubber and 16-20-0 for rice ๓ Two partterns of rice "plantation; transplanting of" paddy seedling and paddy is sown without transplanting ๓ Fertilization: two times/year of rice plantation ๓ No use chemical ๓ Use indigenous breed such as rice 	<ul style="list-style-type: none"> ๓ Disease and weed ๓ The shortage of family labor High cost of input factor ๓ ๓ Low product price ๓ Deficient water resource and non appropriate soil (low soil fertility)
R4 Small holding rubber-fruit tree farming system	<ul style="list-style-type: none"> ๓ Increase farm income/use high technology in implementation strategy/enlarge farm size toward more activity/increase product and yield 	<ul style="list-style-type: none"> ๓ Mixed fruit tree crop for decreasing of risk and disease ๓ Use similar fertilization 15-15-15 for both rubber and fruit tree ๓ Have pond in fruit tree area ๓ Use equipment and method in harvest 	<ul style="list-style-type: none"> ๓ The shortage of water resources ๓ The deficiency of capital for input factor ๓ The efficient extensional system and management ๓ Inconvenient communication ๓ Low quality of product and price ๓ Much disease and natural harm

Table 2 Continued

Rubber farming system	Farm purposes	Farm implementation strategies	Farm constraints
			<ul style="list-style-type: none"> ๓ Little agricultural knowledge ๓ Deficient family labor
R ₅ Small holding rubber- livestock farm	<ul style="list-style-type: none"> ๓ Insufficient farm product/increase farm income toward increased standard of living 	<ul style="list-style-type: none"> ๓ Plan for livestock production; ๓ Sell at least 8 cows/year average ๓ Use indigenous breeds that are resistant to environment and more appropriate than high breed ๓ Contract local livestock officer for support of input factors such as vaccine, additional feed toward decreasing the cost of production ๓ Manage working time for farm activity 	<ul style="list-style-type: none"> ๓ Insufficient feed resource (grass for animal feed) and vaccine ๓ Disease and pest ๓ Low product and price (rubber)
R ₆ Small holding rubber integrated farm	<ul style="list-style-type: none"> ๓ Increase farm income/improve existing farm implementation strategies/ improve farmer's ability/increase farm savings, improve the efficiency of farm management/decrease farm debt. 	<ul style="list-style-type: none"> ๓ Land use efficiency by means try to increase biodiversity and there are founded four farms types such as -Rubber with fruit tree and livestock -Rubber with rice and fruit tree -Rubber with rice, fruit tree and livestock and -Rubber with fruit tree and fishery ๓ Use fertilizer in similar form (15-15-15 in both rubber and fruit tree) ๓ Fertilizer for rice 16-20-0 ๓ Use chemical for weed control ๓ Try to use family's labor for decreasing the cost of production 	<ul style="list-style-type: none"> ๓ Low quality of product and price ๓ Disease and Pest ๓ Insufficient capital investment ๓ Pattern less in practice ๓ Inefficient extensional system ๓ Little knowledge in management ๓ Shortage of water resources ๓ Shortage of family's labor ๓ Use indigenous breed

Sources: Participatory Rural Appraisal (RRA) Techniques from twenty-six small holding farms

2.3 Farm constraints faced

All small holding farms were faced with the main constraints of low production and price, disease and pests due to the use of vulnerable breeds (i.e. RRIM 600), and insufficient capital for farm investment. In addition, the results show that the small holding rubber-fruit tree farming system and the small holding rubber-integrated farming system were more faced with constraints than other small holding farms.

3. Constraints and their causes on small holding farms

3.1 Main constraints faced by small holding farms

Low product price is the most serious constraint faced by all types of farmers. In addition, deficient production knowledge, disease and pests, insufficient capital for farm investment, and the poor market system are also important constraints on all types of farms and farmers (Table 3). Like other primary commodities, rubber price fluctuation depends on both supply and demand factors in the market and external events. During the last twenty years, the rubber price fluctuated greatly, and affected smallholding farms in Thailand. For example, in 1995, the world's rubber production was in excess of consumption and the rubber price dropped. This had bad effects on the small holder and was a major reason for small farmers to leave their farms to search for off-farm employment (Juman, 1987; Somboonsuke and Rattanachai, 1997). Inevitably, this led to under utilization of land and productivity further declined in Thailand, and also in Malaysia, and Indonesia. The

problem is made worse by the low level of education, lack of accessibility to credit and low adoption of new agricultural practice and innovations. The market constraints which include the low type and grade (normally 80% of USS grade 3 and 4) also reflect the inefficiency, complexity and constraints of industry (Somboonsuke and Rattanachai, 1997). Also, small holders get the unfair price in the local market, and marketing becomes difficult and complicated for these small holders to comprehend and moreover individual small holders are unable to cope with it (Thipayakul and Promdej 1987). The market structure and rubber prices are complementary to each other in determining the final price paid to small holders, who are the original producers of raw material. The price paid to the producer in local market is residue of the FOB price, after deductions for export and other taxes and marketing margins. The constraints of , high cost of production and input such as fertilizer, seed and chemicals for weed control and also low farm-gate price are causes of insufficient capital for investment.

3.2 The comparison constraints faced between the current systems of small holding rubber-based farms.

Biological constraints and economic constraint are the most serious constraints while physical constraints and social constraints are lesser constraints. This indicates that the government should concentrate on the economic and biological aspects in the development of small holding sector. In the Table 4, it is shown that small holding rubber-integrated farming system (R_6) and small holding rubber-fruit

tree farming system (R_4) are faced with many constraints, especially economic constraints such as shortage of labor, price and quality of production and deficient capital investment, and biological constraints such as disease and pests due to, these systems are more management and intensive practice.

3.3 The causes of main constraints faced

The main constraints faced can be analyzed through using the problem tree analysis technique (Figure 1):

3.3.1 Low production price and quality

It was found that fluctuated price in local markets, over-supply of production, and inefficient local markets were causes of this constraint. In the fluctuated price, it was found that small holders have little influence in bargaining for better prices in the local markets, and also an inefficient government plan and policy with no plan for price insurance system, since small holders normally sell their

production individually and inefficiently through a local farmers group system. Concerning the oversupply, it was found that the government has no plan for a production control system, and there is inefficient international trade for agricultural production. Concerning inefficient farm practices, it was found that small holders have little knowledge of good practices, and there is usually an insufficient extension system in local area, often because there is little interest. Concerning inefficient local market, it was found that the government has no plan or policy for a local market system.

3.3.2 Deficient capital for farm investment

It was found that little saving, use of capital for other activities, and the high costs of input factors were the main factors mentioned concerning this constraint. Re small savings, it was founded that small holders normally have a low income, often due to having to service debts, and they usually sell their production at a low price. Using capital for other

Table 3 The main constraints of small holding rubber-based farming systems.

Constraint	Percentage
1. Low production price and quality	25.4
2. Deficient capital for farm investment	13.8
3. Disease and Pests	11.2
4. Deficient input factors and high cost of inputs	10.9
5. Inefficient local marketing system	10.2
6. Deficient agricultural knowledge	6.8
7. Shortage of water resources	6.8
8. Low soil fertility	6.1
9. Shortage of family labor	5.1
10. Inefficient local extension system	3.7

Source: PRA, and Problem Tree Analysis from twenty-six small holding farms

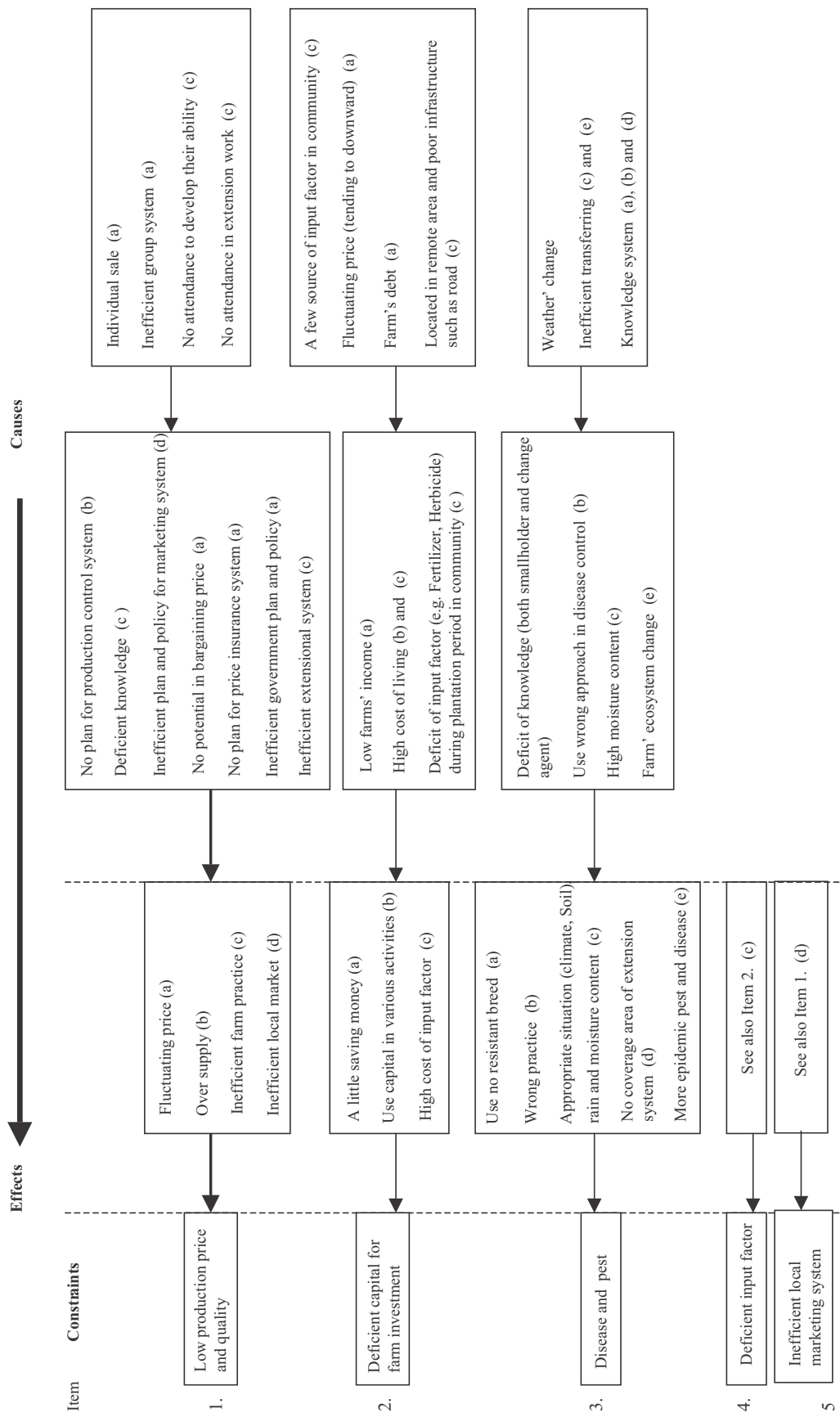


Figure 1 The causes of main constraints of smallholding rubber-based farming system.

Source Problem Tree Analysis from twenty-six small holding farms

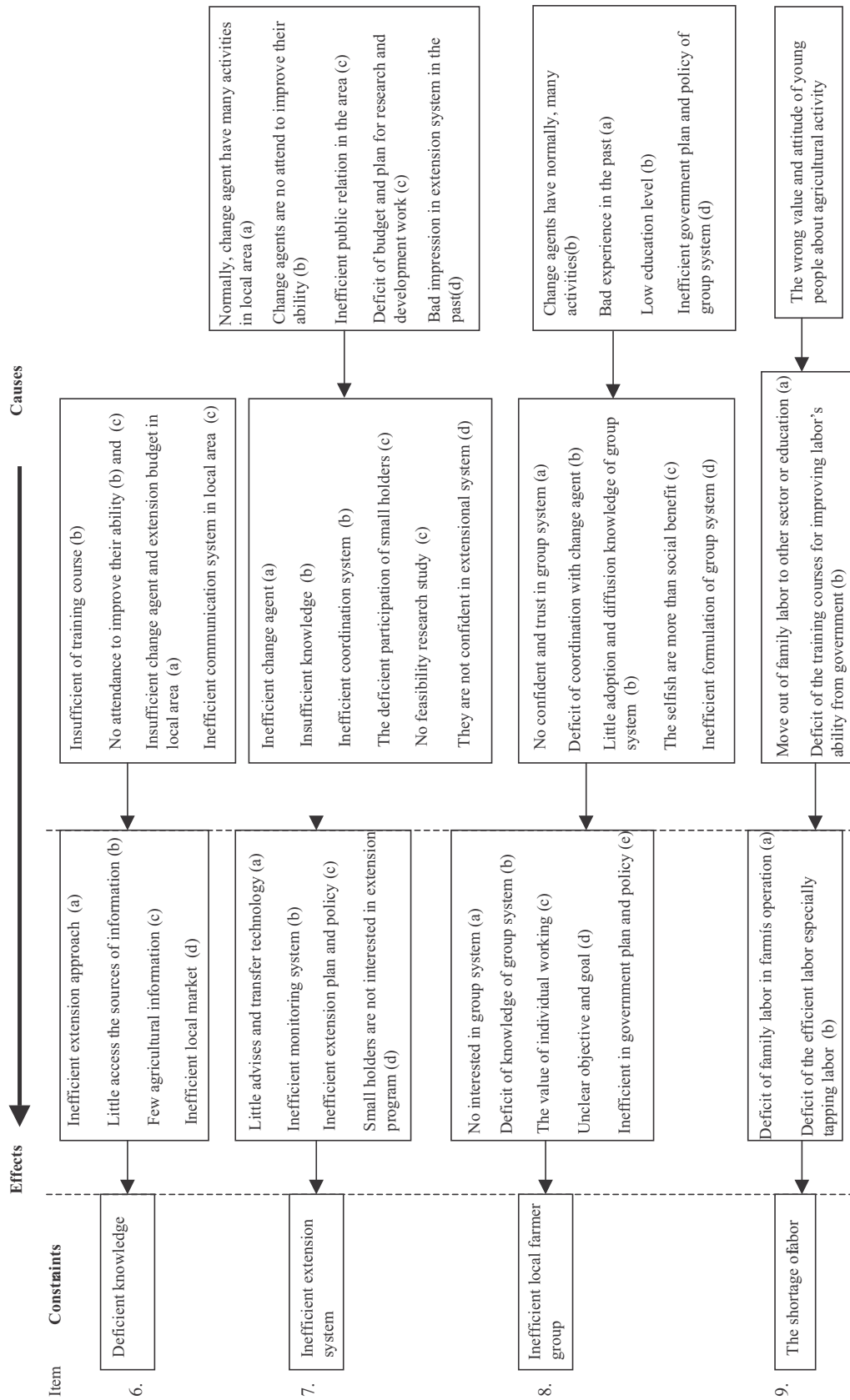


Figure 1 Continued.

Table 4 Comparison of constraints faced small holding rubber-based farms.

Constraints	Small holding rubber-based farming system					
	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆
* Physical constraints						
1. Deficiency of water resources			X	X		X
2. Non-appropriate soil (low fertility)			X			
3. Natural harm and climate				X		
4. Inconvenient infrastructure				X		
* Biological constraints						
1. Disease/pests and weeds	X	X	X	X	X	X
2. Low yielding breed (crop/livestock)						X
3. Deficiency of input factors (i.e. fertilizer)		X	X		X	
* Social constraints						
1. Inefficient local farmers' groups or organizations						X
2. Inefficient local extension system and management				X		
3. Deficient production system knowledge		X		X		X
* Economic constraints						
1. Deficiency of capital for investment	X	X		X		X
2. Low product price and quality	X	X	X	X	X	X
3. Inefficient local marketing system						X
4. Deficiency of family labor and equipment			X	X		X
5. High cost of inputs						X

Sources: Participatory Rural Appraisal (PRA) from twenty-six small holding farms

Remark R: Small holding rubber-based farm: R₁= Rubber-monoculture farming system, R₂= Rubber-intercrop farming system, R₃= Rubber-rice farming system, R₄= Rubber-fruit tree farming system, R₅= Rubber-livestock farming system and R₆= Rubber-integrated farming system

activities means that small holders find it is necessary to use what money they have for living expense, which are quite high. Also, input factors are high, compare to their cost in the past, such as fertilizer and herbicides.

3.3.3 Pests and disease

It was found that using vulnerable breeds, wrong practices not appropriate to the climate, an inefficient extension system and having more epidemic

pests and diseases in the area were the main points of this constraint. It was found that both small holders and exchange agents have little knowledge of pest and disease control and management. Also, the changing farm ecosystem is the main cause of new epidemic pests and diseases.

3.3.4 Deficient input factors

It was found that the high cost of inputs under the present situation is the main source of this

constraint; there are few sources of inputs in the community.

3.3.5 Inefficient local marketing system

The government has no efficient plan or policy for a local marketing system for the protection of small holder price. Small holders normally get an unfair price in the local marketing system.

3.3.6 Deficient knowledge

Deficient knowledge of good farming practices results from an inefficient extension system, little access to new or reliable sources of information in the community, and little agricultural information in the community. Due to an insufficiency of training courses, small holders are not improve their ability. There are not enough exchange agents, nor is their sufficient budget to improve community communications.

3.3.7 Inefficient extension system

It was found that an inefficient monitoring system, inefficient extension plans and policies, inefficient exchange agents and small holders are the main causes of this constraint. In inefficient monitoring system, it was found that there are deficient exchange agents due to the exchange agents having various activities in the local area. In inefficient plans and policies concerning extension, it was found that the deficient participation and coordination between small holders and exchange agents, and no feasibility studies are the main causes of this constraint. In inefficient change agent and small holders, it was found that both small holders and exchange agents

are not fulfilling their responsibility. Small holders are, normally, not confident in the local extension system.

3.3.8 Inefficient local farmer group

It was found that small holders are not interested in a group system, the value of individual working, deficient knowledge in group system, and inefficient government plans and policy are the main causes of this constraint. In the issue of no interest in a group system, it was found that, at present, small holders are not confident in a group system, for they believe that a group system can't solve their problems because some small holders have had bad experiences in the past. In value of individual working, small holders normally work individually to sell their production and decide their own management strategy. They are afraid that they will lose their benefits if they participate in a group. It can be said that small holders are more concerned with selfish interests than with social benefits. Regarding deficient knowledge of group systems, it was found that inefficient coordination systems and little adaptation to group system of knowledge were the main causes of this constraint, primarily due to the low educational level of small holders and change agents who normally had various activities in the community.

3.3.9 Shortage of farm labor

It was found that leaving the farm to work in the non-agricultural sector, deficient family labor and deficient transfer of knowledge concerning improving labor abilities were the main causes of this constraint. Especially leaving the farm to work in non agricultural

sector, where it was found that it is the value of young labor that agricultural work comparison industry work and get more education.

3.4 The impacts of farm constraints on small holders' adjustment

The constraints faced by small holders and their causes as previously mentioned result in decreasing farm productivity and income. It was found they impacted on the current small holders' adjustment, especially in the socio-economic adjustments of small holders. It was found that the changing socio-economic aspects of the small holders are more serious than the changing bio-physical aspects of the small holders, i.e. (1) small holders have to borrow more than the past, (2) they are unable to plan for family expenditures, causing them to decrease luxury activities, such as decreasing social status, inequity of social status in community, and less participation in social groups and activities

in the community, due to small holders being more closed in behavior and having less information, respectively (Figure 2).

4. The strategic factor analysis summary (SFAS) evaluation and possible solutions

4.1 SFAS' evaluation criteria

From the constraints faced by small holders and their causes as previously mentioned, we can understand what constraints are found in each system and the degree of seriousness of these constraints. The analysis of these constraints to find a plan and policy leading to possible solution was undertaken by means of the Strategic Factor Analysis Summary (SFAS) technique. The results are shown in Figure 3 (Turban and Meredith, 1981). In the SFAS, three criteria were used for evaluation: immediate solution, difficult solution and expected usefulness. All of these criteria were measured in terms of the average

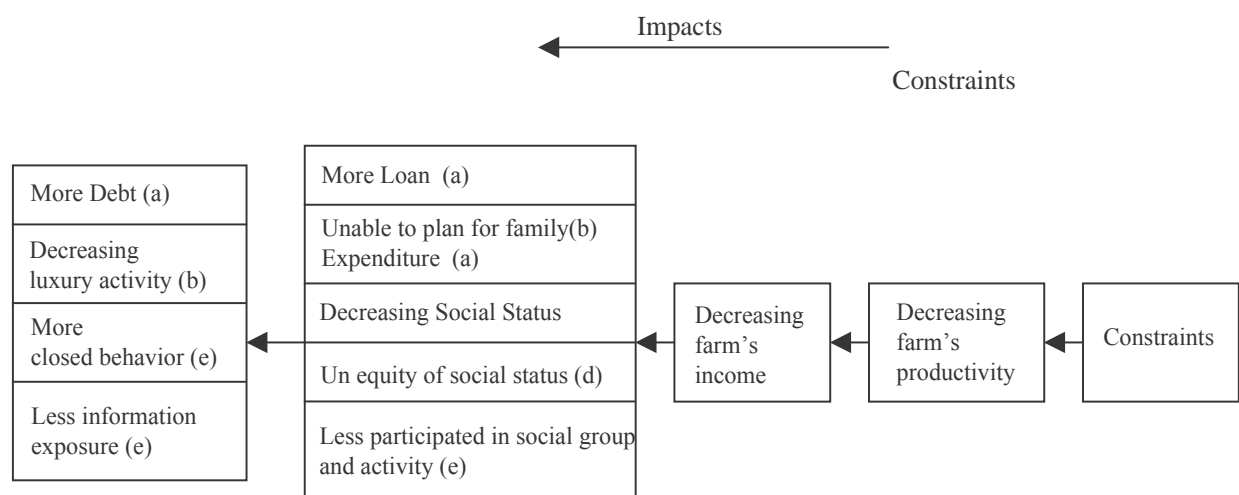


Figure 2 The impacts of farms' constraints on small holders' adjustment.

Sources : Problem Tree Analysis technique

of opinion of small holders, local officials and researchers, as given by means of an interval range as follows (Miah, 1993): (1) average (C) opinion between 1.00-1.80 meant never, or the lowest level, (2) average (C) opinion between 1.81-2.60 meant little, or low level, (3) average (C) opinion between 2.61-3.40 meant moderate or middle level, (4) average (C) opinion between 3.41-4.20 meant much or high level, and (5) average (C) opinion between 4.21-5.00 meant very much or the highest level.

The results were that in the immediate solution criteria, all of small holding systems have the high degree level of immediate solution (C between 3.41-4.20). It is indicated that the current constraints faced of all systems are important and necessary for solution and effect on decreasing farm's productivity. In the difficult solution criteria, it was founded that only small holding rubber integrated farming system has the moderate degree level of difficult solution (C = 2.61-3.40) otherwise, they have the high degree level of difficult solution (C between 3.41-4.20). Due to these constraints plan and policy constraints, the deficit of budget for solving the constraints is one of important limited factors. In the expected usefulness criteria, it was found that small holding rubber-Monocultured farming system and Small holding rubber-livestock farming system have the high degree level of expected usefulness (C between 4.20-5.00) if their constraints are solved the small holding rubber-fruit tree farming system, small holding rubber-rice farming system and small holding rubber-integrated farming system will have the high degree level of expected usefulness (C between 3.40-4.20), while the small holding rubber-intercrop farming

system has the moderate degree level of expected usefulness (C between C 2.61-3.40). From the SFAS evaluation, It can be said that the constraints faced, found in this research study, are actual and important constraints that effect directly on decreasing farm's productivity.

4.2 Possible solutions

In Figure 3, the constraints analyzed for setting can be the strategic plan and policy for development of small holding rubber-based farming system following and suggestion for possible solution.

4.2.1 Strategies for improving farm's productivity

The strategies for improving farm's productivity are: (1) providing a credit system to meet the cost of cultivation, including a subsistence incentive, (2) encouraging the establishment of community capital funds for investment, (3) providing soil and leaf analysis and fertilizer recommendation, as well as disease and pest control information, (4) providing infrastructures and financial incentives based on the socio-economic position of the small holders in general, or in specific areas, such as land acquisition schemes, (5) providing information on high-yield varieties and other modern planting techniques, (6) strengthening research and development and dissemination of this information to small holders through exchange agents and local community groups, (7) improving access to water through water resource infrastructure assistance and management, (8) encourage exchange agents of technology transfer to be more supportive of smallholders, (9) improving the rubber-processing technology available to

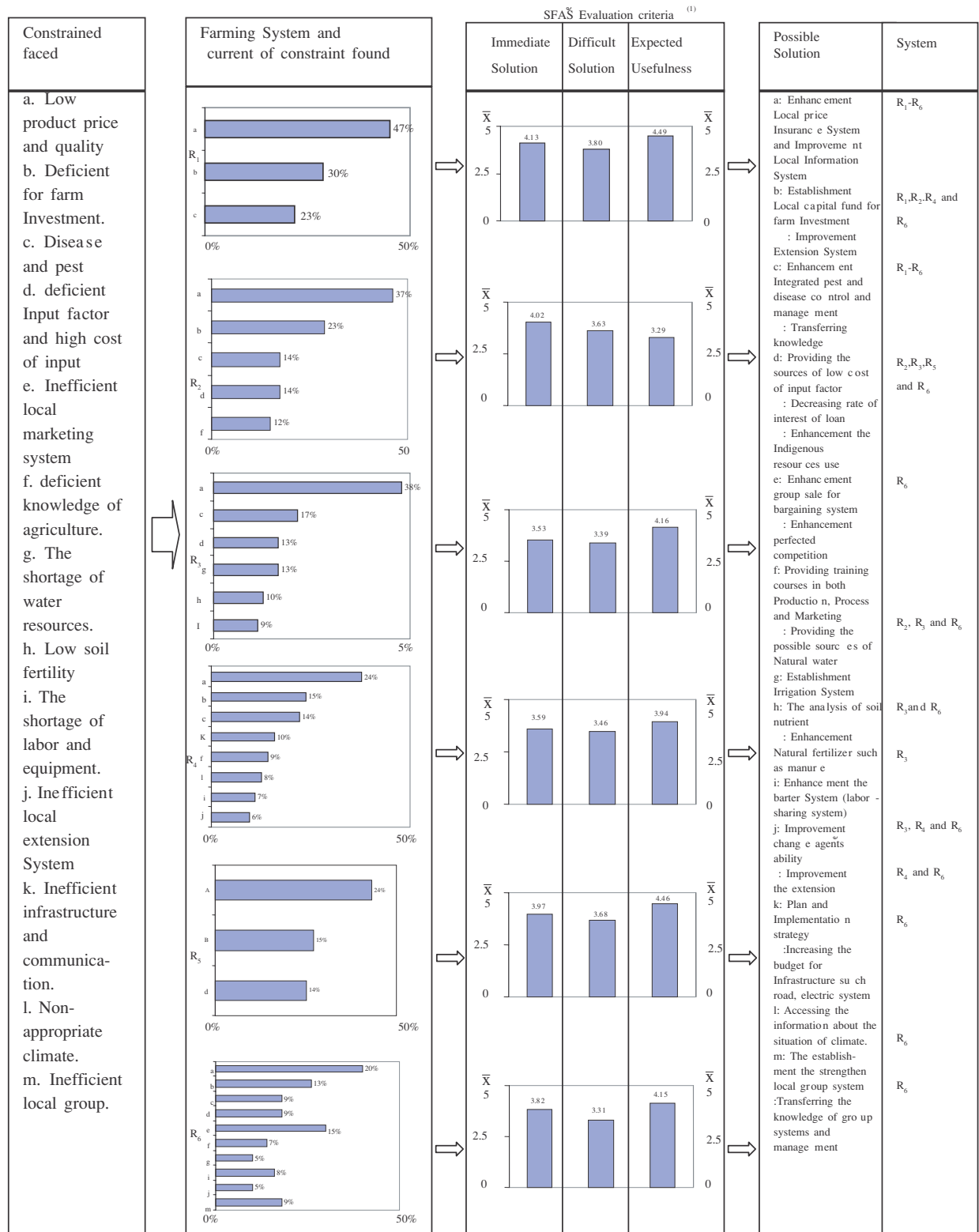


Figure 3 SFAS' evaluation and possible solution of rubber-based farming system.

Sources SFAS' technique (Turban and Meridith, 1981) and PRA techniques

smallholders so they can provide a better grade of rubber sheet, and (10) encourage the establishment of value-added businesses in local communities to process some of the rubber there, and thus increase overall community prosperity.

4.2.2 Strategies for improving small holders' ability and potential

The strategies for improving small holders' ability and potential include (1) emphasizing the needs of small holders and encouraging the improvement of small holders' ability, aspiration, skill and knowledge by providing appropriate training courses such as breeding technique, harvesting techniques such as tapping, marketing and processing, and (2) motivating small holders' to become more self-reliant.

CONCLUSION AND RECOMENDATION

Small holders faced many constraints in trying to maintain a profitable farming operating such as low production price, deficient production knowledge, disease and pests, and insufficient capital for farm investment. Low production price has been the largest single problem for small holders in all small holding systems. These various problems all have an effect on the small holder's living style and status in their community. Following the economic arises, small holders have had to adjust their attitudes towards their traditional ways of farming and doing business, to become more efficient, leading them to take steps to (1) improve their managerial ability

through government training courses, (2) be sure they access current information on their farming activities, and (3) join local farmers groups to share knowledge and bargain collectively when necessary with a stronger voice. Various possible solutions are offered to overcome these constraints, in certain cases, and public policy options also suggested helping small holder can make the change. What is certain is that rubber will remain an important commodity in the world, and Thailand is an important world supplier of this commodity, so with a positive attitude and willingness to work to adapt, the rubber industry can remain an economic strength in southern Thailand.

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