

## PROMOTING FARMS HOUSEHOLD TOWARDS SUSTAINABLE AGRICULTURE OF LOWER CENTRAL PROVINCE THAILAND

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### Abstract

Most Thai farmers cultivate monocultures with difficult to control quality, quantity, and price. Product prices are low with high production costs. This causes farmers to become indebted and poor. Sustainable agriculture is a concept that helps farmers to be self-reliant and reduce poverty. The objectives of this research are threefold: 1) to examine the current levels of government policy, farmer characteristics, financial support, water management, and sustainable agriculture; 2) to determine the causal influence of government policy, financial support, water management and farmer characteristics on sustainable agriculture; and 3) to propose guidelines for encouraging farm households to adopt sustainable agricultural practices. Both quantitative and qualitative research methods were used in this study. In the quantitative study, the sample group comprised 300 members of rice-growing farm households. The instrument utilized was a survey questionnaire. The data was analyzed using a structural equation model. In the qualitative study, in-depth interviews were conducted with three key informant groups. There are a total of 18 individuals, including 6 government officials, 6 exceptional national farmers, and 6 rice farmers.

The results indicate excellent water management, solid financial support, very helpful government policies, highly suited farmer characteristics, and high degree of sustainable agriculture. It is also found that water management, financial support, government policies, and farmer characteristics have direct effects on sustainable agriculture at 0.05 level of significance. These findings lead to the following recommendations for farm households to implement sustainable agriculture. Firstly, farmers should have access to an adequate agricultural water management system. Secondly, farmers should have easy access to financial resources. Thirdly, clear government policies should be established to encourage, assist, and support farmers in adopting sustainable agricultural methods. Lastly, farmers should receive ongoing education on sustainable farming practices. In order to make farmers change their attitudes to see the benefits of sustainable agriculture for themselves and their families, the government and related

parties need to accelerate incentives for farmers to realize the benefits of transforming monoculture farming into more sustainable agriculture .

**Keyword:** Sustainable Agriculture/ Farms Household/ Water Management/ Government Policy

## Introduction

Thailand is an agricultural country, it is known and recognized by the world as one of the world's kitchens. Most farming is monoculture, seasonal, the frequency and severity of the disasters that occurred. Thus, affecting farming, the uncontrolled output in each production cycle has resulted in a delay in the growth of the Thai agricultural sector. Instead, costs are likely to continue to rise, the price of many agricultural products has an average value of negative (Kittisak Thongmethip, 2021). Repeated monocultures in the same area result in low yields, but high risk (high risk, low return), in particular, plants are at risk of having a high supply surplus in the global market. Farmers therefore have to bear the ever-higher cost of production. Lower net income, there is a lot of debt. This is in contrast to the government's efforts and budgets that have been thrown into the agricultural sector in large numbers every year (Somrasmi Chantharat et al., 2019). Apart from that, Thai farmers are smallholder farmers, it has a smaller number of household members and has a higher average age, the proportion of workers over the age of 60 is increasing. In 2018, the proportion of farmers over the age of 60 in Thailand's agricultural sector reached 46%. In addition to age, land ownership is also a major problem because more than 50 percent of farmers have less than 10 Rai of land. Farmers with more than 20 acres of soil account for only 20 percent and only 42 percent of farmers have access to water resources (Information and Communication Technology Center; Department of Agricultural Promotion, 2020).

Bank of Thailand's 2017 Household Economic and Social Condition Survey 2017 Pointing out the severity of income inequality within occupational groups, it was found that agriculture is a profession that should be taken care of first. This is because income inequality is highest. At the same time, there are below average cases and it is the occupation of most households of Thai kitchens. Agricultural households have an average net income of 16,000 baht per month, of which 60 percent have a net income per month below the occupational average. In addition, farmer households face a condition where the head of the household is older and less educated, which can hinder their ability to raise income. As evidenced by the main earners of households, Farmers range in age from 40 to 60 years. While the level of education of farmer households does not exceed the elementary level. Farmers over the age of 85 still have an average debt of hundreds of thousands of Baht. (Nattapat Kingnet and Natnari Maneejak, 2019).

Problems and obstacles arising from Thailand's agricultural sector, it reflects that conventional farming cannot continue. Modification of production systems that generate higher incomes sustainably, it is an income that can be used to adequately sustain one's own and families' livelihoods. As well as reducing the cost of farming, be more self-reliant, as well as reduce dependence on natural water. The Sustainable Agriculture concept is therefore used as part of the solution to the problem.

It focuses on 5 main farming systems, comprising organic agriculture, New Agricultural Theory, integrated agriculture, Natural Agriculture and Agroforestry (Office of the National Economic and Social Development Board, Prime Minister's Office, 2017). Sustainable Agriculture is a model for farmers to apply in the production process, using techniques that are, or adapt as part of the natural process of that locality. There are three basic principles: 1) economic sustainability 2) Environmental sustainability and 3) Social sustainability (Navachiwan Foundation, 2012). However, the shift of production to Sustainable Agriculture. There are many factors involved. According to the review, factors affecting Sustainable Agriculture include Government Policy, Farmer Feature, Financial Support and Water Management.

### Research Objectives

1. To study the level of government policy, Farmer Feature, Financial Support, Water Management and Sustainable Agriculture
2. To study the influence of causal factors on government policy, Farmer Feature, Financial Support, Water Management and Sustainable Agriculture
3. To propose ways to promote farmer households towards Sustainable Agriculture.

### Research Hypothesis

1. Government Policy has a direct influence on Sustainable Agriculture.
2. Farmer Feature has a direct influence on Sustainable Agriculture.
3. Financial Support has a direct influence on Sustainable Agriculture.
4. Water Management has a direct influence on Sustainable Agriculture.

### Research Methodology

**Quantitative Research:** Among the examples where members of farmers' households engaged in farming in the Lower Central region of 17 provinces, 300 people, Obtained by systematic randomization. The tools of the research are questionnaires on government policy, financial support, water management, farmer feature and sustainable agriculture factors, 75 items. The IOC found that the individual IOC values ranged from 0.60-1.00 and found the confidence of the questionnaire. It was found that the confidence value of the entire questionnaire was .985. By using descriptive statistics and inference statistics by analyzing structural equation models.

**Qualitative Research:** The key contributors were 1) 6 public sector executives, 2) 6 outstanding national farmers, and 3) 6 farmers engaged in farming, for a total of 18 people. A tool is a structured interview model created by a researcher based on a research, conceptual framework, 5 open-ended questions, to conduct in-depth interviews with key contributors and analyze data

### Findings

1. Government Policy, Farmer Feature, Financial Support, Water Management and Sustainable Agriculture, the sample commented on all 5 extreme levels. Factor. Government

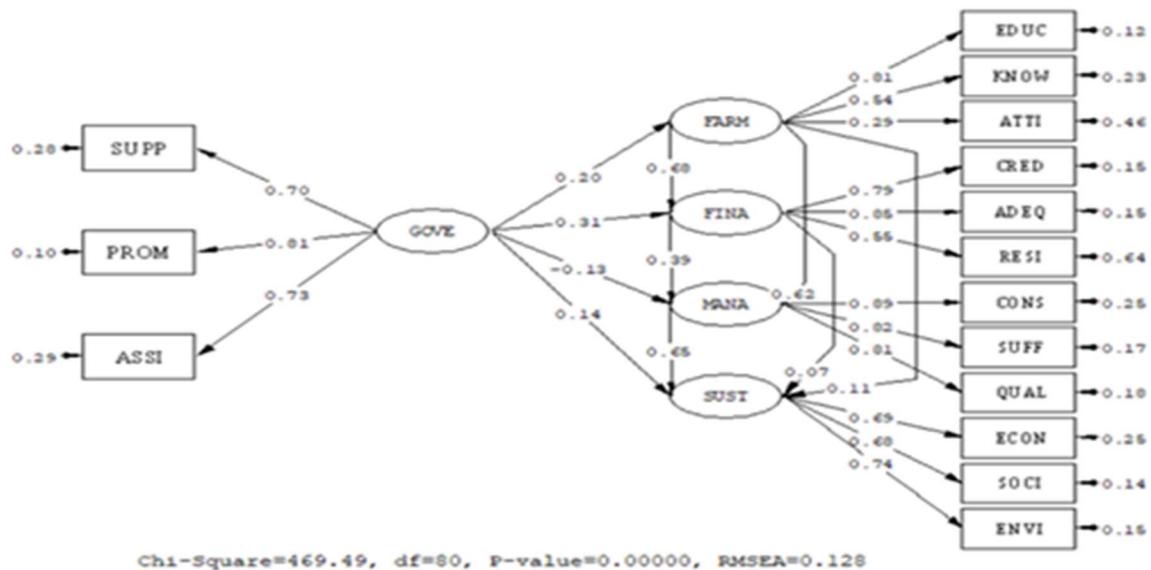
Policy has the highest average ( $\bar{X}=3.98$ , S.D. = .79). Followed by Farmer Feature ( $\bar{X}=3.74$ , S.D. = .64), Sustainable Agriculture ( $\bar{X}=3.64$ , S.D. =.74), Financial Support ( $\bar{X}=3.59$ , S.D. = .79) and Water Management has the least average. ( $\bar{X}=3.52$ , S.D. =.88), shown in Table 1.

**Table 1** Average level, Standard deviations and sequences of the factors studied

Factors	$\bar{X}$	S.D.	Interpret the Results	Order
Government Policy	3.98	.79	High	1
Farmer Feature	3.74	.64	High	2
Sustainable Agriculture	3.64	.74	High	3
Financial Support	3.59	.79	High	4
Water Management	3.52	.88	High	5

1. Results of analysis of structural equations

1.1 The results of the analysis of the relationship structure model are modeled on assumptions, proposed image 1

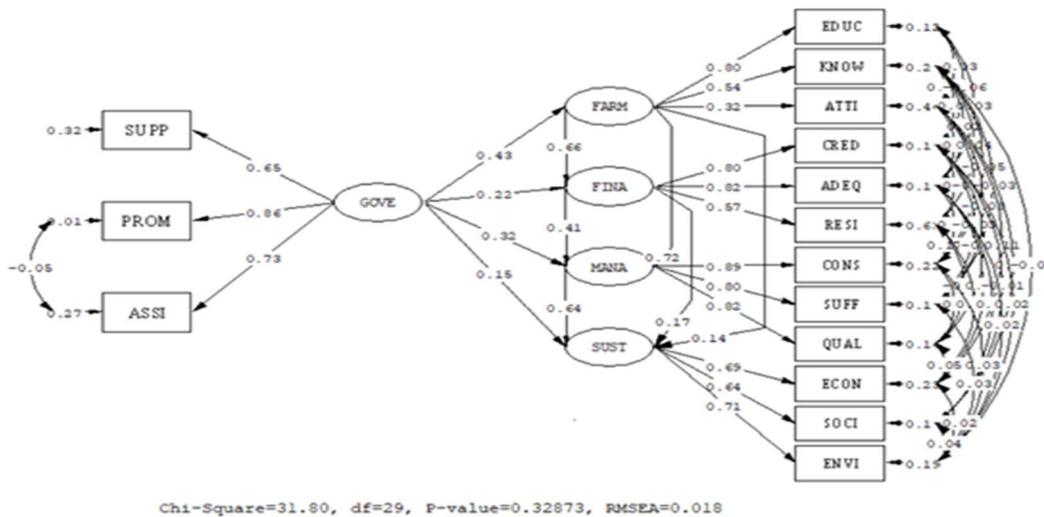


**Figure 1** Modeling the structure of relationships based on assumptions (Estimates)

Based on Figure 1, the hypothesis-based model that the researchers have developed based on related concepts and theories is not consistent with empirical data. Based on the calculated statistical values, Chi-square = 469.49, df = 80, p-value = 0.000, GFI = 0.83, AGFI = 0.74, RMR = 0.059, RMSEA =

0.128, CFI = 0.95, and CN= 71.40. Some key statistical values have not yet met a certain threshold, so the model is adjusted until the harmonization index values are consistent with empirical data, an alternative model was obtained with a calculated statistical value, I.E. Chi-square = 31.80, df = 29, p-value = 0.329, GFI = 0.99, AGFI = 0.94, RMR= 0.027, RMSEA = 0.018, CFI = 1.00 and CN = 462.10

2.2 Analysis of alternative structural models. Present alternative relationship structure models (Estimates) Proposed image 2



**Figure 2** Alternative relationship structure model (Estimates)

According to Figure 2, external latent variables, namely Government Policy (GOVE), directly affect Farmer Feature (FARM), Financial Support (FINA), Water Management (MANA), and Sustainable Agriculture (SUST), equal to 0.43, 0.2, 2, 0.32, and 0.15, respectively. Farmer Feature (FARM) directly affects Financial Support (FINA), Water Management (MANA) and Sustainable Agriculture (SUST) of 0.66, 0.40 and 0.14 respectively. Financial Support (FINA) directly affects Water Management (MANA) and Sustainable Agriculture (SUST) at 0.41 and 0.17, respectively, and Water Management (MANA) directly affects Sustainable Agriculture (SUST) at 0.64.

**Table 2** Comparing models based on research assumptions with alternative models

List	Statistical Values	Model Based on Assumptions	Alternative Models	Meaning
1. Chi-square	*Low Near 0	469.49	31.80	Suitable
	*Equal df	80	29	Suitable
Relative Chi-square	( $\chi^2$ /df)< 2.00	5.88	1.09	Suitable

2. GFI	>.90	0.83	0.99	Suitable
3. AGFI	>.90	0.74	0.94	Suitable
4. RMR	Approach 0	0.059	0.027	Suitable
5. RMSEA	<.05	0.128	0.018	Suitable
6. CFI	*0-1	0.95	1.00	Suitable
7. CN	> 200	71.40	462.10	

### 1. Hypothetical test results

Hypothetical test results showed that water management, financial support, government policy and farmer feature had a significant direct influence on sustainable agriculture at .05 levels with influence values of 0.64, 0.17, 0.15, and 0.14, respectively, presented in table 3.

**Table 3** Hypothetical test results

Research Hypothesis	Path Coefficient	t statistic	Result
Government Policy, Farmer Feature, Financial Support and Water Management affect Sustainable Agriculture			
1. Government Policy affects Sustainable Agriculture (GOVE --> SUST)	0.15*	2.14	Support
2. Farmer Feature affects Sustainable Agriculture (FARM --> SUST)	0.14*	2.05	Support
3. Financial Support affects Sustainable Agriculture (FINA --> SUST)	0.17*	2.12	Support
4. Water Management affects Sustainable Agriculture (MANA --> SUST)	0.64*	2.02	Support

\*  $p$  value  $\leq 0.05$

3. The guidelines for promoting farmer households to Sustainable Agriculture include: (1) having a water management system; Adequately agricultural, To be used for Sustainable Agriculture (2) Financial support for farmers by providing farmers with convenient and adequate access to financial resources (3) Establish a clear government policy to help, Promote and support farmers in shifting production to sustainable agriculture and (4) continuous educating farmers about Sustainable Agriculture to lead to a change in farmers' attitudes to see the benefits of Sustainable Agriculture towards themselves and their families.

### Conclusions

1. Factor: Government Policy, Farmer Feature, Financial Support, Water Management and Sustainable Agriculture are at the top 5 levels.

2. Water Management, Financial Support, Government Policy and Farmer Feature have a direct influence on Sustainable Agriculture.

3. Guidelines for promoting farmer households to Sustainable Agriculture include: (1) water management; Sufficiently agricultural (2) Financial support for farmers to access convenient and adequate sources of money (3) Establish a clear government policy to assist, Promote and support farmers in shifting production to sustainable agriculture and (4) Continued education about enableable agriculture with farmers.

### **Discuss the results**

It presents a fruitful discussion of the influence of latent variables introduced in studies affecting agriculture. Sustainable Found that Water Management, Financial Support, Government Policy and Farmer Feature had a significant direct influence on Sustainable Agriculture at a .05 level. Discussion of sequential results of direct influence values as follows:

Water Management has a direct influence on Sustainable Agriculture. Significantly, the .05 scale explains that in the past, agriculture, especially monoculture cultivation, faced a major problem: water used for cultivation. Most farmers still rely on seasonal water, rainwater, and farmers do not yet collect water. Due to limited agricultural land, Therefore, there is no catchment in the area. Therefore, cultivation relies solely on natural water or water from irrigation systems. If there are adjustments made to the enabling agriculture. Farmers have mixed crop cultivation, there is a need for systematic water management in order to have water for cultivation throughout the year in order to be able to sustainable agriculture (Thakorn Kanjiradej et al., 2018). In line with the World Bank (2007), water management has resulted in farmers being able to make the most of their water use, which in turn gives farmers more responsibility for using water in farming.

Financial Support has a direct influence on Sustainable Agriculture. Significantly, the .05 level explain that. Capital money is the main factor in the production of agricultural products. Most poor farmers do not have the funds to meet their crop needs on time. Financing farmers to meet production is therefore very necessary. By helping farmers, such as easy access to agricultural funding, smaller interest rates will help farmers do more Sustainable Agriculture (Khandker & Faruquee, 2001). In line with Ashraf & Giashi (2011), it states that the governments of each country should establish policies to support agricultural entrepreneurs in raising funds, Funding is a facilitator for farmers. To invest in Sustainable Agriculture The government should control the amount of loans and interest rates to promote the growth of the agricultural sector.

Government Policy has a direct influence on Sustainable Agriculture. Significantly, the .05 level explain that modifying or incentivizing farmers who have previously cultivated monoculture to continue farming is necessary for the government to have policies in place to help, Promote and support farmers clearly. Since the basics of Thai farmers are still struggling with debt, The area of farming, as well as most farmers, is aging, resulting in limited adaptation and knowledge. In line with the Czyzeaski et al (2018) study, it was found that Agricultural policy contributes to the

environmental sustainability of European farming. Through financial support through country subsidies. In line with the DeBoe (2020) study, it was found that policies create a positive impact on the environment through reducing or directly removing the pressure of farming on specific areas. The policy promotes the restoration of desolate lands to achieve better environmental performance in all cases and affects sustainability and productivity. And Vorley (2002). It states that national policy plays a role in intervening in 1) negotiating agreements on the duties and objectives of smallholder farmers and family agriculture 2) Create the right environment for peasant organizations and new social movements to become partners in decentralization 3) Support the role of NGOs, community groups and the public sector and 4) assist in fair trade between smallholder farmers and agribusinesses to democratically control the market.

Farmer Feature has a significant direct influence on Sustainable Agriculture at a .05 level. Farmers need to be knowledgeable. Understanding of cultivation from the subject of cultivation land, Soil Fertility Water Management. As well as if traditional farming needs to be shifted to Sustainable Agriculture. The more necessary it is for farmers to be educated, Knowledge and positive attitude towards Sustainable Agriculture. In line with Bagheri (2010) studies, the perception of potato farmers about Sustainable Agriculture is based on attitudes towards sustainable practices such as resource conservation, negative effects of agricultural chemicals, Invasion of pests caused by continuous cultivation. In addition to attitudes, it was found that studies of potato farmers also correlate with perceptions of economic and social sustainability. In line with George et al. (2007) studies, it was found that after training farmers had significantly higher knowledge and skills than before training, Farmers learn about improving climate risk management through a variety of ways of doing exercises, discussion better reflection and implementation of sustainable agriculture concepts.

## Conclusion

Sustainable Agriculture is self-reliant farming, integrate resources to be used in farming with maximum efficiency. To enhance the quality of life of farmers, reduce farming costs and increase income for farmers. Such a concept is recognized all over the world, Thailand's government has adopted the concept of agriculture, to drive new farming practices. However, Thailand's sustainable agriculture is still limited. Because there are still problems, there are many obstacles that prevent farmers from making adjustments to Sustainable Agriculture. For example, the policies established by the government cannot be put into practice in each area, Farmers have a limited land area for farming, Areas outside the irrigation system, lack of effective water management, as well as barriers to farmers' own lack of knowledge, Lack of Financial Support. Such problems and obstacles need to be systematically addressed, to enable farmers to effectively transition traditional farming to Sustainable Agriculture in the future.

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