

Development Model of Arabica Coffee Production of Farmers in Chiang Rai Province

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KEYWORDS

ABSTRACT

This research aims to 1) study the attitudes and practices of Arabica coffee production farmers in Chiang Rai Province, 2) study factors affecting Arabica coffee production processes of farmers in Chiang Rai Province, and 3) develop coffee production practices. This research applied a mixed research methodology. For quantitative study, data were collected from Arabic coffee farmers, using a research questionnaire. Descriptive statistics consisting of frequency, percentage, mean and standard deviation and inferential statistic consisting of Multiple Regression Analysis (MRA) were used to analyze the collected data. For qualitative research, data were collected through in-depth interview. The samples in this study consist of government agencies, officials from the Department of Agricultural Extension, officials from the Chiang Rai Provincial Office District agricultural officer Lecturer, Faculty of Agricultural Production Mae Jo University, two experts in coffee production, and farmers who grow Arabica coffee in Chiang rai province with a total number of 14 people. Data were analyzed using content analysis. The research results showed that 1) Agriculture knows about Arabica coffee production practices. The attitudes and practices in producing Arabica coffee were at a high level 2) A number of years growing Arabic coffee, communication with officials, awareness of information to forward Arabica coffee production practices of farmers in Chiang Rai Province had a positive effect on Arabica coffee production. 3) The results of statistical analysis on factors affecting Arabica coffee production of farmers in Chiang Rai Province by using Multiple Regression Analysis showed that factors affecting Arabica coffee production of farmers in Chiang Rai Province include gender factors (Beta = .367, $p < .01$), level of education (Beta = .196, $p < .01$), communication with officials (Beta = 119, $p < .01$), and community membership (Beta = .302, $p < .01$). 4. The model of Arabica coffee production practices of farmers in Chiang Rai Province is useful, appropriate and accurate.

1. Introduction

Coffee is one of Thailand's important economic crops. That creates an income for farmers of approximately 4,400 million baht per year, with coffee growing areas throughout the country approximately 270,000 - 273,000 rai, yielding 26,000 - 31,000 trees, with a yield per rai of approximately 92 - 120 kilograms. The current coffee market is expanding rapidly, causing the demand for coffee beans to increase (Office of Agricultural Economics, 2019). However, the problem of coffee production in Thailand is caused by farmers' lack of proper coffee production technology, lack of proper maintenance such as pruning, integrated pest control, and improving the soil appropriately according to the soil conditions and the needs of plants. In addition, an important reason for the production of coffee beans comes from old coffee trees.

The root system and plant condition are deteriorated. Farmers lack the ability to prune trees and plant coffee to replace damaged trees. Therefore, the yield per rai is low. In order to increase the coffee production potential of coffee farmers in Thailand to compete with coffee growers in other countries, the Department of Agricultural Extension has therefore created a project to promote increasing the efficiency of coffee production for sustainability. According to the coffee strategic plan for 2017 - 2021, coffee farmers in Thailand have higher production potential in quantity and quality, creating additional value for coffee and increasing income. Farmers' emphasis on integrated management (Value Chain) based on the potential and identity of coffee in Thailand. Development is stated in a production standard system at the farm for the consumer level. By increasing production efficiency, the farmers can reduce production costs to develop coffee bean quality to international standards. Local coffee production is becoming a center for coffee trade in ASEAN in the future (Channuwong, 2014; Department of Agricultural Extension, 2021).

The Department of Agricultural Extension General Director revealed that Thailand is in the "Bean Belt" area, suitable for growing coffee. There was a rich ecosystem and environment where Arabica and Arabica coffee varieties could be grown. In the past, in the northern and Robusta varieties in the southern region, the Department of Agricultural Extension has transferred coffee knowledge to farmers. Farmers were able to reduce production costs and increase yield per rai through participatory learning processes as well as supporting farmers gained knowledge into practice, increasing the potential and developing the quality of Thai coffee. It will be released to the market both domestically and in ASEAN. It also promotes coffee production in large plots. By encouraging coffee farmers, they form groups to procure production factors. They use appropriate production technology from planting until harvest—group selling coffee products, including connecting markets and creating coffee networks. There are 28 large coffee plots with a total area of 11,443 rai and 1,284 farmers. They are promoting a development to meet standards, developing knowledge for farmers about Thai agricultural product standards such as GAP, Organic Thailand, and international standards such as Asian GAP, Eurep GAP, IFOAM, USDA, EU, and so forth, together with relevant agencies to prepare Thai coffee bean standards. To promote the production of quality coffee beans that meet standards and are safe for consumers. Moreover, there is also a rise in the standard of Thai coffee production.

By organizing a coffee bean contest, they were based on judging criteria and based on international standards. The coffee beans that win the contest can make the farmers' institute famous. They can further expand the coffee production business. In addition, it also promotes the development of coffee farmer groups and community enterprises by transferring knowledge on production, processing, and product development to a variety to meet market needs. As a result, farmer groups and community enterprises are strengthened, and be able to run the coffee business sustainably (Bangbon et al., 2023; Channuwong et al., 2022; Department of Agricultural Extension, 2021)

The importance of the above Arabica coffee production problem Therefore, it is the source of Arabica coffee farmers' development, production, and promotion. The Ministry of Agriculture and Cooperatives has implemented the Coffee Strategy 2017 - 2021 to develop the potential of coffee farmers in a complete value chain based on the potential and identity of Thai coffee. Develop a production standard system at the farm-to-consumer level. By increasing production efficiency, reducing production costs, developing high-quality coffee beans to international

standards, local coffee production, and continuing to be the center of coffee trade in ASEAN (Ministry of Agriculture and Cooperatives, 2017).

2. Research Objectives

1. To study knowledge, attitudes, and practices of Arabica coffee production of farmers in Chiang Rai Province.
2. To study the factors affecting Arabica coffee production practices of farmers in Chiang Rai Province.
3. To develop a production model for Arabica coffee production by farmers in Chiang Rai Province.

3. Literature Survey

Growing coffee in the northern region happened by the grace of His Majesty King Bhumibol Adulyadej, who had a broad vision and the royal idea to bring coffee beans to encourage farmers in the highlands in the north to grow them to replace opium cultivation. His Majesty the King solved the drug problem, deforestation, and poverty. Chiang Rai Province is currently Thailand's most significant and best-growing Arabica coffee area. The province has followed in the footsteps of continuing the royal initiative. By specifying Arabica coffee/tea, it is an important strategic crop of the province. Moreover, create strategies for implementing development and promotion comprehensively and systematically from upstream to downstream. The concept of sustainable agricultural production does not destroy the ecosystem, environment, society, and community. Including developing processing standards and creating a network to move towards international trade. (Department of Agricultural Extension, 2021; Siamrath, 2021). Chiang Rai Province currently has the largest Arabica coffee growing area in Thailand, approximately 38,000 rai, yielding 4,355 tons, and a tea cultivation area of 53,436 rai, yielding 32,010 tons. The coffee growing area of Chiang Rai Province has an advantage over other planting areas, namely the abundance of the ecosystem and environment. In addition, it is located in the area along the equator up to the north not exceeding the Tropic of Cancer line of latitude at 23.5 degrees north and down to the south not exceeding the Tropic of Capricorn line of latitude at 23.5 degrees south, which is classified as a tropical area. It has a hot climate, lots of rain, and dense forests and is known as the "Coffee Belt," considered the most suitable area in the world for growing coffee. In addition, coffee farmers receive continuous promotion from the government until they have knowledge and expertise. Arabica coffee has low caffeine content, which differs from coffee from other sources. With the uniqueness of this flavor and production location. Make Doi Chang coffee and Doi Tung coffee Have been declared registered as a Geographical Indication or GI at the global level (Na Na Newspaper, 2018; Phakaphon Salathong, 2019). There are seven good quality Arabica coffee growing areas in Chiang Rai Province, including 1) Doi Wawee Coffee, for Doi Wawee Coffee. Even though it is grown in Chiang Rai, it became famous and opened the first coffee shop in Chiang Mai. Wawee Coffee Shop uses 70% coffee beans from Chiang Rai Province plus coffee from Mae Chaem District, Chiang Mai Province. Moreover, coffee from Khun Ya, Doi Inthanon, Chiang Mai Province, another 30%, is a coffee shop that is quite popular for coffee lovers. 2) Doi Tung Coffee Doi Tung Coffee is considered a Thai coffee brand in the pioneering era. It is coffee grown from the Doi Tung development project of Her Royal Highness Princess Maha Chakri Sirindhorn. To carry on His Majesty's determination to be a collective business, promoting and improving the quality of life, living conditions, and careers of the communities on Doi Tung. Moreover, it also promotes local tourism in the Mae Fah Luang Foundation project area. 3) Doi Chang Coffee Doi Chang is located at Tam Wawi, Mae Suai District, Chiang Rai Province. It is a mountain 1,700 meters above sea level. With this height, excellent-quality Arabica coffee can be grown. 4) Doi Mok Coffee: This area can

also grow good quality Arabica coffee. Doi Mok is part of the same area as Doi Chang. Villagers' community enterprises make coffee growers and producers. Winter plant processing group Roasted coffee packaged for sale Bring it to sell and create a coffee brand called Lisu Doi Chang. 5) Doi Mon Coffee, from Akha Ama Shop, is a 100% Arabica coffee variety, good quality, premium grade, grown in Mae Suai District, Chiang Rai Province. However, the brand Akha Ama in Chiang Mai until it became famous. There is a young, energetic man named Lee Ayu Chuepa, a young man from the Akha tribe who owns the brand. Moreover, they are exporting this brand of coffee to sell all over the world. 6) Pang Khon Coffee, coffee from Ban Pang Khon. Coffee naturally grows under large trees and in the upper reaches of streams. It makes coffee beans grow slowly and absorbs the flavor from the land well. This natural coffee farm is located in the area of the Royal Agricultural Development Station. which makes the coffee of Ban Pang Khon have a unique, pungent taste and 7) Mae Chan Tai Coffee The area for growing coffee at Ban Mae Chan Tai is in Mae Suai District, Chiang Rai Province, next to Phrao District, Chiang Mai Province. Here, locals grow coffee organically. Natural agriculture and taking care of the entire production process. It is called authentic handmade coffee. There are good quality roasted and ground coffee products for sale nationwide. Coffee lovers know Mae Chan Tai coffee very well. (Thairath newspaper, 2018; Phunphatracheewin. 2009)

In the past, Thai farmers have always tried to change their production. There is continuous development of production. The production of various types (output mix) and specific types (single output) depends on the availability of production factors and the suitability of nature and the environment, including production promotion from government and private agencies. Developing expertise in producing agricultural products will increase farmers' expertise (farm specialization) with existing skills and production factors. Farmers can expand production scale, which affects economies of scale (Economy of scale) from the efficiency of using production factors and reduced production costs. Agricultural households will have the opportunity to receive higher incomes.

On the other hand, there will be uncertainty in the price of produce. Factors of production climate and policies to promote production from outside agencies It has created an incentive for some households to change their production from allocating resources for one type of production to doing many types of agriculture at the same time (farm diversification) with the expectation of earning more or sufficient income to sustain themselves. Living households will allocate limited resources efficiently to maximize utility. (Ill Economic Research Institute ,Yingphakorn, 2019) consistent with the problem of producing Arabica coffee. In Chiang Rai province, weevils will encounter problems penetrating the coffee fruit. It is a small beetle that reproduces quickly. It can destroy coffee beans even before the fruiting stage. Severe damage occurs to the tissues within the fruit during the ripening stage. It makes the seeds porous, and various plant diseases come and destroy them again. Seeds lose quality and cause the fruit to fall off prematurely. That is why the yield and quality of coffee decreased by as much as 50 percent, causing significant damage to farmers (Daoruang, 2019).

4. Research Methodology

This study applied a mixed research methodology. Both quantitative and qualitative research was used to collect and analyze data. The population used in quantitative research is Arabica coffee farmers. In the area of Chiang Rai province, there were 503 people, a sample size of 223 people was obtained from Yamane's sample calculation formula (Yamane, 1967, p. 170), the error level was .05, and a questionnaire was used as a tool to collect information. Consists of 4 parts: a questionnaire on the personal factors of respondents, knowledge about Arabica

coffee production operations, Attitudes regarding Arabica coffee production practices, and Arabica coffee production operations. Descriptive statistics and Multiple Regression Analysis (MRA) were used to analyze data.

5. Research Findings

1. The research results revealed that most coffee farmers know about Arabica coffee production operations at a high level, with 123, representing 55.2 percent, followed by the medium level, with 87 representing 39.0 percent, and the low level with 13 people. Accounting for 5.8 percent (Table 1)

Table 1: Farmers' level of knowledge about Arabica coffee production practices. (n=223)

Acknowledgement Level	Number (Person)	Percentage
Low	13	5.8
Medium	87	39.0
High	123	55.2

2. From the analysis of the attitude of agriculture in growing and producing Arabica coffee, it was found that the attitude of agriculture in growing and producing Arabica coffee is at a high level. The average value was equal to 3.84 (S.D.=.42). When classified by aspect, it was found that coffee cultivation in the northern region occurred with the royal grace of His Majesty King Bhumibol Adulyadej, King Rama IX, with the highest average value equal to 3.84 (S.D.=.42). 4.03 (S.D.=0.67), followed by Arabica coffee in Chiang Rai province, which has good quality. It has a unique characteristic, which is that it smells good. It has a mellow tea flavor. Mixed with a slightly sour taste, when you drink it, you will feel refreshed. Moreover, it has low caffeine. The average value was 4.01 (S.D. = 0.74). The part with the lowest average value was cultivating Arabica coffee to help farmers generate income to support their families, 3.13 (S.D. = 0.81) (Table 2).

Table 2: Agricultural attitudes towards growing and producing Arabica coffee.

Topic	\bar{x}	S D	Interpr etation
1. Growing Arabica coffee helps farmers generate income to support their families.	3.13	0.81	Moderate
2. Coffee is an important economic crop in Thailand.	3.84	0.42	Maximum
3. Transferring coffee knowledge to farmers helps reduce production costs and increase production per rai, supporting farmers in putting their knowledge into practice.	4.03	0.67	Moderate

4. Using the right technology in coffee production produces high-quality coffee.	3	0	Maximum
	.	.	
	9	8	
	6	5	
5. Coffee cultivation in the northern region occurred with His Majesty King Bhumibol Adulyadej, King Rama IX.	4	0	Maximum
	.	.	
	0	6	
	3	7	
6. Chiang Rai Province is Thailand's most extensive and highest-quality Arabica coffee-growing area.	3	0	Maximum
	.	.	
	9	8	
	8	2	
7. Arabica coffee in Chiang Rai province is of good quality. It displays unique characteristics. It smells good and has a mellow tea flavor and a slightly sour taste. When you drink it, you will feel refreshed. It has low caffeine	4	0	Maximum
	.	.	
	0	7	
	1	4	
8. Doi Ngam Coffee, Doi Tung Coffee, Doi Chang Coffee, Doi Mok Coffee, Doi Mae Mon Coffee, Pang Khon Coffee, and Mae Chan Tai Coffee. It is a source of good quality coffee growing.	3	0	Maximum
	.	.	
	8	9	
	8	2	
9. Coffee growers are constantly changing their production and developing Arabica coffee production.	3	0	Maximum
	.	.	
	9	9	
	9	7	
	3	0	
10. Developing expertise in coffee production will help farmers expand production.	.	.	Maximum
	9	9	
	3	7	
11. Uncertainty of output prices. Climate affects coffee production.	3	0	Maximum
	.	.	
	8	9	
	4	8	
12. The problem of moths penetrating coffee fruit affects the quality of coffee beans.	3	0	Maximum
	.	.	
	9	7	
	7	0	
13. Government sections are developing production and promoting agriculture for coffee growers by setting coffee strategies for 2017 - 2021.	3	0	Maximum
	.	.	
	8	7	
	9	1	
14. Coffee Strategy Plan 2017 - 2021 aims to develop the full potential of coffee farmers.	3	0	Maximum
	.	.	
	9	6	
	3	7	
15. Increasing efficiency in coffee production: Farmers will reduce production costs and develop	4	0	Maximum
	.	.	

high-quality coffee beans according to international standards.	0	9	
	0	7	
Total	3	0	
	.	.	Maxi
	8	4	mum
	4	2	

3. From the analysis of Arabica coffee production practices of farmers in Chiang Rai Province, it was found that overall, Arabica coffee production practices of farmers in Chiang Rai Province were at a high level. The mean value was 3.80 (S.D. = 0.43). When considering each aspect, it was found that preparing seeds for planting had an average value of 3.92 (S.D.=.53), followed by planting and care. The average value was 3.87 (S.D.=.53), following the principles of harvesting and processing. It has a mean of 3.85 (S.D.=.60), and the harvesting mean was 3.55 (S.D.=.57) (Table 3)

Table 3 Arabica coffee production practices of farmers in Chiang Rai Province.

Topics	\bar{x}	S D	Interpre tation
1. Seed preparation	3. 92	0 . 5 3	Maxim um
2. Planting and care	3. 87	0 . 5 3	Maxim um
3. Harvesting	3. 55	0 . 5 7	Maxim um
4. Compliance with harvesting and processing principles	3. 85	0 . 6 0	Maxim um
Total	3. 80	0 . 4 3	Maxim um

4. The results of analysis on factors affecting Arabica coffee production by farmers in Chiang Rai Province. Using multiple regression analysis, it was found that factors affecting Arabica coffee production by farmers in Chiang Rai Province include gender factors (Beta = .367, p <.01), level of education (Beta = .196, p <.01), communication with officials (Beta = 119, p <.01), and community membership (Beta = .302, p <.01) (Table 4).

Table 4 Factors affecting Arabica coffee production by farmers in Chiang Rai Province.

Independent variable	Dependent variable		
	Arabica coffee production		
	B	t	Sig.
1. Gender	.367	1.802	.007**
2. Age	.006	.802	.384
3. Educational Background	.196	.927	.003**
4. Status	.061	.220	.826
5. Number of members	.006	.151	.880
6. Number of laborers	.030	.492	.624
7. Total household income	.084	1.067	.287
8. Number of cultivated areas	.002	.065	.949
9. Funds for the production of Arabica coffee	.040	.218	.827
10. Amount of household debt	.092	1.326	.181
11. Number of years in which have been grown	.033	1.342	.186
12. Communication with officials	.119	2.800	.006**
13. Training	.142	1.457	.014*
14. Perception of information	.074	2.503	.013
15. Membership in community organizations	.302	1.759	.008**
Constant	2.420	3.911	.000**
R ² = .281 (28.10%) F = 2.292 Sig. F = .005			

* Statistically significant at the 0.05 level

** Statistically significant at the 0.01 level

6. Conclusions and Discussions

From the research results, it was found that farmers have knowledge about production of Arabica coffee. Both attitudes and practices in producing Arabica coffee can be extended because farmers interested in growing Arabica coffee intend to develop their coffee growing career until they succeed. This belief is in line with the research of Sukhothai Thammathirat Open University (2017) and Salathong (2019), which found that farmers are interested in and have knowledge of agriculture because it will enable them to improve their quality of life. Overall, attitudes of agriculture in growing and producing Arabica coffee. It is at a high level. They show an average equal whenever classified by aspect. It was found that coffee cultivation in the northern region occurred with the royal grace of His Majesty King Bhumibol Adulyadej, King Rama IX, with the highest average, followed by Arabica coffee in Chiang Rai Province. Arabica coffee in Chiang Rai province has quality and unique characteristic. That is, it smells good. It has a mellow tea flavor mixed with a slightly sour taste. When you drink it, you will feel refreshed. Moreover, there is low caffeine. It can be discussed that farmers show a positive

attitude towards the cultivation and production of Arabica coffee. Moreover, Arabica coffee in Chiang Rai province has a good taste, an aromatic aroma, and a sour taste. The results of this study are relevant to Naewna Newspaper (2018) which stated that Arabica coffee is grown in Chiang Rai province; it has a unique identity: mellow taste, fragrant, and delicious. Drinking Arabica coffee makes you feel good.

Farmers' model of Arabica coffee production practices in Chiang Rai Province. It is useful. There is a possibility that it is appropriate and accurate because the farmers studied well before planting coffee. It is consistent with the research results of Channuwong 2014, Inkhang (2014), Palapanya (2019), and the Plant Research Institute (2019), who found that coffee cultivation, care, and harvesting coffee, and exporting coffee to other countries will help to increase national income. However, farmers need to build a business network and alliance. If they have studied and planned for the coffee business well, they can expand the coffee business to expand coffee business and increase more profit.

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