

AN ANALYSIS OF ECONOMIC, ENVIRONMENTAL, AND SOCIAL IMPACTS OF JASMINE RICE FARMING IN DOKKHAMTAI DISTRICT, PHAYAO PROVINCE, THAILAND

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ABSTRACT

The purpose of this paper is to synthesize the economic, environmental, and social impacts of jasmine rice cultivation at the community scale in Dokkhamtai District, Phayao Province, Thailand, by considering a mixed-methods research approach - questionnaire, interview, and focus-group discussion. Data analysis relied on the Social Return on Investment (SROI). The results showed that the economic, environmental, and social impacts of jasmine rice cultivation in study area, in all aspects, was at high impact ($\bar{X}=3.63$). Social impact was the highest impact ($\bar{X}=3.70$), followed by economic impact ($\bar{X}=3.60$), and finally environmental impact ($\bar{X}=3.58$). Data was collected from three key participants in the government sector: The Director of the Phayao Provincial Agricultural Office, the Director of the Dokkhamtai District Agricultural Office, and the Head of the Rice Seed Center in Phayao, along with twenty key participants in the community: the Head of the Jasmine Rice Farmers' Group (a cooperative crop), the Head of the Community Rice Center, and representatives of the local mill and the Jasmine Rice Farmers Group in Dokkhamtai District.

The results on the Social Return on Investment (SROI) assessment showed the net benefits in output and outcome to be positive, with a total of 12,106,148.90 THB (385,055.62 USD). There was additional financial input from the Thailand Research Fund in the amount of 9,733,218 THB. The return per 1 THB was 1.24 THB, a positive social return on investment. Suggestions to improve the level of return on social investment at the policy level include: 1) formulating an effective water management policy for jasmine rice cultivation in the North Mekong region, 2) supporting a grant to carry out ongoing research projects, and 3) applying the results to an analysis of public and private projects or NPOs to ensure the value of investment on social impacts and to maximize the benefits to all stakeholders.

Keywords: Project Evaluation, Social Return on Investment, Jasmine Rice, Phayao Province

INTRODUCTION

Thailand is considered to be among the world's most important rice growing regions. Statistics placed Thai rice exports second in the world in 2019, at 7.58 million tons (Thai Rice Exporters Association, 2020), leading to the application of new technology in rice farming imported from abroad. While the difficulties in increasing productivity have for the most part been solved, there is still several economic problems related to social investment in health care for issues by insecticides used in the rice fields and toxic runoff into river causing environmental

pollution. The impacts caused by the production process must be considered and managed, with the focus not only on financial return on investment for the amount of rice produced. The economic, environmental, and social costs have to be factored in as well (Phonbunsri, 2004).

Jasmine rice is well-known Thai rice and is recognized all over the world. The most popularly cultivated variety of jasmine rice is No.105 (Khao Dawk Mali 105). It was awarded top prize in the 9th edition of The World's Best Rice 2017, presented by The Rice Trader, an industry in-depth information service about the global rice industry. Likewise, Thai Hom Mali Rice is thought to be the world's best tasting rice. Hence, Thailand is considered one of the best quality jasmine rice producers, with these varieties mainly grown in the northern part of Thailand, where the location, climate, and geographical characteristics are optimal to cultivate jasmine rice (Thai PBS News Agency, 2017).

Phayao Province is one of the areas of jasmine rice cultivation in Thailand. From the Central Agricultural Registration Database in 2020, 65,935 households were registered as rice cultivating households, with a total cultivated area of 647,565.38 rai. The majority of the area growing jasmine rice is located in Dokkhamtai District, which has a cultivated area of 111,423.17 rai (Department of Agricultural Extension, 2020). However, jasmine rice farming needs water during the growing season – water that is also used for other crops – all of which affects the eco-system, the environment, and society, and therefore the community's economy. This research provides an assessment of the impact of jasmine rice farming on the economic, environmental, and social structures at Dokkhamtai District, Phayao Province, in order to apply the results to planning and formulating policy to support farmers in developing high quality jasmine rice while simultaneously improving social aspects and sustainability.

RESEARCH OBJECTIVES

The research objective was to assess the impacts on the economic, environmental, and social impacts of jasmine rice cultivation in Dokkhamtai District, Phayao Province, Thailand.

LITERATURE REVIEW

The literature review of the research on economic, environmental, and social impacts in jasmine rice cultivation at Dokkhamtai District, Phayao Province, Thailand, can be summarized as follows:

The concept of Social Impact Assessment (SIA), the study to explore solutions to the social problems caused by human action or natural occurrence (Wattanachaiyingcharoen, 2003), affects the social changes after the contribution of any activities or project impacts. To conduct any projects, the person in charge, stakeholders, or impact takers, realize the overall achievement of the project in terms of the results on the economy, society, or the environment. These factors assist in decision-making about the projects being undertaken (Achawanantakul & Yamlaor, 2014). Hence, all stakeholders will estimate the level of change in economic, social, or environmental terms, along with proposing measures to reduce social impacts in accordance with the context of the social situation in the area to create benefits for stakeholders, while reducing the negative social impact as much as possible (Education Policy Institute, 1996).

Analyzing the social impact is primarily divided into two periods: the general condition before the project, and the time after the implementation. These periods indicate the severity and direction of the social impacts, which are related to the community's conditions. Nevertheless, the social impacts should be the outcome of the social project's contribution (Fongsri, 2010).

The carrying out of the projects or social activities of various organizations are all focused on creating positive social impact or social values - for example, generating income, reducing expenses, or reducing the cost of living. However, when there is no empirical follow-up

assessment, the success rate of the projects is unknown, as is an answer to the question of how much the projects or activities meet the needs of the community (Achawanantakul & Yamlaor, 2014).

To achieve the economic, environmental, and social objectives, social projects must create a balance of three pillars (the Three-Pillar Approach) that must take into account economic, environmental, and social needs. Sustainability must not focus on one pillar alone, but has to be economically, environmentally, and socially sustainable (Segnestam, 2002; Kristensen, 2004; Van de Kerk & Manuel, 2008; Chakprai et al., 2017).

The scope of social impacts is wide and covers various social dimensions across institutional, community, and social levels. In practice, social impacts can be identified as any changes affecting attitudes, health and safety, lifestyle, economic and political structures and patterns, or several at the same time, from the individual level onwards (Clark, Norkaew, 2010).

In this regard, to assess the social impact of the implementation of sustainable development on social, economic, and environmental aspects (World Bank, 1987), this research was designed to evaluate the social impacts concerning all stakeholders and focus on the major issues in accordance with the social context of the jasmine rice farming group in Dokkhamtai District. Indicators were identified to cover all aspects of the sustainability of social development, which consist of three components:

1. Eight indicators of economic impacts: increasing income, increasing of additional income source, expenditure decrease, debt decrease, production cost decrease, more productivity, more local products, more technology or local innovation.
2. Six indicators of environmental impacts: establishment of a community resource management group, more forest area or more water resource preservation, decrease in environmental pollution, hygienic environment in the community, more economical use of energy, greater of alternative energy in the community.
3. Six indicators of social impacts: increased social integration of the community, increased accessibility to education system, better health care, greater safety for life and property, secure occupations and habitat, greater concern about the preservation of local traits and culture.

After assessing the social impacts, the social outcome targets emerged for calculating Social Return on Investment (SROI). These impacts can identify the outcome of the financial value to compare it with the cost of investment and calculate the ratio on the social impacts to the cost of each project (Achavanuntakul & Yamlaor, 2014). The calculation process employs the variables as a proxy with blended value in which the three values are compared with the return on investment of the stakeholders as indicators of success. Each indicator and the process of index analysis is presented in the proxy value. SROI is calculated by dividing the present value of the social impacts with the investment cost after subtracting the value that already existed prior to the social project (Brooks, 2008).

The core of Social Return on Investment (SROI) consists of stakeholder participation through the sharing of their opinions, contributing the success index to measure the success of the organization at an acceptable level. In general, the SROI results will contribute to making changes and creating strategies that encourage the organization to deliver activities aimed at improving the social impacts and the practical scope of practices, or to provide empirical assessment of simulation models before making decisions. SROI data supports organizations in creating social value, financial value, and environmental value as tools for management, monitoring, improvement, and evaluation. When the results of calculated SROI are higher than the practical results, a deadweight technique is applied to exclude the existing value before the social enterprise project (Scholten, Nicholls, Olsen & Galimidi, 2006). In order to measure social value that is incalculable in numbers and show return on investment in financial value by indicating the outcome proxy, the level of acceptance on the effectiveness of assessment depends on the supporting reasons of the identified financial proxy (Alter, 2007).

Therefore, this research has applied all of the above-mentioned concepts to construct the instruments as a guideline to gauge the outcomes of social assessment in every aspect of SROI.

Identification of financial proxies relied on the mean count of the area needs and related data in academic papers to assure acceptable values and confirm the actual outcome, in order to bring attention to the next investment in social development with a sustainability approach.

RESEARCH METHODOLOGY

The assessment on economic, environmental, and social impacts on jasmine rice cultivation in Dokkhamtai District, Phayao Province, Thailand employed both qualitative and quantitative approaches to a single case study method in order to understand the process of growing jasmine rice at Dokkhamtai District, Phayao Province. The qualitative approach utilized a variety of instruments with key information from jasmine rice farmers and related government sectors in the study area.

For the quantitative research, a questionnaire was used to collect data that calculated a sample size of 385 participants from a population of 9,693 registered jasmine rice farmers. The sample size used the Taro Yamane method of $9,693/(1+9,693 \times 0.052)$, which assumes a 5% Margin of Error and 95% level of confidence. Data collection of 371 questionnaires (96.36% response rate) through the assessment form of economic, environmental, and social impacts of jasmine rice cultivating group in Dokkhamtai District were completed and ready for analysis. The questionnaire was separated into four sections:

The first section contains the general background of the participants: Gender, age, highest level of educational, primary job, monthly income, and monthly household income.

The second section contains questions about the farmers' occupations, jasmine rice cultivation, how to join the jasmine rice cultivating group, participation in the group, and support from other organizations.

The third section contains questions about the assessment on the economic, environmental, and social impacts of the jasmine rice cultivating group in Dokkhamtai District.

The fourth section contains additional suggestions.

The qualitative research approach employed in-depth interviews, unstructured interviews, and group interviews with farmers and related government organizations in Dokkhamtai District. The questions consisted of three dimensions: 1) Economic –the income of jasmine rice farmers, the yield of jasmine rice per rai, postharvest processing, technology employed in jasmine rice cultivating, distribute channels of jasmine rice products, the overall cost of cultivation, and the cost per rai of cultivation, 2) Environmental: ways in which farmers manage their community environment, methods of taking care of upstream forest areas in utilizing water resources for cultivation, pollution from cultivation, efficient use of resources, and the use of renewable energy in farming, 3) Social: how farmers are strengthening their knowledge about jasmine rice cultivation, farmers in good health, safety issues for life and property, job security as a farmer, preservation of local traits and traditional culture in rice cultivating.

SROI were utilized as an instrument for collecting data on rice processing, productivity, and water management in jasmine rice cultivation at Dokkhamtai District. To evaluate the social value from the impacts, data was collected from interviews with key participants selected from related stakeholders who currently work in the government sector: The Director of the Phayao Provincial Agricultural Office, The Director of the Dokkhamtai District Agricultural Office, and the Head of the Rice Seed Center, Phayao. Interviews were also conducted with twenty key participants in the community: The Head of the Jasmine Rice Farmers' Group (a cooperative crop), the Head of the Community Rice Center, representatives of the local mill, and representatives of the Jasmine Rice Farmers' Group in Dokkhamtai District.

RESEARCH RESULTS

Dokkhamtai District, Phayao Province has arable lowland with wet areas and a primary water source, the Rong Chang River that is suitable for agriculture. This area has mixed geographical characteristics of both hilly and flat areas with the Ing River as the main river that runs into Phayao Lake. There are also tributaries flowing into the area as well as a small reservoir that supports the local people in Dokkhamtai District. The farmers' primary work is rice farming, gardening, and growing onions and shallots. When the cultivating season is over and the dry season begins, some farmers migrate to work as laborers in the bigger cities.

Database registration in Dokkhamtai District shows 152,008.80 rai for rice cultivation, divided into 111,428.10 rai for jasmine rice, 39,271.25 rai for glutinous rice, 5 rai for Pathum Thani fragrant rice, and 1,309.43 rai for other non-jasmine rice (brown rice, berry rice, coarse rice, etc.). Dokkhamtai District is a well-known area where the most jasmine rice is grown in Phayao Province. Jasmine rice farmers in Dokkhamtai area cultivate excellent quality rice that has been recognized at the national level. In an interview with Mr. Banchong Krajangbho, a local farmer and Chair of the Community Rice Center at Ban Thungtonsri, he stated that in 2020 the members of the center were selling their rice at 10,000 THB per ton (1 rai produces 800 kg of rice). Other Dokkhamtai District farmers interviewed mentioned the same price (with rice levels at 25%-30% humidity), and said that at 15% humidity, price could go as high as 15,000-18,000 THB. However, because of the tremendous amount of productivity in the previous year, there was not enough space to dry the rice, forcing farmers to sell their rice at 25%-30% humidity.

The results of the assessment on the economic, environmental, and social situation of jasmine rice cultivation at Dokkhamtai District collected from 371 questionnaires returned by jasmine rice farmers in the study area were as follows:

Part I: The demographic characteristics of the respondents are: male, 228 (61.4 percent), age 41-60, 227 respondents (61.1 percent), primary school educational level, 192 respondents (51.7 percent), primary occupation farmer, 358 respondents (96.4 percent), and monthly income lower than 5,000 THB, 187 respondents (50.4 percent). The results are shown in Table 1.

Details	Quantity	Percentage
Male	228	61.4
Age range 41-60 years	227	61.1
Primary education	192	51.7
Primary occupation as a farmer	358	96.4
Monthly income at less than 5,000 THB	187	50.4

Part 2: The data on the farmers' profile results showed that of the respondents, 224 people (60.3 percent) had 20 years or more experience in rice cultivation, 362 respondents (97.6 percent) found Khao Dawk Mali 105 to be the most popular variety of jasmine rice, 149 respondents (40.1 percent) farmed an area of fewer than 10 rai, 311 respondents (83.2 percent) have productivity per rai of less than 1 ton, 360 respondents (97.0 percent) sell 1 ton for less than 15,000 THB, 304 respondents (81.9 percent) primarily rely on middlemen for their selling channels, 320 respondents (86.2 percent) are registered farmers at the Phayao Provincial Agricultural Extension Office, 294 respondents (80.0 percent) have received support from public and private organizations, 294 respondents (80.0 percent) are involved in the development program for knowledge and technology, 287 respondents (77.4 percent) employ chemical

fertilizer technology in cultivating, 309 respondents (83.3 percent) joined the association of the large field cultivation group, 291 respondents (78.4 percent) join any association that provides benefits in rice seed support, and 187 respondents (50.4 percent) of farmers' fields are outside the irrigation areas. This data is presented in Table 2.

Details	Quantity	Percentage
More than 20 years rice growing experience	224	60.3
Popularity of jasmine rice is Khao Dawk Mali 105	362	97.6
Farmers' cultivating area is less than 10 rai	142	40.1
Productivity per rai less than 1 ton	311	83.2
Selling price for 1 ton less than 15,000 THB	360	97
Selling channel relies on middlemen	304	81.9
Registered farmer at the Phayao Provincial Agricultural Extension Office	320	86.2
Received the support from public and private organizations	339	91.3
Involved in development program on knowledge and technology	294	79.2
Employ chemical fertilizing technology in cultivating	287	77.4
Join the association of the large field cultivation group	309	83.3
Join any association providing benefits in rice seed support	291	78.4
Farmers' field outside irrigation areas	187	50.4

Part 3: The assessment on the economic, environmental, and social impacts of jasmine rice cultivation in the Dokkhamtai area is as follows:

An economic impact assessment found high levels of importance across all aspects ($\bar{x}=3.60$). For each aspect, farmers claimed a high impact on their primary income comes from jasmine rice cultivation ($\bar{x}=3.95$), while the Farmers' Association produced jasmine rice products with moderate impact ($\bar{x}=3.20$).

An environmental impact assessment found high levels of importance across all aspects ($\bar{x}=3.58$). For each aspect, respondents stated important impact on their association to conserve forests and water sources a high impact ($\bar{x}=4.08$), and the association supports renewable energy use, such as using solar cells to pump water with moderate impact ($\bar{x}=2.87$).

A social impact assessment found the level of importance across all aspects ($\bar{x}=3.70$). For each aspect, most of the respondents were concerned about social issues of outside organizations supporting knowledge of jasmine rice cultivation to association members at moderate impact ($\bar{x}=4.16$), while a smaller number of association members migrated to find other work or gave up their jobs as farmers ($\bar{x}=3.09$). Therefore, the assessment on the economic, environmental, and social impacts of jasmine rice cultivation in Dokkhamtai District, Phayao Province, which used data collected from 371 farmers in the study area, was of a high importance level ($\bar{x}=3.63$), as shown in Table 3.

Table 3 ASSESSMENT ON ECONOMIC, ENVIRONMENTAL, AND SOCIAL IMPACTS			
Assessment on Economic, Environmental, and Social Impacts	Level of Importance		
	\bar{X}	S.D.	Level
	3.63	0.94	High
Economic impact	3.6	0.97	High
Primary household income from jasmine rice cultivation	3.95	1.04	High
Farmers' association produced jasmine rice products	3.2	1.176	Moderate
Environmental impact	3.58	0.91	High
Association conserves forests and water sources	4.08	0.764	High
Association supports renewable energy use	2.87	1.208	Moderate
Social impact	3.7	0.95	High
Outside organizations support knowledge of jasmine rice cultivation	4.16	0.618	High
Lower number of farmers migrated for work or changed jobs	3.09	1.288	Moderate

Part 4: Conclusion and recommendations. Farmers need public organizations to support the cultivating-related equipment, such as balers, stubble tractors, and vacuum sealers, they require being productive. Farmers also need support processing rice that can be ready for sale, creating value-added products, and accessing product storage methods. Training is necessary in managing water crises that affect jasmine rice cultivation in Dokkhamtai District, as well as with learning approaches to water management that can support year-round rice farming. Furthermore, data collected from stakeholder interviews and documents revealed the social impacts that affected the stakeholders, which is shown in Table 4.

Table 4 STAKEHOLDER ANALYSIS	
Stakeholders	Indicators
Large field cultivation farmer association	Better quality of life through effective water management in jasmine rice cultivation areas.
Community Rice Center Farmers Group	Increasing income due to sufficient water sources during seeding rice process.
Irrigation Project, PhayaoOffice	Responsible government organization on water distribution in Dokkhamtai District.

Data from stakeholder analysis showed that farmers' improved quality of life derived both from the increasing income the received by producing superior jasmine rice and by their recognition of the importance of the cultivating area, well-known for Dokkhamtai Rice with its unique characteristics. Improving the quality of jasmine rice cultivation depends on the effectiveness of water management by the Irrigation Project, Phayao Office.

Goals	Main target
Input	Water quantity in jasmine rice cultivation.
Activities	Knowledge delivered to farmers about water management to cultivate quality jasmine rice.
Output	Rice that meets the set standard brings guaranteed higher sales price and marketing support from the government.
Outcome	Increasing income from jasmine rice sales, reduction in the cost of cultivation, better quality of life for farmers, decreased migration rate for farmers, decreased use of chemicals, farmers' feeling pride in their products.
Impacts	<p>Positive impacts</p> <ul style="list-style-type: none"> - Increase in income from selling jasmine rice and jasmine rice seeds, course on water management. - Decrease in cost of rice cultivation and medical care caused by occupation or disease from use of chemicals in rice cultivation, decrease in migration of farmers looking for work in Bangkok during the dry season. <p>Negative impact</p> <ul style="list-style-type: none"> - Water management for agriculture may cause damage to the ecosystem, possible forest destruction, and loss of animal habitats

Data analysis on the effectiveness of water management for agriculture in Dokkhamtai District collected from stakeholders' interviews in order to create practical indicators that can calculate the financial proxy is shown in Table 6.

Indicators	Financial Proxies
1. Sufficient water during cultivating season to grow high quality jasmine rice to the farmers' satisfaction.	(Average jasmine rice selling price per ton in 2019 minus average jasmine rice price per ton in 2018 (in THB) multiplied by amount of rice produced by the Large Field Cultivation Farmers' Association in 2019 (tons)
2. Sufficient water to double-crop fields or cultivates other economical plants.	Percentage of farmers migrating during dry seasons (persons) multiplied by cost of travel to Bangkok (THB)
3. Amount of underground water pumped to support the water level in the rice fields.	Percentage of the cultivated area of Large Field Cultivation Farmers' Association that use ground water in rice cultivation (rai) multiplied by average cost of pumping water to rice fields (THB)
4. Amount of rice seeding.	Average income of The Community Rice Center Farmers' Group (THB) multiplied by number of members
5. Number of times for hospitality	Travelling cost to the Health Promoting Hospital plus treatment cost plus loss of minimum day wage when not working (THB) multiplied by number of members of Community Rice Center Farmers' Group
6. Number of times invited as a lecturer or consultant in planning for water management approach	Number of hours per each lecture (hours) multiplied by payment per hour (THB) multiplied by invitation ratio per year

Travelling cost to the Health Promoting Hospital plus treatment cost plus loss of minimum day wage when not working (THB) multiplied by number of members of Community Rice Center Farmers' Group

6. Number of times invited as a lecturer or consultant in planning for water management approach Number of hours per each lecture (hours) multiplied by payment per hour (THB) multiplied by invitation ratio per year

An analysis of the indicators and financial proxies, collected through the financial values were used to calculate the impact value from the assessment, deadweight, displacement, attribution, and drop-off also applied to confirm the actual social impact from the social project, is shown in Table 7.

Outcome	Impact	Calculating Social Return				
		Discount rate	3.50%			
		2021	2022	2023	2024	2025
Increasing income from water management for jasmine rice cultivation	1,03,38,000.00	64,61,250.00	32,30,625.00	16,15,312.50	8,07,656.25	4,03,828.13
Decreasing number of occupations changed during dry season	25,248.00	15,780.00	7,890.00	3,945.00	1,972.50	986.25
Decreasing number of times using underground water source	64,613.00	40,383.13	20,191.56	10,095.78	5,047.89	2,523.95
Increasing income from selling jasmine rice seeds with approved standards	96,000.00	60,000.00	30,000.00	15,000.00	7,500.00	3,750.00
Diminishing of the use of chemicals for rice cultivation to improve health of jasmine rice farmers	72,000.00	45,000.00	22,500.00	11,250.00	5,625.00	2,812.50
Farmers' recognition in effectively managing water for agriculture	43,200.00	27,000.00	13,500.00	6,750.00	6,750.00	3,375.00
Total	1,06,39,061.00	66,49,413.13	33,24,706.56	16,62,353.28	8,34,551.64	4,17,275.82
Present value of each year (DCR=3.5%)		64,24,553.74	31,03,649.15	14,99,347.42	7,27,263.54	3,51,335.04
Total Present Value (PV)						12106148.9
Total investment (THB)						9733218

Net Present Value (PV minus the investment)		2372930.9
Ratio on social return (Total value: cost of investment)		1.24

The table above shows the results of SROI assessment as a tool for evaluating the social impacts on investment in jasmine rice cultivation in Dokkhamtai District. The value of social impacts from water management for agricultural policy in jasmine rice cultivation areas in Dokkhamtai District is 12,106,148.90 THB, with an investment capital of 9,733,218.00 THB, and a ratio of social impact per investment at 1.24 THB, as shown in Table 8.

Value	Financial value of impacts
Net value (THB)	1,21,06,148.90
Total investment (THB)	97,33,218.00
Ratio on social return (total value: cost of investment)	1.24 : 1

Data from Table 8 shows the social return on investment in water management policy for agriculture in the cultivation areas in Dokkhamtai District, Phayao Province. It can be concluded that 1 THB of investment will provide a social return of 1.24 THB.

RESEARCH DISCUSSION

The issues related to explain the social impacts on the water management policy for agriculture in jasmine rice cultivation areas in Dokkhamtai District, Phayao Province contain the characteristics of social enterprise that should be applied to SROI to assess value according to the definition by Olsen & Nicholls (2005). There are at least three characteristics: 1) Organizational development process, 2) Receiving subsidized funding for social aims, and 3) A willingness to separate income and social or environmental expenses from income and monetary costs. This research paper found related factors to explain the profits, according to the SROI concept, as follows:

Firstly, analysis defines the importance of stakeholders by the opportunity of the impacts that are consistent with the farmers' and stakeholders' views in formulating water management policy for agriculture in the jasmine rice cultivation areas in Dokkhamtai District, Phayao. Secondly, impact analysis studied the development of management policy for agriculture in the area. The input factor is the amount of water in jasmine rice cultivation delivered to farmers in water management to support quality rice cultivation that facilitates standardized rice products, increased sales price, and marketing support from the government.

The assessment on business profits shows the impact on increasing income for sales of jasmine rice, reducing the cost of the rice cultivation process, the improved quality of life of the farmers, the decrease in the numbers of migrating farmers, the reduction in the use of chemicals, the pride felt by increasing income from additional occupations such as selling jasmine rice products, selling jasmine rice seed, and income as guest speakers on water management.

Additional profits can be measured through a decrease in the cost of pumping water to the rice fields, the costs of medical care required by occupation or disease caused by the use of chemicals, and the cost of migration to work in Bangkok during the dry season.

The results of the SROI assessment show an overview of value assessment in contributing projects under the policy of water management for agriculture in jasmine rice cultivation areas in Dokkhamtai District, Phayao Province. These results may attract the attention of supporters. The social return value of the water management policy of jasmine rice cultivation in Dokkhamtai District concluded that net profits are 2,372,930.90 THB, with a total research fund of 9,733,218 THB. The social return from investment came in at 1.24, which means that 1 THB of investment received a social return of 1.24 THB. This confirmed the value of the return on investment. The social return dividends will be share done year after the implementation policy.

RESEARCH SUGGESTIONS

1. The limitation of the geography of the study area, including the complexity in accessing the area, along with the severity of the Covid-19 pandemic conditions, caused difficulties in reaching the key participants. Further research for more complete data collection is needed under appropriate study conditions.
2. An assessment of the social return on investment of the economic, social, and environmental impacts under the implementation of the water management policy for jasmine rice cultivation areas at Dokkhamtai District, Phayao Province can be applied as a guideline to analyze public, private, and NPO projects before conducting any social activities to confirm the value of investment and to maximize the benefits to all stakeholders.

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