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Area-based Development for Sustainability: the Case of Kok Nong Na Model

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ABSTRACT

Area-based approach has gained more appreciation over time in Thailand development process. Together with the application of Sufficiency Economy Philosophy (SEP) and the New Agriculture Theory established by many Royal initiatives as experimental showcases. It highlights greater success and a better suitable approach in reaching out for poor farmers in the rural area. Highlight on agriculture diversity, better utilization and management of farm essential resources, and community knowledge collaboration (much more on bottom-up approach), KNN model practice has shown in this study to be an interesting alternative for social and economic development for developing country with inequality gap. Some initial investment is required for storage of water for year-round farming and cultivation. The practice fits perfectly with Biodiversity, Circular, and Green (BCG) economy where various types of plants, trees, fishery, and cattle are combined in farming activities based on each individual farmer's interest and specialization. Residuals from one farming activity are used to further enhance other farming activity productivity, and improving land fertility. Diversity agriculture reduces the need for pesticide as opposed to monocropping. The farming approached as mentioned above has been proven to be benefited and in line with large scale farmers, where the advantages of economies of scale and diversity of productions can easily be combined. Unfortunately, the same principle cannot be applied to smaller size farmers who appear to be dominated in Thai agriculture sector. Therefore, the objective of this study is to come up with some concrete assessment of possible success of smaller farmers to be successful in their transition into KNN model practice. KNN model can be adopted as another alternative approach for agriculture sector and area-

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based development strategy in Thailand. A hypothetical household (small size) was set up by extracting information from questionnaires and surveys with KNN model farmers across country and benefit-cost analysis method was used for the feasibility analysis. The study shows that, financially, KNN model has proven to be feasible for farmer with small, medium, and large size of land (data from our surveys indicates that most larger land pot farmers practicing KNN model are successful farmers). A sizable amount of funding is needed as an initial investment and funding also required for later stages to maintain fertility of the plot even though part of these needs can be fulfilled by some of the short-term income generated. The process might take roughly about 4-5 years for farmer to be successful and stabilized by which they earn sustainable annual income above the self-sufficiency level. Findings from the study reaffirm that KNN model can be an alternative approach for rural community development, and it builds on farmer's specialization toward sustainability particularly for small farmers who potentially can be left behind in the traditional development process.

Keywords: Sufficiency Economy, Area-based Development, Agriculture Diversity, Mono-crop Farming, Kok Nong Na Model, Cost-benefit Analysis, BCG Economy

Background and Significance of the Research Problem

Thailand, over the last 50 years, has engaged in a large and continuation of economic development process in countering with poverty related issues. The fundamental problem for most developing countries has been getting most of the population up to a better standard of living by raising productivity. Economic growth has been the major focus driven by income generation, and it has been successful to a certain degree where large amount of poverty was eliminated. Moving up the ladder and standing at an upper-middle income stage of development, infrastructure development projects in high economic potential area such as the eastern seaboard has been the core development path hoping that it would be served as growth driver. Unfortunately, the positive spillover effects were limited largely with resources that were easily mobile. Labor migration from the rural agriculture-based area into urban and industrial estate leaving behind those who were incapable of moving. As a result, Thailand has also been criticized of having an economic structural problem rooted in inequality issue. Not only income but also wealth and other dimensions of inequality such as education, especially quality of education, was pointed out as one of the major obstacles preventing the country to move forward and get out of middle-income trap.

Improving quality of living in rural area has been a profound challenging aspect in Thailand sustainable development path especially for smaller farmers who live in remoted area. Getting access to necessary inputs such as market information and more advanced technology so that to improve productivity has been limited. The process has become more complex recently with the emergence of inequality concerns in many aspects. Small farmers in the rural area appear to struggle to raise their productivities so that to catch up with other sector in the economy. Higher potential labor in the agriculture sector shift away in searching for better opportunities in the city leaving the elderly generation behind. The average age of farmers in Thailand has increased over the past 30 years makes it even more difficult for them to adjust from labor-intensive to more capital- and technology-intensive approach such as smart farming and precision farming. Moreover, distribution of benefits attained from the export and tourism sectors seem to be difficult because of the existing bottleneck in domestic value chain and the mobility of resources, especially capital and labor, into some of the area received infrastructure improvements. As a mobile resource, labor force in the rural area, mostly in agriculture sector, was drawn into the urban area with greater income opportunities as incentives.

Area-based development has shown to be a significant and necessary component in Thailand's recent sustainable development plan as it was repeatedly emphasis in the country's 20-year National Strategic Development Plan. Recent development policies need to be more precise, more targeted, and focus more on smaller scale investment and reaching out for those poor households reside particularly in the remoted area which getting access to the necessary large-scale infrastructures, such as good schooling, decent healthcare facilities, and access to the market, to improve their production capability are limited. In fact, it is getting much more difficult over time for those households to catch up with the changing economic and social structures surrounding the community. For instance, technologies are reaching out and e-commerce are everywhere. Instead of using those available advancement to enhance their products and values, they were not able to adapt to the changes and ended up suffering to the degree, in some cases, simply struggle to survive. The objective of this paper is to strengthen the essential of area-based development, where the development process relies on bottom-up and cooperative networking mechanism, as an alternative way to achieve a more sustainable result. In addition, by using KKN model as an example for an economic and social assessment, this study aims to shed some light on how and what policy choices are for Thailand to engage in its development path toward inclusive growth or development.

Research Objective

In seeking ways for rural development and hence creating economic opportunities for many who has been lagging and left behind in the development process, special provision programs have been introduced. This might be considered a better option for policymakers aiming toward social development as well as mitigating inequality problems. Successful showcase of KNN model has been around in Thai society but whether it can be applied in general cases. Complaints of unsuccessful cases have also been buzzing around arguing that practices of KNN model is just a gimmick for government officers to draw fiscal budget knowing it does not worth doing it. The main objective of this study is to reaffirm quantitatively the possibility of KNN model offered as an alternative approach for rural development especially for smaller farmers to achieve sustainability option of improving quality of living. This paper is organized as follows; reviews of some conceptual ideas related to rural development and area-based development are discussion in the next section. Description of Kok Nong Na model (KNN model) practice and its essential features are provided for the explanation of how it works. Financial feasibility of KNN model based on a set of assumptions using representative farmer who participated is analyzed in the following section. At the end, summary and remarks are provided as an argument for alternative rural development approach.

Scope of Research

Conceptual Thought on Area-based Development and Design

Some literature reviews related to area-based development is provided in this section. For country like Thailand, water management is a crucial for way of life and development process. Economic activities in the remote rural area are mostly agricultural related. Availability of water used for farming and fertility of the farmland are essential for the survival and maintaining financial adequacy of most households. To lift those low-income households out of poverty, it is almost inevitable to improve income generated from agriculture products. Government investment in large water management infrastructures such as irrigation system, reservoirs, and dams were built but were not effective in covering much of the agricultural area. Farmlands outside the covered area run a risk of flood damages in the rainy season and drought damages in the dry season. Most of the land was used for cultivation once a year. Water has not been adequately supplied and these rural households were left facing climate risk on their own. Rainfed agriculture and mono-cropping was the only option for poor community.

McLean and McLean (2001) and Na Chiangmai (2005) describe rural development as a dynamic process involves human resource development in all aspects; individual, organization, and community. Area-based development follows the similar path and focus on positive changes happened in the development area. It requires interdisciplinary knowledges and a well-established strength within households and community. With area-based development, household is the nucleus of the development process and later in the next stage can form into a community to address bigger and more complex issues in sharing public goods and collaboration. Meaningful impacts to improve standard of living in the rural area do not come from monetary assistance packages, mostly transfers, nor some government market intervention mechanism such as price or quantity control over agriculture products. It is much more relied on how much the community members can get together and help each other out in tackling their common difficulties as a group. Collaboration among themselves become such a profound factor for successful sustainable development especially in a rural remoted area where, reaching out by the government or expending of city prosperity is harder to achieve.

Collaboration especially at the community level plays such a significant part in area-based development. Na Chiangmai (2017) emphasizes on the significant role of efficient collaboration for knowledge creation in area-based rural development where bottom-up knowledge creation at the community level to collectively identity needs and seeking ways to encounter problems. Hirose (2011) further highlights on three crucial factors for successful collaboration covering; sharing of physical and mental foundation (for this study referred to farming infrastructure and social supports for farmers), information- or knowledge-creation and social ecosystem, and the role of leadership in value sharing and intrinsic motivation (stick together and encouragement as farmers go through difficult periods). Another key feature in successful area-based development, specifically related to agriculture-based economic activities, has been pointed to the establishment of necessary infrastructure at the household level so that there is enough incentive to invest and maintain the system. Self-reliance approach where individual household prioritizes its goal to self-sufficient at the early stage and later development into a much more sustainable way of living helps improve farmer's quality of living in the rural area over time.

Kok Nong Na Model (KNN Model)

KNN model is a smaller scale on a private or individual decision management which has been introduced as an alternative approach for area-based development. A crack behind the

scenes of the new (alternative) approach to rural development as another application of the Sufficiency Economy Philosophy (SEP) and the New Agriculture Theory initiated by King Rama IX in Thailand. It has been proven successful in many cases exhibited in the implementation of the Royal initiative projects in various areas across the nation. Necessary farming infrastructure for water storage is the essential component to start with. To improve land utilization for framing, adequate amount of water must be provided for farmer on a year-round basis. It is also crucial that armers must adjust and change their farming habit as well as attitude so that they can achieve more efficient use of valuable water and other farming inputs. Knowledges including management skill, farming techniques, and technology are required so that household who now equipped with farming infrastructure can organize farm activities in the most effective and efficient way.

Diversity Agriculture Practice for Household Income and Expenditure Stabilization

The idea of diversity agriculture under Kok Nong Na model turns small scale farmer into a better farming condition. With that, farmers are less exposed to some of the market risk, price fluctuations and the changes in quality demand and supplies, which they cannot control or accept to the impact, i.e., once get hit with a shock, such farmer become poorer and indebted. In the other words, by changing farming practice to be more diversified, farmers gain their ability to work in the market mechanism. The small amount of farm products is easier to take care of when unexpected event such as falling in price influenced by many other factors. In fact, these agricultural products are used for household food consumption which in turn meet two additional purposes of providing food necessary and reduce household expenses. Consequently, farmers with KNN model practices are considered to have better self-immune to price fluctuations. Demand uncertainty of agriculture product is diversified over a range of products harvested from the same farmland. In comparison to monocropping farming, despite smaller amount of output and hence less income to be generated in each cultivation, KNN model farmers enjoy a more stable and consistent flows of income over the year.

From market perspective, diversity farming at a small-scale increases farmer's individual supply elasticity. Farmers have more choices with their farm products which they can use for own consumption or sell at a better price in the local market or even share or exchange for other things with their community. For instance, free meals can be offered in exchange for some helping hands in the farm from their neighbors. This indirectly increases farmer's negotiation power in the market and less obligate to unfair price practice if there is one in the market. Moreover, the risk from extreme weather and its impacts are inevitable for small poor farmers

which can be mitigated by plant diversity. The chance of having plant disease and pest in the farmland also minimized by way of multiple cultivation and rotation of various plants grow in the same plot of land. This is to say that farmers are in a better position in risk management and some of the unnecessary uncertainties are diversified. The loss of scale efficiency is compensated by the gains from economies of scope given a set of fixed input.

Providing Necessary Infrastructure and Improving Efficiency Utilization of Resources

Development in the agriculture sector has been relying heavily on the necessary infrastructure development such as irrigation system, the use of machinery, and advance farming practice to enhance its productivity. Unfortunately, attempts to provide these needed assistances in a large scale have been proven less efficient and unsuccessful for small farmers and those who are not covered in the development areas. Shifting from relying on government provided infrastructure required for agriculture which is not adequate and inefficient into private self-managed determination.

Conceptually, KNN model is focus more on increasing the utilization of land. Making it farmable year-round instead of leaving the majority of farmland not utilized during the dry season. Traditional farming in Thailand that relying on rain-fed crop, such as rice farming, only allowed to complete once a year in the rainy season. Excess labor in the off-season migrate to the urban area in seeking for job opportunities and earn extra income. Agricultural lands are left unattended and there is no significant attempt to improve the quality of farmland in preparation for next crops. With KNN model practice, multiple cultivation made possible which increases the value of output obtained for the same plot of farmland. Moreover, the efficiency gains are coming from the fact that to have enough water stored for year-round uses, farmer needs to carefully plan on how to make use of the available water in the most productive way. The water pond is also use for fishery to create food for self-sufficient and more value if sell in local market.

KNN Area-based development: Necessary Conditions for Success

Area-based development in KNN practice or any other approaches requires some of the conditions needed to be fulfilled.

1. Strong commitment from the participating farmers

2. Some initial investment is necessary particularly for the provision of water storage for household and farming uses. Planning and managing how to collect, store, and use are also essential.

3. Knowledges, farming techniques, and collaboration in knowledge-creation and -sharing are all important mindsets need to be established for KNN model farmers together with planning and management skills for risk diversification.

4. It takes some time at the beginning stage before the stable income streams settle in which means farmers need to have enough patient and not give up easily.

5. There are some uncertainties involved both in the starting period as well as to carry on KNN model practice since each plot of land for area-based development is unique and requires specific attention.

6. Technical problems and knowledge creation for further improvement of the farmland and farming techniques are going to development and thus, collaborative knowledge creation and sharing via communication network is such a useful advantage.

Research Methodology

A hypothetical household who practices KNN model was set up as a representative and treated as our unit of analysis to explore some possibilities of success quantitatively. The setting derived from KNN households' characteristics and the ways of how all of KNN model activities which contributed to household's potential benefits and costs such as the variety of plants to generate short-term and long-term incomes. Numbers of surveys and interviews were conducted among random sampling of households across regions in Thailand for various size of land plots. Unfortunately, this study cannot capture the expenditure side of corresponding to spending behavior and cost of living. However, most of households interviewed revealed that expenditures have been reduced significantly after participating in KNN model practice. A wide range of rationale provided from relying on products in their own farms instead of purchasing everything from the market to reduction of some unnecessary expenses such as hiring expenses as family labor is enough to cover the work in the farm, health expenses as they become healthier, and even cutting down on cigarette and alcohol consumption. Moreover, there also some mentions about non-monetary benefits such as having more family time together and improving mental health as farmers have less stress from working. These benefits have not been considered in this study. All of these gathering information was then used to project this hypothetical household for our quantitative cost-benefit analysis.

KNN Model Financial Assessment

A simple cost-benefit approach is employed in this study to shed some light on the possible success of KNN model practice. KNN model is based on the idea that water and land

are the most important factors of farming production and thus, it is important to increase the utilization of both resources. By doing so, farmers will be able to enhance farming productivity and capability to raise income and hence, better quality of living. In the past, from a farmer perspective, if enough water can be stored, multiple farming cultivations will be possible. Short-term plants and long-term perennial trees are managed so that more income generation opportunities are opened for participated farmers.

A Framework for Financial Feasibility Analysis[3]

A value for money assessment based on KNN model activities are investigated. Financial feasibility, base of project cost-benefit analysis, in supporting farmer decision whether to participate in the program was analyzed. Farmer's benefits are calculated from the expected income streams in all farm activities in various cultivation of short- and long-term plants. Short-term plants are mostly vegetables that can also be used for household consumption and an alternative to sell in the community market. Banana, papaya, chili, and tomato in various kinds are among the popular choices. Several fisheries, mostly Tilapia, and farm animals (cattle) are also considered depending on farmer's interest and specialization among the available choices. The cost of animal feed is rather small for farmers because they rely mainly on residuals from the farm. Some perennial trees are planted which will create more later in the later years. Fruit tress such as mango, guava, coconut, mangosteen, and durian are among the top choices. Moreover, perennial non-fruit trees such as bamboo and other types are planted to provide shaded area for farmers while working in the field and woods to for house repair in the later years. If not used, the value of the trees is perceived as long-term saving for the household. The initial investment costs of KNN model farming includes land development according to the KNN design (mainly digging up ponds to store enough water for annual usage both household consumption and farming). The expense on volunteer worker(s) hiring allocated to the plot by the KNN model project under the government economic rehabilitation fund during Covid-19 is used as a proxy labor cost required to get participating farmer ready at the beginning year. The funding for materials supporting the KNN model activities is included to represent the cost of setting up communication networking. Moreover, annually cost of farming and harvesting cost are the average cost for each plant with data provided by the ministry of agriculture and cooperatives. The information on type of plants, farm animals, and fisheries as well as the

[3] Database used for financial analysis in this paper obtained from the agriculture surveys by Ministry of Agriculture and Cooperative, Thailand.

quantity of each farming activity are collected from questionnaires and interviews with the representative farmers across various areas in Thailand. Additional financial assumptions related to the assessment such as the applied discount rate and the periods to covered in the analysis are provided to match with farming behaviors. Net Present Value, Internal Rate of Return, and the payback period are calculated to analyze financial feasibility of the project at the farm level.

Assumptions for Financial Analysis

Discount Rate. Since KNN model activities involve income and expenditure flows over time so that the rate for time preference value of money is required. The calculation of this financial analysis assumes a discount rate at 6%. The rate represents the possible cost of borrow for the participating farmer, perhaps with some financial assistants from the government, for the necessary initial investment in farm development infrastructure. Of course, the higher rate will have a significant impact on the financial decision because large part of income streams from KNN model activities are coming from farm production in the future when most of the trees start to bear fruits. Some of the farmers who do not have appropriate financial access, if consider small farmers who were forced to rely on informal debt for their financing, will find it much more difficult to find it makes sense to switch to KNN model practice and less chance of being successful had they join in.

Expected Income. Farmers who practice KNN model chose their own farming activities based on interests and specialization. Streams of current and future income are generated by farming activities. Various plantation of short-term, mostly different kinds of vegetable especially for dairy household food consumption and seasonal grain crops, and long-term trees which are to provide future incomes and savings. Expected income is based on farm productivity and price of the farming products. For this study, farming activities are based on the representative small size farmers, 8 plots in different area across the country. Productivity is assumed to follow the guideline of the information provided by the ministry of agriculture and cooperative which is the average of output per rai. Prices of the farm product are assumed to be an average price in the market. Moreover, perennial plants are assumed to bear fruit from year 3 to 7 in a gradually basis and reach its maturity level of output from the 7^{th} year on.

Expected expenditures (or costs). KNN model requires initial investment to install the necessary infrastructures which in this calculation based on the expenses incurred in KNN model project implemented by the government during the Covid-19 pandemic under the economic rehabilitation loan fund. Those expenditures include land development cost, hiring cost provided by the project which represents some of labor hours needed at the beginning stage,

funding for material supporting KNN model activities to create KNN model practitioner networking and collaboration, and some contribution from the farmers. To form a strong communication networking and collaboration has been crucial for KNN model practice. Knowledge and specific farming techniques will be shared among members in the group and when farmers encounter with unexpected difficulty along the way, some consultation sessions can be initiated to collectively help each other out. Additional costs of farming also included based on the average cost in maintaining and harvesting the perennial plants over the years. Forgone income from the farmer's decision to give up current job is also included.

Project Duration. For the financial calculation, this study assumes a project program that last for a 10-year period in the analysis. The period is long enough to account for the benefits of perennial trees to generate income for farmers, i.e., if the project is financially feasible in 10-year duration, it certainly will be feasible for the longer period as perennial become more valuable over time.

Results

Financial examination of a small (household) size farmer, 3 rai of KNN model practice which provide enough water for year-round usage cover 11 rai of agriculture cultivation, indicates that farmer can benefit from the practice especially in the long-term period. If the farmer can become self-sufficient and get through the first 3 years under KNN model, benefits start to exceed the costs from the third year on and much more stable positive net income will be generated with income from perennial trees set in. Farmland is expected to be better utilized as multiple cultivation within a year is possible. Farmland productivity improves instead of deteriorated over time because diversity agriculture allow farmer to add non-chemical fertilizer at no cost compared to mono-cropping farming where more chemical fertilizer is needed over time. Table 1 shows that the farmer who participated in the KNN model is expected to have a positive value of NPV of about 720,000 over 10 years. Farmer is expected to have an initial investment of over 220,000 baht mostly for water management infrastructure within the farm which, in this case, farmer got support from the government under the Covid-19 economic rehabilitation project. Under normal circumstance, it is the financial burden and risk a farmer must take if he/she is going to start KNN model practice. In fact, this amount of required investment is a significant barrier for small farmer, especially those who are poor and having limited access to funding, to practice KNN model.

Table 1 Project's Value for Money at the Farm Level (KNN Household Lab Model 3 rai)

Year	Net Cash Flows (baht)
0	-220,880.00
1	-81,969.16
2	12,726.93
3	72,434.85
4	90,207.10
5	145,501.17
6	143,155.17
7	235,059.20
8	236,273.57
9	321,208.23
10	382,532.26
Discount Rate = 6%,	**NPV = 720,121.51 baht**
IRR = 31%,	**Payback Period = 5 years and 1 months**

Source: Calculated by Authors

It is also important to point out that, to be successful, farmer needs to bare some cost of foregone income especially in the first couple years before more income from the farm can be earned in the later years. Uncertainty in the first couple years of KNN model is a very crucial according to interviews with participating farmers. It was observed from the field survey that some of the KNN model plots, that was unsuccessful, was a result of some unexpected event such as flooding in the area right after the ponds were finished and most of the plants were still too fragile to weather the impacts. In some cases, it was the technical problems that the area designed for water storage cannot have enough depth to ensure adequate amount of water year-round. In many cases, the ponds just do not hold up water because of the type of soil and geographical landscape which increase the initial investment and become too expensive for the farmer. Over time, some other difficulties might persist so that farmers cannot sustain long enough to gain the benefits in the later periods. Rate of return of the project measured by IRR is at 31% which is above the 6% discount rate demonstrates that the project provides significant return to the successful farmer over the course of 10-year period. It also suggests that the cost of borrowing for farmer can indeed be higher and still feasible for farmer to invest in KNN model.

Payback period at about 5 years shows that farmer needs to remain in KNN model practice for at least 5 years to be sustainable.

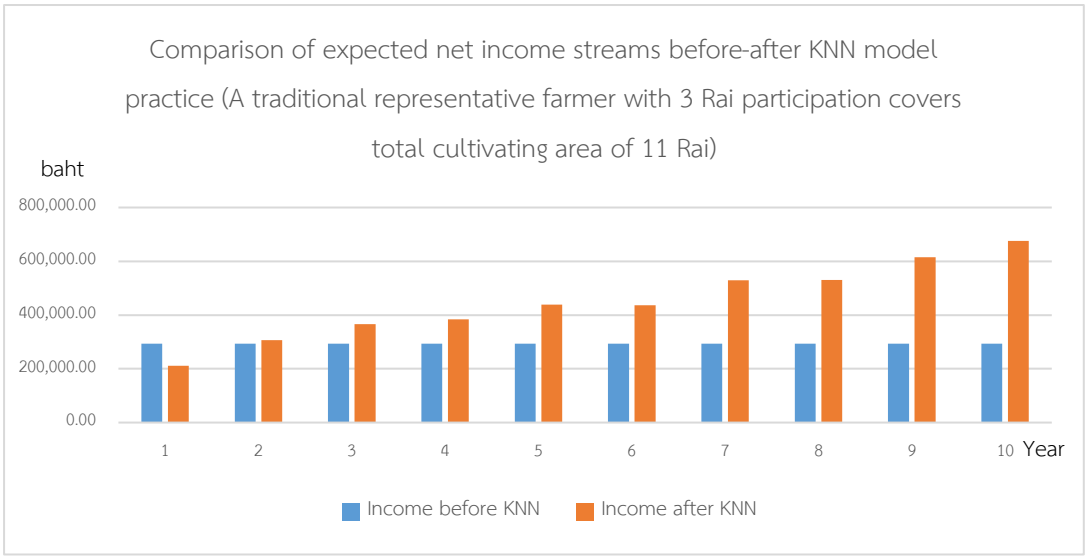

Figure 1 Expected Net Income over 10-year period Before and After KNN Model Participation

Net income streams comparison before and after joining KNN model for the representative farmer is shown in figure 1 below suggests that KNN model practice farmer can experience some expected foregone income in the first few years either from monthly salary given up or from part of the cultivated farmland used for water storage. Revenue reduction form smaller farming areas is compensated by multiple harvests of various plants. In the long-run, productivity of the farmland improves because organic fertilizer is consistently added with KNN model practice. Participated farmers are taught to recognize the important to maintain good soil quality which in turn will significantly reduce the cost of farming. After 3 years, expected income created with KNN model practice is going to outweigh farmer's prior earning. It has been pointed out from the interviews that the first couple years of KNN model practice is difficult for farmer to go through. Despite the financial analysis results shown above, only about half of the KNN plots started in the KNN model project under the government Covid-19 economic rehabilitation program was deem successful. Farmers are going to be challenged and discouraged not only be their neighbors but also, in many cases, from within the family. It is interesting to note here as well that some of the non-monetary benefits received from the interviews with KNN model farmers has not been included. Having more time to spend with family was mentioned. Parent and their children were separated when they worked in a factory

in the urban area away from home. With KNN model, they work together in the farm and children can help in some activities during free time from school. There has not been a study on the assessment of social benefit KNN model might contribute for the household and community. Moreover, it was claimed that KNN model practice also improve farmer health condition and thus, reduce household's health related expenditures. Better working conditions, less toxication in the working space, cleaner living and working environment, less chemical used in the farmland, and less stress, and relatively good nutrition are the two factors highlighted in the interviews. These expenditure reductions have not been assessed and covered in the financial analysis of this study.

Sensitivity Analysis of Kok Nong Na Model Project

Many factors contribute to the success of KNN practice. Two major factors are considered for KNN model sensitivity analysis: discount rate and initial investment because they are the important factors influence farmer's decision whether to participate. Discount rate has an implication of the cost of fund for initial investment. Small farmers in most cases have limited access to loan services and must rely on very high financial cost. Higher risk assessment also contributes to the costly cost of fund for farmers. The fact that larger portion of benefits from KNN model are coming from the later years which are subject to future uncertainty can raise the cost of borrowing even higher. It is shown that KNN model, successful case, can bear the financial cost of investment up to about 28%. Realistically, since KNN model involves in some uncertainty from many factors associated with farming activities, it might be safe to have borrowing cost of no more than 15-18% taken other risks in consideration. The estimate is rather subjective depending on how well most of the related risks can be managed and diversify over the years of practicing KNN model.

Table 2 Sensitivity Analysis on Discount Rate and Initial Investment Factors

Risk Factors		NPV (baht)
Discount Rates	6%	720,122
	15%	262,928
	25%	43,241
	29%	-4,346
Initial Investment	220,880 baht	720,122
	Increased by 100%	511,744
	Increased by 400%	94,989
	Increased by 450%	-9,199

Source: Calculated by Authors

Additionally, some of the necessary conditions required has been revealed both from the farmers (on the practical side) and the policy planner side as the country is looking forward an alternative way of development. Initial investment required is one of the factors mostly mentioned. The justification of whether how initial investment can be handled is depending on what perspective we are looking at, i.e., should this be the burden of farmers who expected to benefit mostly from the practice or should the government steps in fully or partially giving the fact that it does provide some social benefits in further stage of development? In any cases, the result indicates that KNN model can be financially feasible even with initial investment increased by 4.5 folds (over 1 million baht for a plot with 3 rai of KNN model on 11 rai of cultivation area). This suggests that the achievement of KNN model to create positive NPV is not very much sensitive to the amount of initial investment. Larger initial investment comes with better or higher quality of infrastructure which contribute to create higher value in farm output in the present and in the future. It also illustrates that KNN model can be applied to various size of farmland, sometimes it is by the choice of the farmer not necessarily has to commit all land owned, which requires different amount of initial investment. The flexibility of KNN model financial feasibility related to initial investment was to cover many scenarios and technical difficulty which requires much higher initial investment to ensure adequate size of water storage for year-round use. Some area needs to have greater depth for the water pond to hold enough water or some area might be harder to dig due to type of soil and landscape. Greater initial investment cost might cause by the needs for farmer to improve quality of soil in the farmland to enhance productivity and supporting the way of diversity agriculture.

Discussion

At the policy level, cost-benefit assessment of the KNN model project under the rehabilitation loan program largely depends on the rate of successful plots and the contributions those so call "lab models"[4] have in rural development. The analysis needs to consider farming activities over the course of the years as KNN model takes time to evolve. Farmers are expected to change their attitudes and hence, their farming behaviors to fit with the concept of Sufficiency Economy Philosophy (SEP) and New Agriculture Theory (NAT) which also emphasis, among other things, nonchemical farming. Experiences from conducting questionnaires and surveys in this study indicate that for KNN model farmers, maximizing income generation from the farmland might not be the primary objective. Instead of increasing plantation scale for more output, better or more efficient utilization of resources; particularly land and water, in the farmland takes a center stage in the practice. In addition, diversity farming approach is employed for income stability purpose over long-term period. It also enhances farm productivity by reducing resources required. In doing so, more trees and plants are grown in the same plots of land (multiple cultivations) and the quality of soil is maintained and improved because of the reduction or eliminate of chemical used in the farm. Under KNN model, a household size (smaller but adequate to fit with household demand for water year-round) irrigation system was created so that, with good management of how to be most efficiently use, enough water is available for year-round farming. In doing so, farmers make plan on what to plant and where to plant on the plot. KNN model farming is self-reliance base which means farming materials including labor are mostly from the area and within the household itself to reduce cost of farming. This does not imply that KNN model cannot be expanded so that farmer can benefit from economies of scale. It is rather taking existing scale, that individual household can handle, and making the most out of it in the first step. Then, later when farmers gain more experiences and ready both in terms of management skills and financial strength enough to accept greater risk, they can move on to the next step with a larger size. While size of the land pot, geographical location which influence the type of soil capability in holding the stored water for farming use, and fertility of farmland proven to be crucial for the success of KNN farmers, smaller

[4] For this project, the government provided the necessary initial investment for selected farmers who are interested in joining KNN model practice. One of the conditions attached was for the farmers to use their plot as experimental demonstration of how successful KNN model can be in getting out of poverty and thus, called "lab model." Successful KNN model farmers are acting as mentors and friends to help each other in the process with well-organized community communication network.

farmers are also given such an opportunity to be successful citing that financial factor was not the major obstacle but rather the discouragement from within the family as the model demand longer time period. Theoretically, it is just to make sure that with the current size farmland whether the household can reach the stage of constant return to scale yet before moving forward. Additionally, KNN model farmer is also diversity agriculture based and hence, greener practices can be anticipated. In the success cases compared to the mono-crop plantation; more trees, better utilization of farmland, and improving quality of soil are observed. The learning hubs and farmers' community networking, as presented in "Lab Model" are expected to contribute significantly to inclusive growth as the learning hubs attract more participation from farmers across country. Unfortunately, a successful KNN model practice demands great commitments and patient from the farmers which we see in many cases, farmers easily gave up and the plots become failures. Combining the "right" farmers (households) and providing them the required necessary supports play such a key role in KNN model contributions to greener and more inclusive development such that strengthen the possibility of KNN model as a legitimate choice of rural development approach in Thailand.

Suggestions

The last two decades, roughly after the financial crisis in 1997, have seen Thailand gone through a difficulty stage into the next stage its development. Poverty incidents have been around particularly in the remote area where it seems to get less attention from policy perspective. Agricultural infrastructure such as irrigation system and large-scale plantation were deployed aiming at solving the problem together with many government price intervention schemes. Unfortunately, those measures appeared to be ineffective and unsuccessful as the evidence of poverty persists. As a result, many of the small poor farmers are lacking behind because they are not capable of catching up due to their worsening economic conditions. The lands used for farming were less fertile, still relied mainly on rainfed agriculture and declining productivity are all add up to the cost of agriculture production which is the major source of income. The gap between those who can seek out better economic opportunities in the urban area and small farmers in the rural area has been widening over the years. Recently, inequality has become one of the major concerns for Thailand in its attempt to climb out of the middle-income trap. To achieve the next stage of development, Thailand needs to find a way to cope with both poverty and inequality issues while maintaining its competitiveness in the international market. This requires the country to lift those who were left behind out of poverty trap and narrowing inequality gaps. The idea of area-based development, which implies that community

in the area must be the nucleus and the main agents to lead the changes for improvement, was one of the alternative choices for development approach. Since the initiation of the sufficiency economy philosophy, it has been proven and widely accepted for its successful by helping participated farmers getting out of poverty and endure better quality of living. In this paper, Kok Nong Na model is used to represent an alternative development approach. Initial capital investment is required to build necessary infrastructure, digging pond(s) to store enough water for year-round usage, so that the land can be utilized more efficiently. Diversity agriculture is the way of farming instead of monocrop to ensure farmers self-reliance on food and income stabilization throughout the year. Most of the produces and residuals from the farm are reused in the farm and hence, reduce cost and increase production from the farm. However, KNN model practice is not a guaranteed success. It depends so much on the farmers themselves to have a strong commitment, hardworking, and patient enough as the process take a certain period to reach a satisfactory level of outcome. Despite the promising analytical results, it is important to keep in mind that KNN model success is also relied heavily on farmers themselves. Strong self-commitment, open mindset to learning and accepting the change so that can adapt accordingly and being patient enough in the development process are among the necessary factors. Supporting efforts from public sector vis appropriate and effective policies are largely welcome as an endeavor to apply KNN model for an alternative sustainable development strategy in Thailand.

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