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COPING STRATEGIES OF RUBBER FARMERS IN BUENG KAN, THAILAND DURING A PERIOD OF PRICE FLUCTUATIONS

Piyanead Neadkhun, Yos Borisutdhi, Suchint Simarak, and Chaiteera Panpakdee[*]

Faculty of Agriculture, Khon Kaen University, Thailand

ABSTRACT

The purpose of this study was to analyze the coping strategies applied to mitigate the impact of rubber price fluctuations. To achieve this, 98 rubber farmers in Nonsa village located in the province of Bueng Kan were selected to determine their coping strategies and to identify the determinants influencing their decisions. The study reveals the existence of six coping strategies, all of which were aimed at strengthening their self-dependence in various forms. They minimize fertilizer costs by reducing the number of times they would apply it. The available household labor is engaged, while the costs to hire other labor to sufficiently handle production are lowered because some of the tasks, such as tapping, is amended from the traditional system of 2d/3 to the half-spiral (S/2). In addition, short cycle home-grown crops and livestock are introduced on unused lands to generate both a valuable food supply and manure. In brief, these coping strategies were developed to create an equilibrium between their household expenditures and the agricultural revenues to nurture the farmers' well-being when experiencing a state of economic hardship. However, to maintain these coping strategies against unexpected uncertainty, specific knowledge about how to build resilience should be creatively facilitated. Resilient rubber farmers are required to cope with all kinds of change to sustain their farms' functions, structures, and operations in the same domain.

[*]***Corresponding author:***
Chaiteera Panpakdee
chaitpa@kku.ac.th

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1. INTRODUCTION

Since 1997, the expansion of rubber cultivation as a cash crop has increased rapidly in North-eastern Thailand because of an attractive increase in rubber prices. This was due to the subsequent demand for numerous types of auto parts in prominent new economies, such as India and the People's Republic of China (Fujita, 2020). Furthermore, the cultivation of rubber stemmed from the North-eastern farmers' inspiration and motivation to rise from poverty. Previously, the cultivation of maize and cassava was insufficient to offer farmers sustainability in terms of attaining economic stability and environmentally friendly conditions (Thongpan, 2014). The amount of income derived from the two crops relies enormously on socio-ecological factors, such as land tenure, plantation size, labor, and natural phenomena (Prasara-A & Gheewala, 2018). Consequently, these factors have led some farmers to considerably increase their rubber production. This has

been proven by the fact that North-eastern rubber farmers alone cultivate more than 5,230,429 rai (836,868 hectares)[1] of rubber out of the total available agricultural land of 38,991,793 rai (6,238,687 hectares) (Office of Agricultural Economics, 2017).

Like other agricultural practices, however, rubber cultivation is taking place in an agricultural system, whose components have been dynamic (van Apeldoorn et al., 2011). This is especially true with regard to price volatility, which has fluctuated over time and has been induced by uncontrollable factors (Romyen et al., 2018). During the first decade of the 2000s, there was an economic rubber boom in which rubber prices reached a historical peak of THB 146/kg in 2001. Since then, prices have decreased severely to approximately one-fifth of their highest value, standing at THB 34.51/kg in 2008 due to the global market's cyclical demand and supply ("Looking Back at the Rubber Price for the Past 10 Years, Comparing the Prices Up and Down for All 3 Governments", 2017; Arunmas, 2018). According to multiple experts, this decline occurs frequently. The domestic supply of natural rubber has exceeded the demand of those industrial countries. Furthermore, although Thailand is the world's largest rubber manufacturer, it lacks the bargaining leverage to control rubber prices because several neighbouring countries, such as Myanmar, Malaysia, Vietnam, and Indonesia, are prepared to compete as substantial exporters in the global rubber market (Nicod et al., 2020). These situations are acute concerns for Thai rubber farmers. When they participate in growing such a perennial crop that requires great financial and temporal investments, and one that is cultivated without the promise of predictable earnings, they will inevitably have to confront risks (Jitpakdee et al., 2021). Earning additional income from other crops is quite arduous since most of them have previously produced rubber using a method of rubber mono-cropping system (RMCS) (Office of Agricultural Economics, 2017).

Bueng Kan is a province in North-eastern Thailand, whose economy is predominantly based on rubber production. Most farmers grow rubber as a main cash crop for sale, while rice strains are cultivated for food security (Thongpan, 2014). In terms of distributing marketing and up-to-date technologies for farm management, this province has been facilitated by the provincial administrative organizations. This is substantiated by local rubber farmers' yielding around 41–60 kilograms of latex per day, mostly through trees of 10–20 years tapping age. In other words, around 208,058 tons of rubber production is generated on average per year from 876,355 rai (140,216.8 hectares) of the province's total area (Kokkong Sub-district Municipality, 2017). However, rubber farmers in the region are unable to escape the impacts of price fluctuations. For instance, they faced unsatisfactory prices in 2016. Rubber prices were considerably below 46 baht per kg, down significantly from 80 baht per kg in the same period the year before (Arunmas, 2018). As a result, their revenues remain unpredictable, and this situation is not likely to change due to a combination of downward pressure on prices and the effects of ongoing climate change (Tongkaemkaew & Chambon, 2018). The Board of Investment of Thailand (BOI) attempted to help them by investing in concentrated latex manufacturing, considering this a worthwhile investment. The outcomes were still unsatisfactory (Chuaibudda et al., 2016). Some other circumstances have also created losses to farmers. Apart from natural disasters and price fluctuations, the increasing cost of production and a shortage of skilled workers has posed a problem for rubber farmers. This has led to the adverse result of stabilizing income, and some have not earned enough remuneration to sustain their rubber production (Duangmanee et al., 2022). Interestingly, in light of the reduced revenues, the number of Bueng Kan rubber farmers has not decreased like in other rubber-growing regions of Thailand. Conversely, the amount of land, which is used for rubber plantations, has increased considerably (Kokkong Sub-district Municipality, 2017). This phenomenon is thus worth investigating.

Conceptually, this study focuses on the coping strategies of the Bueng Kan rubber farmers rather than their adaptations and makes a clear distinction between their dependence upon the time scale. In this respect, their empirical actions used to cope with the impacts of price fluctuations, excluding emotion-focused coping strategies, are principally investigated. This type of study is vital. It provides a specific set of practices to overcome and reduce economic stress. These practices are also useful to increase resilience ability, whose concept is fundamental to sustainable development (Panpakdee et al., 2021). It helps rubber farmers learn how to properly handle price fluctuations and their consequences in rubber production. To address the study questions, the objectives were as follows: (1) to comprehend the agricultural context of the rubber farmers in Bueng Kan Province; and (2) to examine the coping strategies of the rubber farmers and their determinants to cope with the impacts of rubber price fluctuations.

[1] 1 hectare = 6.25 rai (Food and Agriculture Organization of the United Nations (FAO), 1999).

2. RESEARCH METHODOLOGY

2.1 Theoretical framework of this study

Academically, many definitions of a coping strategy have been identified (Mutaqin, 2019). For the present study, coping strategies are defined as responses of rubber farmers to minimize, solve, or reduce the impacts of perceived threats (Berman et al., 2012). Emotional states such as thoughts and mindfulness practices have been ignored in an endeavor to make the findings useful in terms of formulating a tangible set of actions against fluctuations in rubber prices.

Because there are differences in risk attitudes among people, in this study, we have adopted the theory of reactive strategies as the main instrument. This theory is associated with problem-focused solutions. Coping strategies are defined as efforts to deal with past or present stressful situations to reduce some of the negative consequences (Brannon & Feist, 2009). Therefore, this theory can illustrate rubber farmers' short-term and long-term strategies which are implemented after the onset of threats (Berman et al., 2012).

2.2 The study area and sample size

To achieve the study's main objective concerning rubber farmers' coping strategies, a homogenous sampling method comprising a population group from Nonsa village in the Kokkong Sub-district of Mueang Bueng Kan District, Bueng Kan Province was employed with additional expert consultations (Figure 1) (Palinkas et al., 2015). This was because the village contained the largest area of rubber plantations in the province. Of the 333 households, 324 households (97.30%) were full-time rubber farmers. The village has relied mainly on rubber production thanks to the agro-ecological conditions, such as its location by the Mekong River and the harvest costs for rubber being lower than for rice farming (Thongnoi, 2019). The prosperity of rubber production is also possible because of extension officers' support and rubber factories within the province that constantly monitor the rubber farmers' yields (Arunmas, 2018). Furthermore, they have all had at least 7 years plantation related experience (Kokkong Sub-district Municipality, 2017). This level of farming experience was determined to be adequate to alleviate the subjective conditions during the investigation (Babbie, 2021).

The determination of the sample size relied upon the table of expected observed cases from a given population. This table is established by the Department of Agricultural Extension for recommending the statistical sample frame if a small population size is found (Department of Agricultural Extension, 2013). Because the population size was less than 1,000, a sample proportion of approximately 15–30% was recommended (Taherdoost, 2017). As a result, 98 out of 324 rubber farmers were identified to be the units of analysis.

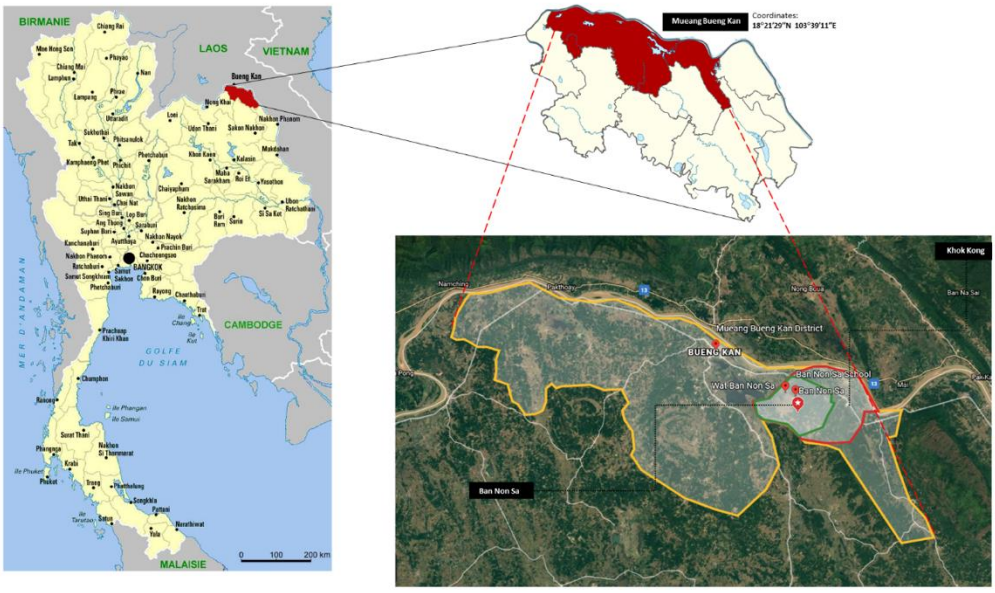

Figure 1: The Study Site, Nonsa Village, Kokkong Sub-district, Mueang Bueng Kan District, Bueng Kan Province

2.3 Data collection

The technique of rapid rural appraisal (RRA) was used to gain the first insights into the village's socio-economic context during the period of mid-2017 to early-2018 (Chambers, 1994). This was implemented in the form of semi-structured questions delivered through focus group discussions. The local extension officers served as a means of support by effectively engaging people to ensure consistency across the responses (Minichiello et al., 2008). Afterward, a complementary survey followed the discussion to collect further data, which was facilitated using a questionnaire. The questionnaire was developed with the following: 1) guidance from published literature, 2) information obtained from the RRA, and 3) consultations with experts, who helped to design the initial draft. The initial draft was pre-tested with 25 rubber farmers from the Si Wilai District of Bueng Kan and was then further adapted to improve its validity and reliability.

It should be noted that the questionnaire was specifically designed to collect primary data in an agricultural context, including coping strategies and the connected determinants, which were being utilized to mitigate the effects of rubber price fluctuations. Therefore, the rubber farmers' socioeconomic content (i.e., their ages, their annual income from different sources, and their memberships in farmers' associations) were excluded to reduce respondent fatigue.

2.4 Data analysis

The data from the questionnaire were analyzed in two parts. Regarding quantitative data, Microsoft Excel was utilized to compute the descriptive data in terms of means and percentages (Taherdoost, 2017). Meanwhile, the inductive thematic approach was used for the qualitative data about coping strategies (Braun & Clarke, 2006). This approach is helpful in terms of interpreting the information and themes in the context of coping theories in agriculture, and classifying coping strategies from adaptation, which people often use interchangeably in the context of disaster response (Bennett et al., 2016). Consequently, a summary table was developed of each theme of coping strategy using appropriate words or verbatim phrases.

3. RESEARCH FINDINGS AND DISCUSSIONS

The findings of the research objectives are presented in 3 parts: (1) the general characteristics of the rubber farmers in Nonsa Village; (2) the agricultural contexts of the rubber farmers in Nonsa Village; and (3) the coping strategies of the rubber farmers and the determinants behind their strategies.

3.1 Rubber farmers' general characteristics

The Nonsa Village has 333 households with a total population of 917 persons. The population can be serially sorted into 460 males and 457 females (Kokkong Sub-district Municipality, 2017). Most are a local tribe called 'Thai Yor', 70.24%, followed by immigrants that migrated from Laos and other domestic tribes at 20.83% and 8.93%, respectively (Department of Cultural Promotion, 2018).

3.2 Rubber farmers' agricultural context

In the past, like for most people in North-east Thailand, this village planted wild rice in lowland areas, while upland zones were used to grow cassava and raise cattle (Department of Cultural Promotion, 2018). Unfortunately, efforts were often fruitless because their agricultural activities were exclusively dependent on seasonal rainfall (Kokkong Sub-district Municipality, 2017). To overcome this, the Rubber Authority of Thailand encouraged the villagers to convert their primitive cash crops from wild rice and cassava into rubber through the continual support of production inputs such as seeds, fertilizers, and available lands. Since then, especially from 1995 onwards, the planting of rubber has been predominant because it offers an income and profit per rai higher than the original plants (Kullawong et al., 2020). Oil palm was introduced to the village around 2005 as part of the Thai Government's objective to increase energy security through biodiesel (Somnuek et al., 2016). However, oil palm was cultivated by only a small group of villagers because of its moderate fit to the village's agro-ecological conditions (Kokkong Sub-district Municipality, 2017).

Now, there is only one major farming typology: the rubber and rice-based farming system. Holding a rubber-monoculture farming system has been practiced for income generation. The food security of households has been supported by local glutinous varieties cultivated in a different sector within the rubber plantations. Although they are currently rubber farmers, they could still potentially grow rice because of their ancestors' rice farming experience. Growing palms were partially seen in the study area. Palm production is still considered an economically valuable plant that could offer an alternative source of income, especially during periods of decreased rubber prices (Kokkong Sub-district Municipality, 2017). These statements can be substantiated by the data in Table 1. According to the total of 3,385 rai (541.60 hectares) examined in the study

area, rubber trees of the clone RRIM 600 were predominant, with most of the farmlands (approximately 76%) transformed into commercially orientated rubber plantations. Apart from this, two other crops, rice and oil palm, were being grown on 738 rai (118.08 hectares) and 75 rai (12 hectares), respectively (Table 1).

Table 1: The Size of the Land Used for Agricultural Production (Questionnaire Survey, N=98)

Types of Crops	Size of the Land Used (ha)	Percentage (%)
Rubber	411.52	75.98
Glutinous rice	118.08	21.80
Oil palm	12	2.22
Total	**541.60**	**100**

The rubber plantations had been planted on lands approximately 150 to 160 meters above sea level, so that they could be conveniently nourished by rainfall (Choenkwan et al., 2014). The rubber farmers indicated that most of the knowledge they had acquired about rubber growing had been gained through their trials and errors along with the Rubber Authority of Thailand's training services. Meanwhile, rice and oil palm had mainly been grown in lowlands without water being supplied by irrigation systems. At the time of the study, two rice varieties were being cultivated, glutinous rice 6 and glutinous rice 12 (Nongkai 80), to achieve a commercial goal of principally growing for self-consumption. The surplus products had either been sold or dispensed to relatives and friends. In the case of oil palm trees, they had recently been introduced on the village's earthen dykes to substitute with cassava, which had proven to be economically unviable.

3.3 The rubber farmers' coping strategies and the determinants behind them

According to the survey data, six coping strategies had been adopted during periods of fluctuations in rubber prices (Table 2). These were the mechanisms they had used to sustain the quality of their livelihoods in the face of frequent variations in the price of rubber. In addition, distinct motives tied with all coping strategies are noted. The mean rank of the motives was implemented to empirically present which motive for each type of coping strategy was most cited by rubber farmers (Braun & Clarke, 2006). This was an attempt to collect all rubber farmers' various motivations into a consensus.

The adoption of the coping strategies shown in Table 2 was based on the rubber farmers' flexibility influenced by situational specificity and individual determinants. In general, most rubber farmers performed just one of the other coping strategies to deal with the situation's specific demands faced. Meanwhile, some rubber farmers used multiple coping strategies at a single time if it was seen practicable to reduce the impact of price fluctuations. In this study, the coping strategies are amalgamated for presentation convenience.

Table 2: A Summary of the Coping Strategies Used by the Rubber Farmers (Questionnaire Survey, N=98)

Contents	Coping strategies		Motives
	Periods of increased price	**Periods of declining price**	
1. Adjusting the size of rubber production land	Gradually increasing	Halting	Alleviating the vulnerabilities caused by the lack of cash flow
2. Allocating the concentration of external labour	Increasing the use of hired labour	Decreasing the use of hired labour and relying more on household labour and relatives	Greatest possible reliance on the availability of household labour to decrease the employment costs
3. Adjusting the frequency and quality of fertilizers	Applying premium quality fertilizers bi-annually (average price = 913.30 THB per sack)	Applying decent fertilizers annually) average price = 672.90 THB per sack)	Controlling the number of fertilizer applications to fit the decreased level of market participation. Maintaining rubber production activities fitting with the available revenue
4. Adjusting the date of tapping	71.1 days per year	35.5 days per year	Maintaining rubber production activities fitting with the available revenue
5. Diversifying the farm's more productive resources	Principally growing rubber, rice, and oil palm trees	Additional exploitation of livestock (freshwater fishes and chickens), home-grown vegetables, and non-timber forest products	Receiving daily needful sources by greatly enhancing the farm's biodiversity and exploiting the non-timber forest products
6. Allocating the household expenditures	Making shifts in expenditure	Saving in a radical manner	Mitigating the effects of income shock

3.2.1 Adjusting the size of rubber production land

During economic downturns, reducing the size of rubber plantations was a rudimentary coping strategy. It was an attempt to alleviate the financial vulnerabilities influenced by the lack of income regarding hiring labour to manage the production tasks, such as weeding and tapping. Furthermore, the limiting of land expansion was shaped by achieving a satisfactory state of balance within the needs of the rubber farmers' families. Rather than making risky agricultural investments, savings and/or incomes would be spent on consumer goods and on educational expenses to please the needs of the household members.

The rubber farmers, especially those who had available unused land and had sufficient savings to mobilize enough labor, had been able to gradually increase the size of their rubber plantations. They were aware that this determination was based on uncertainty due to the annual fluctuations in rubber prices. Moreover, the actions that they were taking appeared to commit a large share of their resources to one activity, which might lead to nothing if environmental changes occur (Olaleye, 2010). However, they considered this practice to be an example of 'no-regret and fewer risk strategies,' and cited that every decision often has unexpected consequences that might be either positive or negative (Holland, 2006). Therefore, increased investment in rubber production was considered to be less risky because the transaction costs from that expansion could indeed be paid back to them in the future.

3.2.2 Allocating the concentration of labor

In years when rubber prices were declining, the number of laborers who were allocated to farming tasks tended to be lower than in the period of increasing prices, reducing from 59.20% to 36.73% (Table 3). Meanwhile, during this tough period, more dependence on the availability of household labor and relatives was visible, increasing from 3.10% to 11.80%. The incremental demand was not solely caused by the greater convenience when negotiating remuneration. They were also dedicated workers, who, when undertaking difficult tasks in the past, had been prone to sacrificing themselves and working in ways that hired laborers were unlikely to accept. Nevertheless, during this period of economic constraint, external labor was still required by some rubber farmers. Due to their obligations in off-farm activities, several family workers may have often failed to complete the production tasks in the required time. Conversely, when production increased in response to favorable rubber prices, external labor was engaged to assist with the increasing workload (Poungchompu & Chantanop, 2015). This statement was verified by the premise that extra employment had risen from an average of 36.73% to 59.20% (Table 3).

Table 3: The Rubber Farmers' Model of Labor Employment (Questionnaire Survey, N=98)

Model of labor employment	Period of increasing prices (%)	Period of declining prices (%)
1. Employment status		
1.1 Employment	59.20	36.73
1.2 Unemployment	40.80	63.27
Total	**100.00**	**100.00**
2. Types of labor		
2.1 Dependence upon household members and relatives	3.10	11.80
2.2 Dependence upon hired labor	96.90	88.20
Total	**100.00**	**100.00**

3.3.3 Adjusting the frequency and quality of fertilizer applications

The frequency and quality of fertilizer applications were adjusted to be appropriate for the varying market conditions. When rubber prices were increasing, a variety of brands of premium fertilizers costing 913.30 THB per sack were applied twice a year, with the average number of sacks being 24.50. The rubber farmers had considered its abundance of nutritious substances to be effective in yielding a considerable volume of latex (mature rubber trees), or in the case of baby rubber trees, accelerating the growth rate.

Although they had been able to easily access credit to procure fertilizers, due to the support of agricultural cooperatives and salesmen (Kullawong et al., 2020), the frequency and the quality of the fertilizers being applied altered when the rubber prices decreased to a significantly lower level, such as below 50 THB per kg. Then, the number of applied fertilizers was reduced to 23.2 sacks per year. In fact, the fertilizers, which on average cost 682.00 THB per unit, were utilized once a year only after the rubber prices had fallen. Moreover, the use of top-dressing fertilizers, such as rock phosphate, which encourages seedling growth at the nursery stage, was eliminated since it was not ultimately required (Waizah et al., 2011). According to various literature, although the quantity and quality of rubber production are based on the proper use of fertilizer, the adjustment of the frequency and grade of fertilizers is acceptable due to two important reasons. First, fertilizer is one of the most expensive expenses in rubber production. Their short-term and immediate concern at that time must be the household's financial security to maintain their welfare instead of the volume of rubber yield

supplemented by various types of fertilizer. Second, excessive use of fertilizer does not guarantee the satisfactory yield of rubber plantations; it guarantees the reduction of living organisms at all levels in that ecosystem (Kullawong et al., 2020). In general, NPK fertilizer with ingredients 16-8-4 is recommended to be applied yearly at around 0.2–0.4 kilograms/plant for rubber trees aged less than 3.5 years. In fact, the NPK fertilizer has been applied throughout the rubber trees' productive lifespan (Damrongrak et al., 2015). Therefore, the main factor driving the intensive use of fertilizer among general rubber farmers is motivated by the relative lack of experience in rubber farming instead of academic recommendations (Chambon et al., 2018).

3.2.4 Adjusting the date of tapping

Similar to other rubber farms in this area, the tapping system frequency had been on a one third-spiral (2d/3): cutting with the frequency of 2 days in tapping followed by one day of tapping rest. This tapping model was selected because it enabled them to exploit the maximum benefit in a short time, despite the fact that it yields only a moderate amount of latex and creates a short life cycle for the plantation (Poungchompu & Chantanop, 2015). However, the tapping system of 2d/3 was adjusted to become a half-spiral (S/2) when rubber prices declined by 7.1% (Table 4). The change was imposed for two main reasons. First, hiring labor for rubber tapping is one of the two most costly production expenses on rubber plantations (Burannasarn et al., 2015). The second reason is a consequence of the first: reducing the frequency of tapping is the simplest technique to achieve an equilibrium between the erratic rubber prices and employment costs.

Nevertheless, 92.90% of the rubber farmers continued to use the original system because rubber from their plantations was their only economic crop. Also, the density of rubber trees and the number of mature trees were compatible in terms of the minimum number of labor required with the available household labor. This refers to the fact that their farms did not require help from external workers to manage production.

Table 4: Rubber Farmers' Tapping System (N = 98)

Types of tapping systems	Periods of increasing prices (%)	Periods of declining prices (%)
A half-spiral (1d/2)	0.00	7.10
A one third-spiral (2d/3)	100.00	92.90
Total	**0.00**	**100.00**

3.2.5 Diversifying the farm's more productive resources

Enhancing a farm's diversification was a major coping strategy which has been employed to relieve the stress of fluctuations in rubber prices. Home-grown vegetables and livestock (chicken and pigs) were introduced in unused areas. The types of vegetables and livestock has remained consistent for years with the only variation seen in the amount of farming. The livestock has been fed within both mature and immature rubber areas by free-range grazing. However, in the areas used to nurture livestock, especially in immature areas, the rubber plants had to be above 2 to 3 meters in height and at least 24 months old before livestock raising could commence, preventing trampling damage from livestock. In this respect, free-range grazing was not only productive to conserve food and promote the consumption of a much more diverse diet than if they were raised in confinement, but it was also beneficial in solving a deficiency of farm labour (Mutaqin, 2019). Meanwhile, home-grown vegetables were cultivated using readily available local nutrient resources such as livestock dung, food waste, and plant litter. Planting home-grown vegetables were reasonable to adopt because it required low assets of labour, funds, and water volume (Aditto et al., 2012).

When the rubber farmers were questioned about their indifference to their diversified pattern, they indicated that the adherence to such livestock and home-grown vegetables was reasonable. It had been specifically adopted to produce more nutritious resources and make them available to households, without the provision of spreading risks (Kummer et al., 2012). Furthermore, although raising livestock and producing home-grown vegetables has been a temporary cycle of agricultural production, they were adequate in generating revenue options to solve the short-term economic pressures.

3.2.6 Allocating household expenditure

The decreased spending on goods and commodities was hailed as one of the key coping strategies by the farmers. Non-essential activities, such as purchasing new clothes and dining out, were reduced to meet their budget requirements, which are naturally associated with their rubber production (Thongpan & Nuengchamnong, 2019). They affirmed that those previously mentioned activities were considered extravagant, especially during tough times (Aditto et al., 2012).

4. CONCLUSION AND POLICY RECOMMENDATIONS

The price fluctuations of rubber pose a serious threat to the livelihood of rubber farmer because this activity is their major source of income. Consequently, various coping strategies have been used to deal with the uncertainty, such as gradually reducing the size of their rubber plantations, as well as their demand for hired workers. Moreover, local and household resources had been further exploited to gratuitously receive consumer goods. Importantly, the number of days allocated for tapping had shifted from 71.1 days per year to 35.5 days per year. Presently, such fluctuations may be even greater because of the Covid-19 pandemic, which could have created both positive and negative outcomes due to the lockdown (Ginger, 2021).

In this study, the most common coping strategies are the six practices shown in Table 2. The number and selection of the coping strategies are significantly influenced by the rubber farmers' characteristics, such as the amount of labor, land size, and experience. For instance, most rubber farmers were aware of the benefits proposed by diversifying crop-livestock farming systems. It was difficult to adopt the method of free-range grazing, however, they were limited in land size and management knowledge. The livestock numbers have to be proportional to land size to ensure there is enough food for all the livestock. In addition, the adjustments in the dates of tapping and the size of rubber production land during a period of low rubber prices may affect their livelihoods in negative ways, such as forcing them to borrow money. To tackle these constraints, Thailand's related organizations such as the Department of Agricultural Extension and the Bank for Agriculture and Agricultural Cooperatives (BAAC) should be more involved in the process. Many studies have revealed that farmers who have access to credit services and extension consultations are more likely to use better coping strategies. Better access to credit and information sources relaxes liquidity constraints and thus enhances the number of creative coping strategies for dealing with the negative effects of various disturbances (Hassan & Nhemachena, 2008; Berman et al., 2012; Boto, 2013). Meanwhile, the other four coping strategies are popular because they are practices based on the rubber farmers' resources, knowledge, and labor capital.

Interestingly, if the six coping strategies are analyzed in detail, especially through a lens of resilience, whose concepts are the foundation of both coping strategies and adaptations (Folke et al., 2010), all strategies are based on the rubber farmers' attempts to create self-reliance and to maintain stability. This is not surprising. According to numerous studies, most farmers are at some point reluctant to seek external help because they know they can handle their own problems (Olaleye, 2010; van Apeldoorn, 2011; Kummer et al., 2012). However, obtaining help from relatives is not considered major. They are not perceived as being external because they are bonded legally and/or biologically (Mehar et al., 2016). Therefore, relying upon being rescued by relatives is safer and mitigates the pressures of having to pay high wages and possibly provide food and beverages in financially tough times (Thongpan & Nuengchamnong, 2019). The effective allocation of existing labor on different tasks and the amount of work carried out has been imperative when livelihood stability and nourishment of social relationships are the goals, but household labor must always be considered (Burannasarn et al., 2015). Husbands and/or wives as the owners have to handle the significant activities of rubber production. Meanwhile, their offspring should be considered as temporary assistants who can help with unskilled duties such as watering, weeding, and fertilizing, because most of them have educational duties to manage (Nicod et al., 2020). If the activities cannot be done efficiently by such household labor, then, relatives are occasionally employed (Tongkaemkaew & Chambon, 2018). In other words, activities of rubber production must be partially dependent on relatives. Theoretically and practically, they are seen as external workers who may have their own agricultural and daily responsibilities to deal with (Somboonsuke et al., 2015).

Although the rubber farmers are capable of self-reliance, they are unable to handle every problem that occurs on their farms. In particular, some problems may require infrastructural support and knowledge to manage the complexities of agriculture (Holland, 2006). Therefore, based on the findings of this study, recommendations can be made.

1. Although it is not highlighted in the results, operating rubber plantations is still a profession that most Thai farmers adopt to support their families. Case-study based research is preferred when exploring the coping strategies that are employed as farmers face price fluctuations that exist in the domestic rubber industry. These approaches, which were built from actual experience, are vital when farmers need to implement precise solutions to deal with such economic constraints.

2. The government and related organizations should be active in distributing essential information and learning approaches which are aimed at building resilience. The approach of building resilience has been proven to transform all kinds of uncertainty into creative risks, which are needed to adapt, and can empower resilient individuals to maintain the functions, structures, and operations of their farms in the same domain (Folke et al., 2010). Nevertheless, such processes must be prepared in an accessible package, which can be

comprehended by the rubber farmers. This emphasizes the necessity for narrowing the gap between the policymakers and the needs of the end-users, which is common in agricultural systems (Boto, 2013).

REFERENCES

Aditto, S., Gan, C., & Nartea, G. V. (2012). Sources of risk and risk ranagement strategies: The case of smallholder farmers in a developing economy. In N. Banaitiene (Ed.), *Risk management: Current issues* and challenges (pp. 449–474). IntechOpen.

Arunmas, P. (2018, January 6). Thailand battles for rubber price rebound: Indonesia and Malaysia join efforts to boost key commodity by withholding exports. *Bangkok Post*. https://www.bangkokpost.com/business/1391090/thailand-battles-for-rubber-price-rebound

Babbie, E. R. (2021). *The practice of social research* (15th ed.). Cengage.

Bennett, N. J., Blythe, J., Tyler, S., & Ban, N. C. (2016). Communities and change in the Anthropocene: Understanding social-ecological vulnerability and planning adaptations to multiple interacting exposures. *Regional Environmental Change, 16*, 907–926.

Berman, R., Quinn, C., & Paavola, J. (2012). The role of institutions in the transformation of coping capacity to sustainable adaptive capacity. *Environmental Development, 2*, 86–100.

Boto, I. (2013). *Brussels rural development briefings a series of meetings on ACP-EU development issues: Agricultural resilience in the face of crisis and shocks*. IFPRL. https://brusselsbriefings.files.wordpress.com/2009/02/cta-reader-30_agricultural-resilience-eng-rev-2.pdf

Brannon, L., & Feist, J. (2009). Health psychology: An introduction to behaviour and health (7th ed.). Wadsworth.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Burannasarn, C., Aditto, S., & Sriwaranun, Y. (2015). Production and marketing management of cup lump para-rubber farmers in Ban Kruat District, Buriram Province. *Khon Kaen Agriculture Journal, 43*(1), 734–737.

Chambers, R. (1994). The origins and practice of participatory rural appraisal. *World Development*, *22*(7), 953–969.

Chambon, B., Dao, X. L., Tongkaemkaew, U., & Gay, F. (2018). What determine smallholders' fertilization practices during the mature period of rubber plantations in Thailand? *Experimental Agriculture, 54*(6), 824–841.

Choenkwan, S., Fox, J. M., & Rambo, A. T. (2014). Agriculture in the mountains of northeastern Thailand: Current situation and prospects for development. *Mountain Research and Development*, *34*(2), 95–106.

Chuaibudda, N., Taweewat, P., & Taweewat, K. (2016). A feasibility study of investment on concentrated latex factoring in Amphoe Mueang Bueng Kan, Changwat Bueng Kan. *Journal of Management Science Chiangrai Rajabhat University, 11*(2), 133–147.

Damrongrak, I., Onthong, J., & Nilnond, C. (2015). Effect of fertilizer and dolomite applications on growth and yield of tapping rubber trees. *Songklanakarin Journal of Science and Technology*, *37*(6), 643–650.

Department of Agricultural Extension. (2013). *Nayobai Lae Naeo Patibat Dan Kan Songsoem Kan Kaset Pi Ngoppraman 2556* [Agricultural extension policy and practices in the fiscal year 2013]. Ministry of Agriculture and Cooperatives.

Department of Cultural Promotion. (2018). *Moradok Phumpanya Isan* [Isan wisdom heritage]. Department of Cultural Promotion.

Duangmanee, K., Tarapohn, P., Pruphetkaew, S., Busbongpaitoon, S., & Artthong, G. (2022). The need for para rubber crop insurance among farmers in Trang Province (Thailand). *Journal of Management Science Chiangrai Rajabhat University*, *17*(1), 1–22.

Food and Agriculture Organization of the United Nations (FAO). (1999). *The vegetable sector in Thailand: A review*. https://www.fao.org/3/AC145E/AC145E00.htm

Folke, C., Carpenter, S., Walker, B., Scheffer, M., Chapin, T., & Rockstrom, J. (2010). Resilience thinking: Integrating resilience, adaptability, and transformability. *Ecology and Society*, *15*, 20.

Fujita, W. (2020). The rubber boom assemblage and internalized friction: Attitudes of the government, NGOs, and farmers in northeast Thailand. *Southeast Asian Studies, 9*(3), 381–411.

Ginger, S. (2021, March 17). ZSL report reveals COVID-19 impact on natural rubber producers. *SPOTT*. https://www.spott.org/news/zsl-report-reveals-covid-19-impact-on-natural-rubber-producers/

Hassan, R., & Nhemachena, C. (2008). Determinants of African farmers' strategies for adapting to climate change: Multinomial choice analysis. *African Journal of Agricultural and Resource Economics, 2*(1), 83–104.

Holland, J. H. (2006) Studying complex adaptive systems. *Journal of Systems Science and Complexity* 19(1): 1–8. http://dx.doi.org/10.1007/s11424-006-0001-z

Jitpakdee, P., Putjorn, J., Sangchatkaew, S., & Putjorn, T. (2021). The participatory public policy formulation of civil society on chemical usage reduction in agriculture: The case of Nong Bua Lamphu, Thailand. *Humanities, Arts and Social Sciences Studies, 21*(3), 416–424.

Kokkong Sub-district Municipality. (2017). *Khomun Thuapai Khong Tum Bon Kokkong* [General information of Kokkong Sub-district]. *Kokkong Sub-district Municipality*. http://www.oic.go.th/FILEWEB/CABINFOCENTER57/DRAWER030/GENERAL/DATA0000/00000023.PDF

Kullawong, S., Aditto, S., Chambon, B., & Promkhambut, A. (2020). Farmer fertilization practices of mature rubber plantations in northeast Thailand during a period of low rubber prices. *Forest and Society*, *4*(1), 162–180.

Kummer, S., Milestad, R., Leitgeb, F., & Vogl, C. R. (2012). Building resilience through farmers' experiments in organic agriculture: Examples from eastern Austria. *Sustainable Agriculture Research*, *1*(2), 308–321.

Mehar, M., Mittal, S., & Prasad, N. (2016). Farmers coping strategies for climate shock: Is it differentiated by gender? *Journal of Rural Studies*, *44*, 123–131.

Minichiello, V., Aroni, R., & Hays, T. N. (2008). *In-depth interviewing: Principles, techniques, analysis* (3rd ed.). Pearson.

Mutaqin, D. J. (2019). Determinants of farmers' decisions on risk coping strategies in Rural West Java. *Climate,* 7(1), Article 7.

Nicod, T., Bathfield, B., Bosc, P. M., Promkhambut, A., Duangta, K., & Chambon, B. (2020). Households' livelihood strategies facing market uncertainties: How did Thai farmers adapt to a rubber price drop? *Agricultural Systems*, *182*, Article 102846.

Office of Agricultural Economics. (2017). *Kan Samruat Suan Yang Khanat Yai Lae Kan Chatkan Suan Yang Khanat Yai Nai Phaknuea Lae Phaktawanok Chiangnuea* [Survey of large rubber plantations and management of large rubber plantations in north and northeastern region]. https://www.oae.go.th/view/1/%E0%B8%A2%E0%B8%B2%E0%B8%87%E0%B8%9E%E0%B8%B2%E0%B8%A3%E0%B8%B2/TH-TH

Olaleye, O. L. (2010). *Drought coping mechanisms: A case study of small-scale farmers in Motheo District of the Free State Province* [Master's thesis, University of South Africa]. https://core.ac.uk/download/pdf/43167095.pdf

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research, 42*(5), 533–544.

Panpakdee, C., Limnirankul, B., & Kramol, P. (2021). Assessing the social-ecological resilience of organic farmers in Chiang Mai Province, Thailand. *Forest and Society, 5*(2), 631–649.

Poungchompu, S., & Chantanop, S. (2015). Factor affecting technical efficiency of smallholder rubber farming in northeast Thailand. *American Journal of Agricultural and Biological Science*, *10*(2), 83–90.

Prasara-A, J., & Gheewala, S. H. (2018). Applying social life cycle assessment in the Thai sugar industry: Challenges from the field. *Journal of Cleaner Production, 172*, 335–346.

Romyen, A., Sausue, P., & Charenjiratragul, S. (2018). Investigation of rubber-based intercropping system in southern Thailand. *Kasetsart Journal of Social Sciences, 39*(1), 135–142.

Somboonsuke, B., Wettayaprasit, P., Phitthayaphinant, P., & Jongrungrot, V. (2015). Potentiality and management of household labor in the smallholding rubber production system: A case study in a traditional rubber area of southern Thailand. *Kasetsart Journal of Social Sciences, 36*(2), 258–270.

Somnuek, S., Slingerland, M. A., & Grunbuhel, C. M. (2016). The introduction of oil palm in northeast Thailand: A new cash crop for smallholders? *Asia Pacific Viewpoint, 57*(1): 76–90.

Taherdoost, H. (2017). Determining sample size: How to calculate survey sample size. *International Journal of Economics and Management Systems 2*: 237–239.

Thongnoi, J. (2019). A dark future for Isaan's 'white gold' despite new rubber subsidies? *The Isaan Record*. https://theisaanrecord.co/2019/11/11/dark-future-for-isaan-rubber-farmers/

Thongpan, S. (2014). The incoming of rubber plantation and decision to return home: Case study of farm households in Huay Kong Basin. *Journal of Sociology and Anthropology, 33*(2): 73–102.

Thongpan, S., & Nuengchamnong, N. (2019). "From paddy field to rubber plantation": Change in livelihood and food security of farmer households in Mekong river area, Bueng Kan Province. *Humanity and Social Science Journal, Ubon Ratchathani University, 10*(1): 10–41.

Tongkaemkaew, U., & Chambon, B. (2018). Rubber plantation labor and labor movements as rubber prices decrease in southern Thailand. *Forest and Society, 2*(1), 18–27.

Van Apeldoorn, D. F., Kok, K., Sonneveld, M. P. W., & Veldkamp, T. A. (2011). Panarchy rules: Rethinking resilience of agroecosystems, evidence from Dutch dairy-farming. *Ecology and Society, 16*(1), 39.

Waizah, Y., Uzu, F. O., Orimoloye, J. R., & Idoko, S. O. (2011). Effects of rubber effluent, urea and rock phosphate on soil properties and rubber seedlings in an acid sandy soil. *African Journal of Agricultural Research, 6*(16), 3733–3739.

Yon Du Rakha Yang 10 Pi Thiphanm, Priapthiap Rakha Khuen Long Khong Thang 3 Ratthaban [Looking back at the rubber price for the past 10 years, comparing the prices up and down for all 3 governments.] (2017, November 13). *Thairath*. https://www.thairath.co.th/business/economics/1124949