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PISAI
Participatory and Integrative Support for Agricultural Initiative

Module 3 Report

Challenges and Opportunities for Sustainable Agricultural Production

14 March to 8 April 2019 and 23 February to 7 March 2020
Kasetsart University, Bangkok, Thailand

Prince of Songkla University
Kasetsart University 1943
Montpellier SupAgro
University of Copenhagen

Participatory and Integrative Support for Agricultural Initiative (PISAI)

Challenges and Opportunities for Sustainable Agricultural Production

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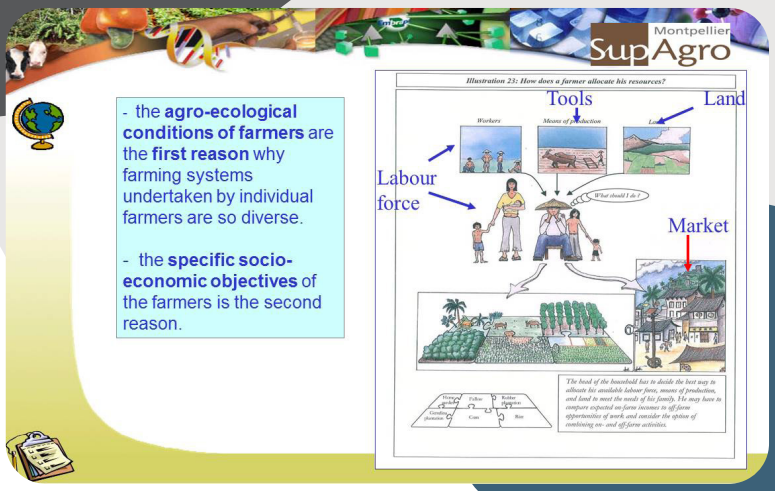
1 Objectives of the module

The module *"Challenges and Opportunities for Sustainable Agricultural Production"* is the third module of the PISAI curriculum being offered in the double degree programme *Participatory and Integrative Support for Agricultural Initiative.*

Having looked downstream at the conditions for the sustainability of the value chains of the commodities produced by farmers in a given area (in Module 1), and also upstream at the conditions of use of the natural resources mobilised for agriculture, such as the soils, and at the organisation of the farming systems at the individual farms level (in Module 2), students were exerted in this module to assess the sustainability of agricultural production at the level of a small region, and to envisage the trends of change and innovation that can be supported in the future for this area, combining extension and technical training, developing new services to local farmers, or designing local and national policies that are consistent with the aim of sustainability.

"What kind of decisions do farmers have to make?"

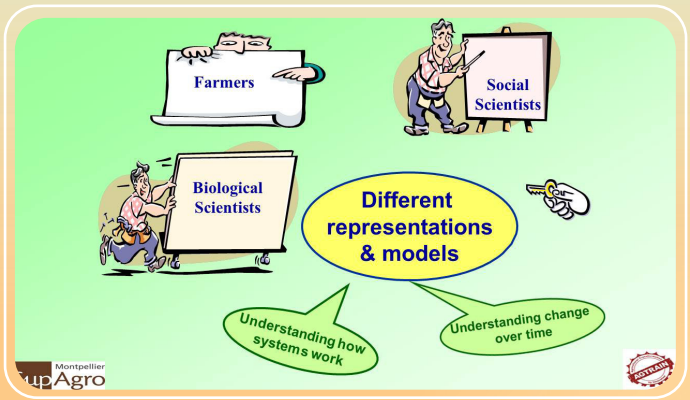
Figure 1: Assessing the conditions of sustainability requires understanding the strategies and the decisions of the farmers



Given this objective, two strong assumptions have guided the definition of the synopsis of the course and the choice of the training methodology.

Integration of knowledge by group works

The skills required for this capacity of assessment are multidisciplinary and integrative by nature. They are better met by multidisciplinary teams than by individuals, whatever intelligent and eclectic these individual students may be. Indeed, in the professional activity, PISAI graduates will generally work in teams and through cooperative mechanisms. Hence the module is organised so that students have to perform some assignments in groups, to which each of the students belongs to for the whole duration of the module. The groups are formed so that, as much as possible, students with different backgrounds and academic origins are mixed together so that they exert collective expertise.



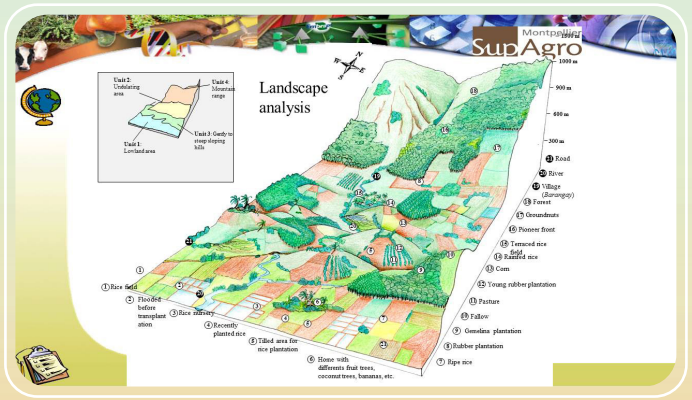
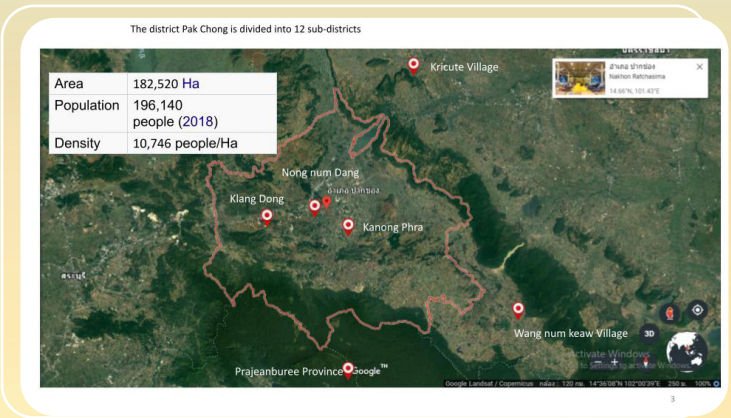


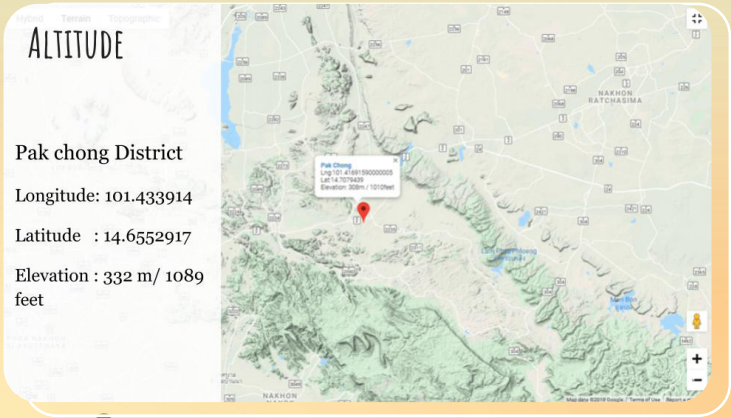
Figure 2 : Sharing knowledge and understanding requires common representations across disciplines

Learning by doing

A second assumption is that, more than for the basic knowledge itself (levels 1 to 3 of the Bloom taxonomy), getting a capacity of integration of knowledge at any upper level of acquiring competences (analyse – evaluate – create), is better achieved when students can directly organise the task in practice. Therefore, active learning was the dominant practice all along the module. During two weeks, the students practically assessed -by groups- the sustainability of agricultural systems which are practised by the local farmers, from diverse points of view. In both years 2019 and 2020, the practical assessment of the sustainability of agriculture in a small region was done in Pak Chong district, situated on the upper terraces of the central plain of Thailand, a region well known for its rapid changes and intensification patterns, and for the questions raised about its future.

Figure 3: Location of the field work





General Learning Objectives

At the end of the module, students should be able to

1. Critically discuss theoretical and methodological approaches to interdisciplinary studies of agricultural production in a small region
2. Describe and define the main concepts for farming systems analysis
3. Evaluate contemporary theories for sustainable land use and agricultural intensification
4. Translate theoretical knowledge into practical solutions that are suitable for assessing the sustainability of agriculture in a given context
5. Select relevant methods and construct a research plan for investigating a real-life "problem" related to agricultural production
6. Collect, analyse and report field data
7. Reflect on research plan and reliability of collected data
8. Generalize and reflect on results observed/obtained at the case level to broader issues of agricultural production, sustainability, self-sufficiency, natural resource management

2 The organisation of the module

Hosting institution:

Kasetsart University (KU) at main campus and at Pak Chong district (Province of Nakhon Rachasrima) for the practical field exercise

Organizing team:

1. Kasetsart University: Dr Buncha Chinnasri
2. University of Copenhagen: Dr Thilde Bech Bruun
3. Montpellier SupAgro: Dr Didier Pillot

Figure 4 : Dr Buncha

Figure 5 : Dr Didier moderating a feedback session

Figure 6 : Dr Thilde, the most Asian Danish teacher

Periods:

14 March to 8 April, 2019
and 23 February to 7 March, 2020

Partners' contribution:

- University of the Philippines - Los Banos (The Philippines): Dr Maria Lourdes Edano, Mr. Johnrell Zuniega (2019),
- Yesin Agricultural Univertsity (Myanmar): Miss Ei Thinzar Kyaw, Department of Agricultural Extension (2019),
- Prince of Songkhla University: Asst. Prof. Dr. Chutima Tantikitti, Miss Rugrat Sae-Yang, Miss Siriporn Prompat, Miss Parittiya Saejew (2019, 2020),
- Kasetsart University: Dr. Oranutda Chinnasri, Assist. Prof. Dr. Penporn Janekarnkij, Dr. Prayath Nantasin (2019), Thailand National Farmers Council: Mr. Papat Panyachartrak, Chairman (2019),
- University of Copenhagen: Pin Pravalprukskul, lecturer (2020), University of Helsinki: Dr Yumi Kobayashi (2020)

3 Preparing the field work with secondary data analysis

In 2019, the module was offered in a three week time. One week was given in Bangkok at Kasetsart University to review the theoretical and methodological options to analyse sustainability in practice, and to collect the knowledge that may be existing and be accessible about the conditions of agriculture in the district where the field work would be undertaken in the following week. Then two weeks were given in Pak Chong, where all the cohort of students and staff moved to at the end of the week 1. In 2020, the duration was shortened to two weeks, in order to make it easier to be attended by the participants, and the whole two weeks were given at Pak Chong. The timeframe presented here corresponds to the 2019 data, which are more complete, although the 2020 objectives are strictly the same, while being fulfilled in a more compressed set of time.

Defining the objectives and sharing the tasks between groups

DAY 1

On day 1, the module started with the registration of the participants, followed by their mutual presentations. The objectives of the training were recalled and the questions about sustainability of agricultural systems were raised. Lectures were offered to review the policy options undertaken in Thailand *(Agricultural Policies in Thailand: Past, Present, and Future)* by Dr. Nipon Poapongsakorn, from Thailand Development Research Institute, whereas Mr. Papat Panyachartrak, Chairman of the Thailand National Farmers Council , presented the point of view promoted by farmers organisations *(Significant Roles in Agricultural Development in Thailand).*

This introduction recalled the ultimate objectives of the sustainability studies. Subsequently, Dr Buncha Chinnasri briefly introduced the surveyed area, Pak Chong District. Students were then asked to identify, by groups, the main challenges that should be explored, in order to assess the sustainability of agricultural systems.

Figure 7: Presentation of the programme on day one. Ei Thinzar Kyaw, Department of Agricultural Extension at Yezin Agricultural University, introduces herself and explains the challenges for sustainability in Myanmar.

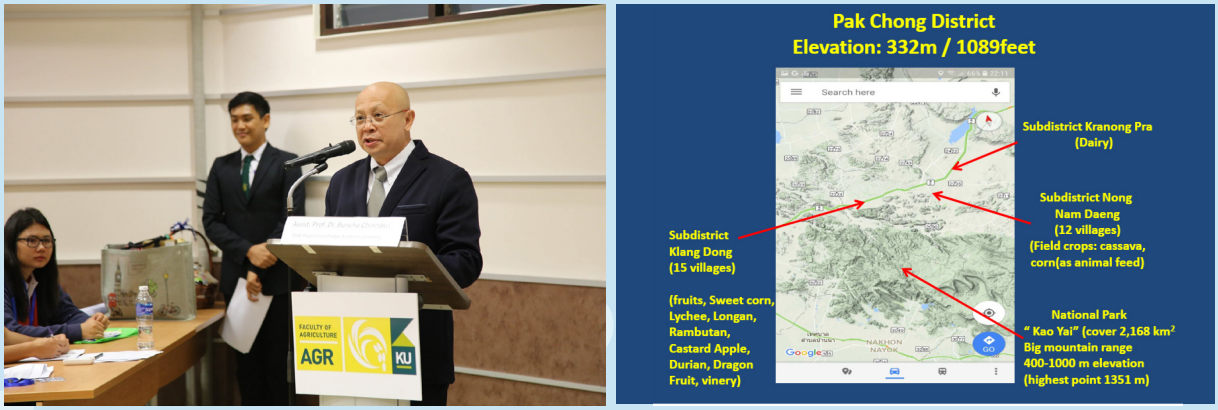


Figure 8: Dr Buncha Chinnasri presents the area for the field work, where the whole batch of staff and students will move to on the week after

On the following day, from the presentation of the results of the group work, and given the model of interpretation of the existing farming systems already developed in the previous PISAI module, four main domains of knowledge were identified as priorities to investigate, prior to going to the field and the survey:

- The climate conditions in the area and their current changes if any: rainfall pattern, temperature, climatic risks, balance of water resources
- The diversity of sub soils and soils in the area and the access to irrigation water
- The land use, the organisation of the production and the economic outputs of agriculture in the district
- The institutions, public and private, and the policies that impact the local agriculture

Four groups of students were re asked to look for available secondary information, collect the one that was relevant for the purpose, and synthetize it so that it could be shared with the other classmates. Recommendations were given by the professors about the sources of information to be explored (satellite images, maps, websites to be explored... access to information sources...).

Secondary information exploration by groups

More specifically, four short lectures were given in parallel with the group work to guide their work:

- Land use decision making in smallholder farming systems, by Thilde Bech Bruun, Copenhagen University
- Relevance, impact, efficiency, sustainability–The concepts and criteria of systems and project evaluation by Didier Pillot, Montpellier SupAgro
- Preliminary assessment for ground water resource: starting from Google Earth to geological map? by Dr. Prayath Nantasin, Department of Earth Sciences, Faculty of Science, Kasetsart University
- Economic assessment of natural resources utilization: foreseeing impact of the current transformations in the next 10 to 30 years by Penporn Janekarnkij, Faculty of economics

Regular feed-back sessions were held within the groups and between groups to keep everyone aware of the progresses made.

How can we investigate what influences farmers' decission making?

Figure 9: Two students present the results of their group work

The climate conditions in the area and their current changes

The student group in charge of studying the climatic conditions in Pak Chong reported about the basic data which could be found in various places. A number of organisations provide synthetic information about rainfall or temperature in the province, sometimes wind and evapotranspiration, but they are often in contradiction with each other. For example, when some of them are heavily complaining about the climate being dryer and dryer, others are arguing that this is not the case, but that the exceptional events (very dry or very wet) are becoming more frequent. The group argued that assessing correctly the climatic conditions in Pak Chong, and their changes, requires going beyond this secondary information but working directly on the primary data.

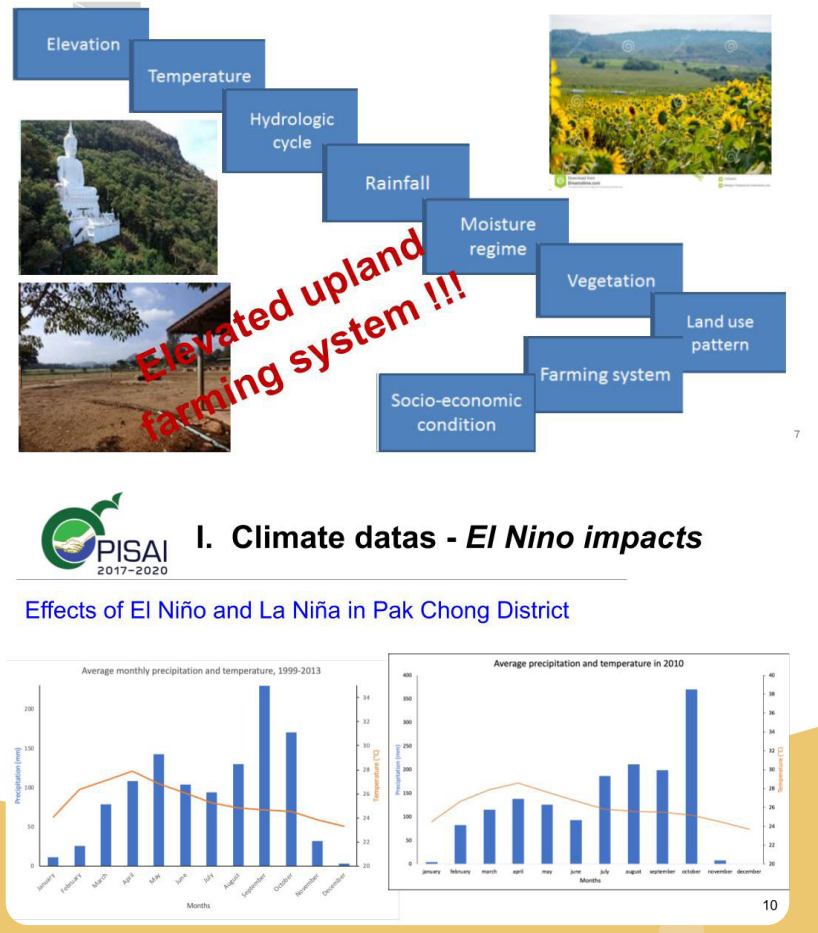
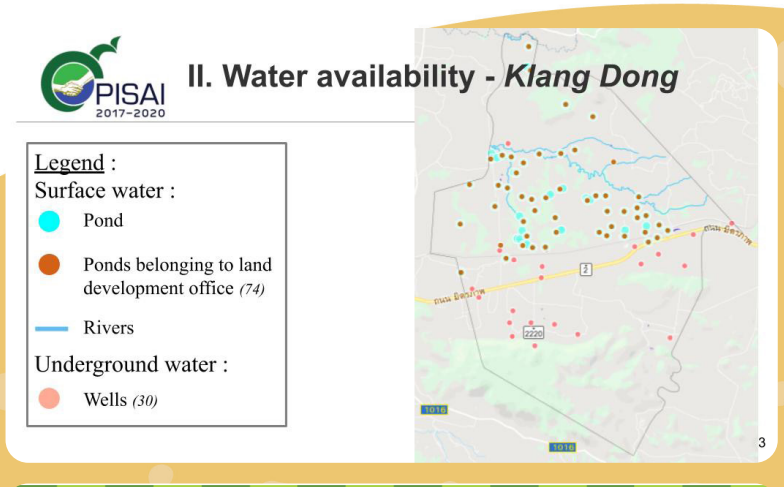


Figure 10 : Climate change in Pak chong: Need to go beyond the common complaints: Look at primary data and calculate the frequency of droughts per two weeks period…

When this is done with rigour, the data then show that the elevation pattern (which goes from 250 m to 1000 m a.s.l.) generates differences of rainfall and temperature across the district. Depending on the orientation of the winds carrying humidity and of the position of each village, the presence of elevated hills generates a "rainfall shadow effect" which may be more impactful at the beginning, at the middle or at the end of the monsoon. The data from the last 30 years confirm that that the rainfall is getting less and less, but only on certain years of the El Nino cycle and, during these years, at precise periods of the yearly pattern. The dry season –even drier- and the first rainy season of the bimodal distribution of rains are the most impacted by El Nina.

The recent extension of perennial crops (orchards) replacing the former annual crops (maize and cassava) changes even more the needs for water. Fields which used to be in fallows during the dry season are now occupied by orchards. At least for those species of fruit trees which flower in the dry season, or for those whose rooting system remains superficial, the capacity to irrigate between December and May becomes strategic. Farmers have increased the number of ponds, wells and boreholes to store the water of the rainy season and use it in the dry season. But when the *availability of water* is one essential parameter of the sustainability, the *access to water*- a social issue, is equally important to consider for assessing the sustainability of particular production systems.



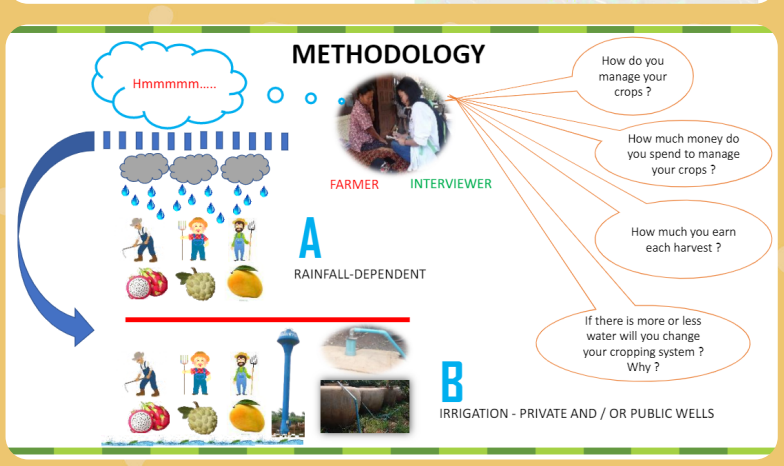


Figure 11: Growing perennial crops over the dry season : The need of irrigation and storing water. Methodological consequences for the assessment of sustainability.

The diversity of landscapes, sub soils and soils in the area and the access to irrigation water;

The group working on the geological and soil conditions, after analysing the satellite images of the area, noticed that the flat land between the hill spots in the landscape have always been deforested since 1990, while the cultivated area occupies the flat land. Contrary to what is generally said about the area, deforestation is not increasing. On the contrary, the forested surface is little increasing around the National Park, and the consequence is certainly more on a loss than a gain of arable land for cultivation, also threatened by the extension of the residential areas and roads.

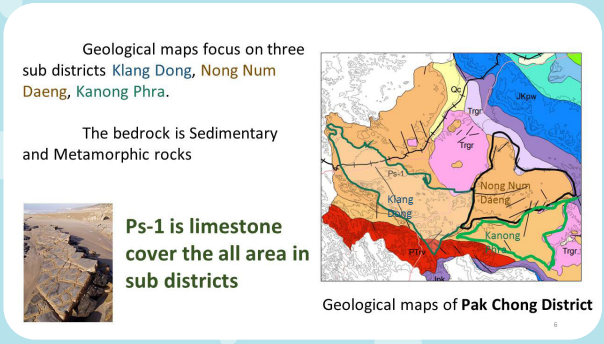
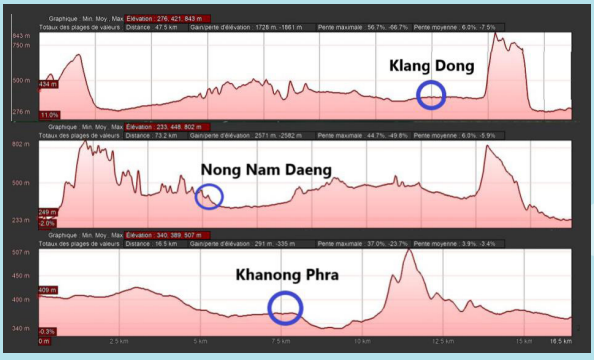


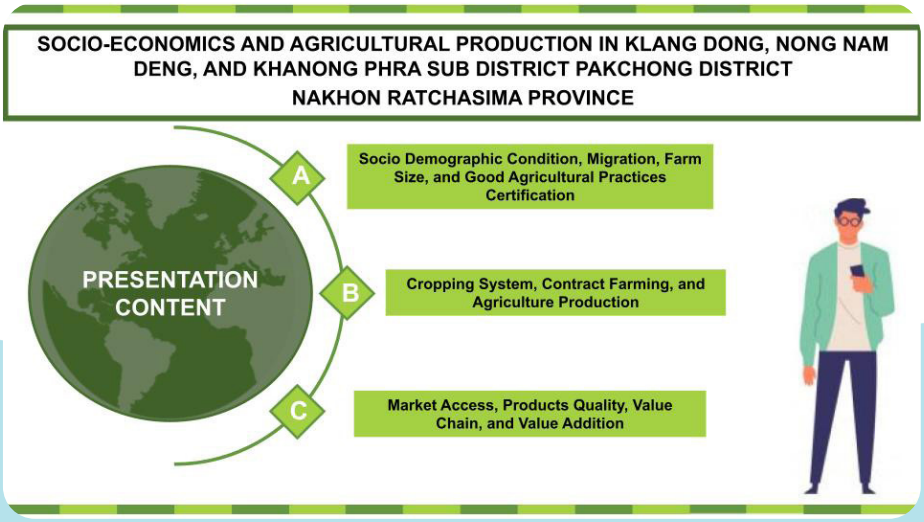
Figure 12: An alluvial plain lying on limestone underground with emerging spots of hills occupied by the Khao Yai National Park

Given that the nature of the geological subsoil on the flat land is limestone, the group identified several consequences relevant for the analysis of the sustainability:

- The soils may be balanced on acidity when they have enough organic matter but may become acid under strong intensification, permanent cultivation and alkaline nutrient leakage;
- Texture may be variable within the district, from sandy colluvial soils close to the hills (susceptible to dry) to heavy clayey soils difficult to cultivate, the structure depending, then also, on the organic matter
- The level of the water table may drop down in the limestone during the dry season or if the pumping out may be excessive, rising the opportunity cost of irrigation water.

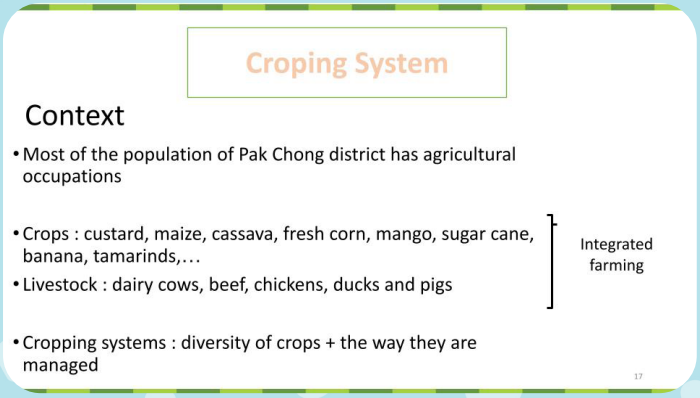


The land use, the organisation of the production and the economic outputs of agriculture in the district



Looking at the socio economics and demographics of the district, the third group underlines the active changes in an area which has moved from a traditional extensive upland crops production to the intensive production of corn and now, when the price of the land increases twice faster than the agricultural commodities that it produces, to intensive high value crops.

Annual crops, especially maize comes in competition with labour intensive orchards, while labour force is reduced by emigration of the youth to Bangkok and to tertiary activities, rather than to agriculture. Now with the facilitation of non-agricultural investments, like tourism and agro-industries, the price of the land is rising to levels that may become impossible to meet for an agricultural project. The questions raised for the future of agriculture in the district are linked with those about the future of the land resource



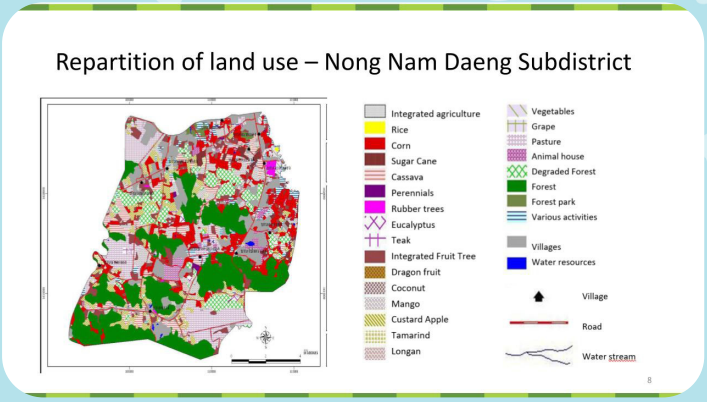


Figure 13: An active dynamics of intensification of agriculture through fruit crops and dairy production.

The institutions, public and private, and the public policies that impact the local agriculture.

The last group analysed the different public interventions that impacted the production and its organisation in the district. Opening the area to closer exchanges with the megalopolis as Bangkok, by building roads, highways, encouraging tourism (national park) encourages shifting of the land use from agriculture to leisure and periurban activities.

Competition is growing with agriculture for land, leading to high opportunity costs for keeping the land in agriculture

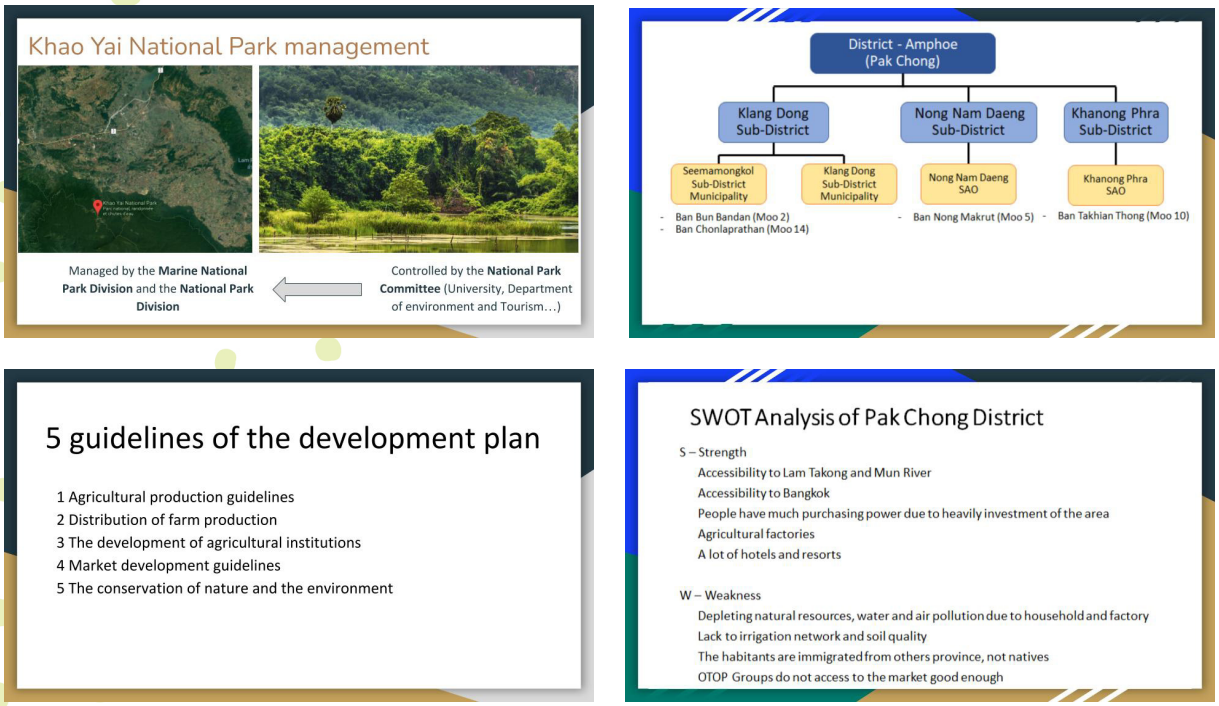


Figure 14 : Public policies encourage increasing accessibility from Bangkok and tourism linked to the national park.

After a rest in the morning (Sunday), the whole group of students moved to Pak Chong district and got accommodated in Suwan Farm. Suwan Farm is the corn seed production farm of Kasetsart University, located on the RN 2 that crosses Pakchong district. The farm provides good conditions of accommodation for groups of learners, right in the centre of the northern part of district.

4 Assessing sustainability in a small region

Hands-on training at Pak Chong

DAY 8

In the morning students were welcome by the head of the farm together with executives of the main public services of the district that deal with agriculture, land, water and natural resources. The area and the history of the farm and its current functions were duly presented by the local hosts. In return, the students' groups presented their preliminary findings about the area, and discussions were held about the assumptions raised at this stage.

A bus tour of the district was then offered, so that the groups observed across the different landscape units that had been identified from the satellite pictures.

In the afternoon, the groups finalised the choice of four villages that represented the diversity of situations in the district, from both the agroecological (soils and climate) and the socioeconomic (mostly based on the demographic pressure and the accessibility of the area) points of view:

- Ban Bunbandan, Klang Dong Subdistrict
- Ban Cholapratan, Klang Dong Subdistrict
- Ban Nong Makut, Nong Nam Daeng Subdistrict
- Ban Tha Kien Thong (Diary), Kha Nong Pra Subdistrict

Each group was then assigned to be responsible for further investigations in each of the four villages, all along the next step until the final conclusion and feedback session. In the evening, each group prepared the fieldwork to be done the next day. Particularly, they chose, on the satellite images of their village, the *walking paths* that they will follow to visit the different units of landscape that could be identified in the village. They also prepared *observation guides* for recording the data they would collect all along these transect walks.

DAYS 9-10

The following two days the groups concentrated on two issues:

- Firstly, building an agroecological zonation of their area, using the secondary information gathered, the week before in Bangkok, plus the direct observations they could do on the landscape and land use.
- Secondly, conducting surveys on the history of agriculture in the area, its transformation and changes and raising assumptions about the causes and origins of these successive changes

Each group organised its own agenda of visits, observations and interviews, and moments for analysing the data they had collected. Feedback sessions were organised every day so that each group could report on the progresses it achieved on these two domains, to be shared with the other groups, to triangularize findings when needed and finally to synthesise the information deriving from the 4 villages in one unique model of agroecological zonation and agrarian transformation.

11-13 DAYS

The programme continued for each group on a more independent manner. For each location (village), specific research questions were raised about sustainability of the agricultural systems in this place and a programme of surveys, measures and interviews was designed to find out responses that were specific to each of the four locations of investigation.

Methodological tools for surveys and interviews, such as Participatory Research tools were regularly exposed and discussed.

Each group could therefore define its own programme of investigation in the village, combining the use of these tools and moments for the data analysis and interpretation. Provisional assumptions were raised at each stage, to guide the observations and interviews of the following day, this generally led to revise and reformulate the assumptions of the day before.

RESEARCH SUB-QUESTIONS

A. WATER STATUS ON THE VILLAGE

1. What are the cropping systems in the village ? What are the factors limiting agricultural productivity in each of them ?
2. Does water become a limiting factor to agricultural production in different cropping systems? Which cropping systems require more water or less water ?
3. What is the rainfall pattern in the recent years (secondary data)? When and why does water become limiting? At what season, year?
4. What is the farmers' perception on the rainfall pattern ?

WATER RESOURCES AND RESPONDENT LOCATION MAP

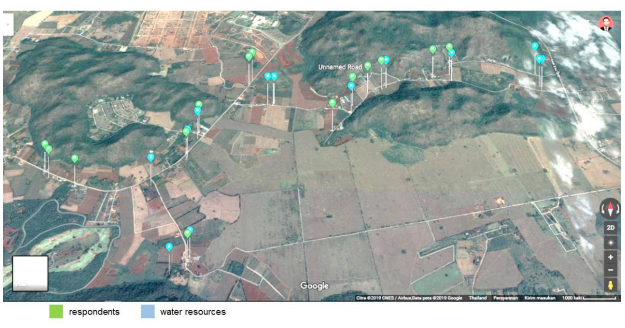


Figure 15 : Defining a methodology and choosing the tools for investigation on the field

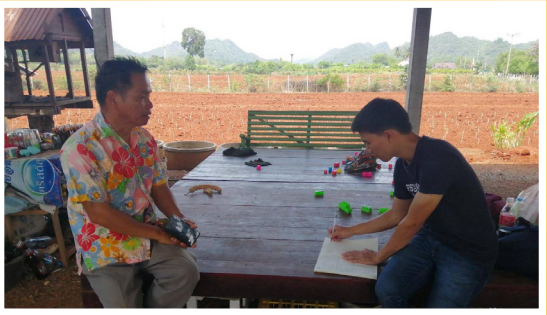


Figure 16: Observation of the real on-farm conditions of production (here soil sampling). Surveying and interviewing, all along a well defined protocol, are the basic tools of Participatory Research Appraisal (PRA)

Figure 17: Sharing the knowledge with the local stakeholders, but while (not systematically) the interpretations

Figure 18: Analysing and interpreting the data every day after the collection from the field

Figure 19: Communicating and sharing with others : the feedback session every two days

DAY 14

The whole group of student and professors could take a rest. A trip to the waterfalls of the Kao Yai National Park was arranged, as well as a visit to PB Valley Khao Yai Winery, where the vineyard cultivation was detailed and a wine testing (Hmm...) was organised with the whole group.

Water management for sustainable agriculture in Pak Chong district

Figure 20 : Two key questions for the sustainability:

1. The access to water is shared and consistent with the other resources (land, labour capacity…)

2. The maximum amount of water that can be used on a sustainable manner (Through collection of run-off water, pumping and storing…) without damage to the other users at the present time and without harming the access to water for the next generations

Water Conservation and Access Improvement

Several orchard farmers have done simple approach of water conservation with using organic mulch.

Improvement of water accessibility could be through several ways, such as :

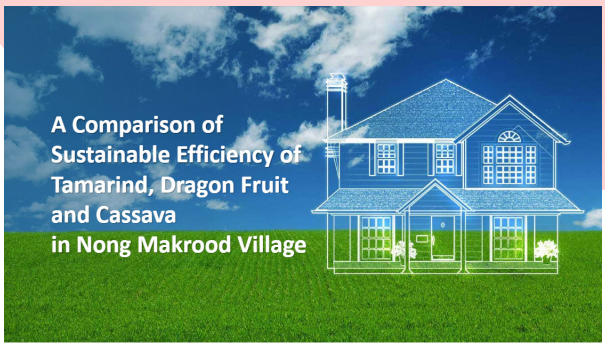
a. Improving number of sustainable public water related infrastructures for agriculture purpose whit certain rules
b. Decrement of public water price for agriculture practices
c. Raising awareness among farmers regarding the availability of public underground wells and how farmers can use it
d. Farmer education on how they can build their own water resources through creating pond in their field or practicing water conservation method if they rent their agriculture field
e. Farmer willingness to support water resources improvement determined by their land ownership

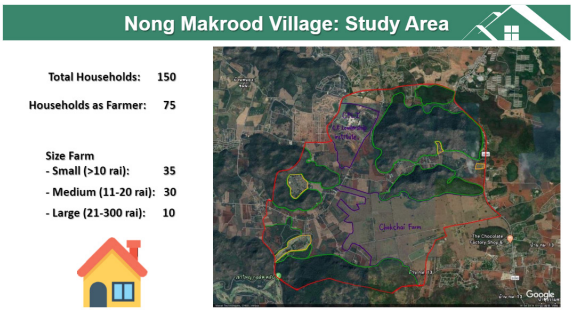
Possible impacts that farmer might have due to improvement of water accessibility is shifting their crops type, increase farm profits, waste of underground water if there are more access of underground water without certain rules.

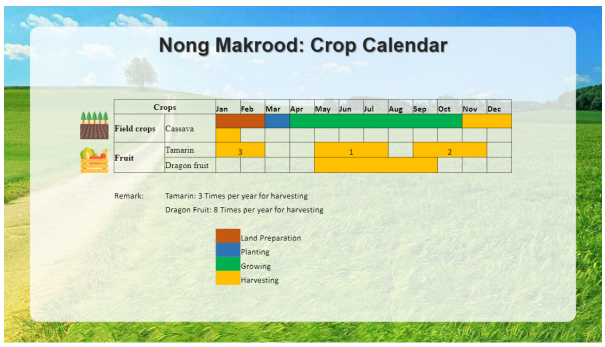
Conclusion and Suggestion

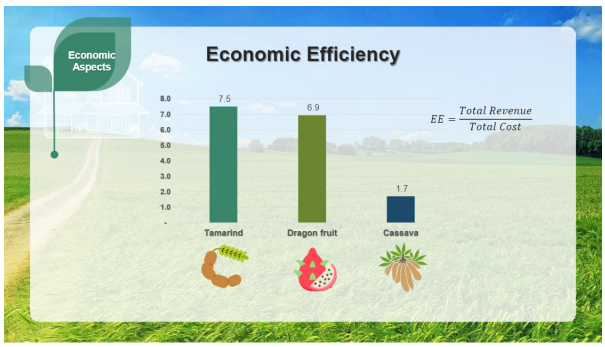
B. Suggestion

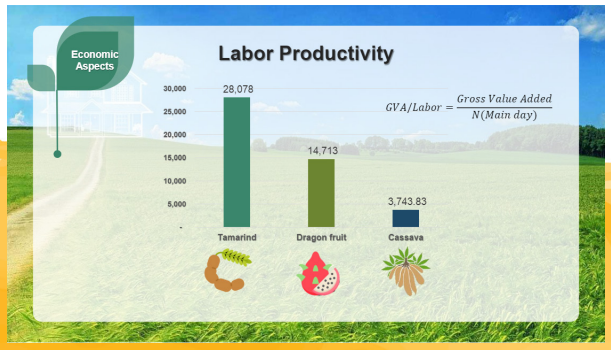
1. A detailed survey regarding on comparison of water usage by household, resort, and agriculture purpose need to be conducted in purpose which activity required most water.
2. Conservation of soil moisture content and water resources technique need to be well informed to farmers.
3. Information regarding public wells as water sources need to be well distributed to famer in certain area of village.
4. Strengthen government support on improving access in water resources with a low price might bring positive and negative impacts

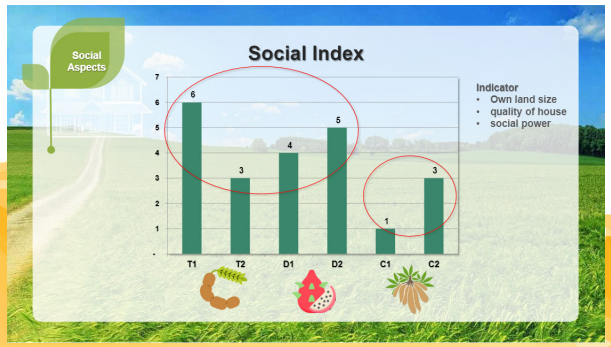


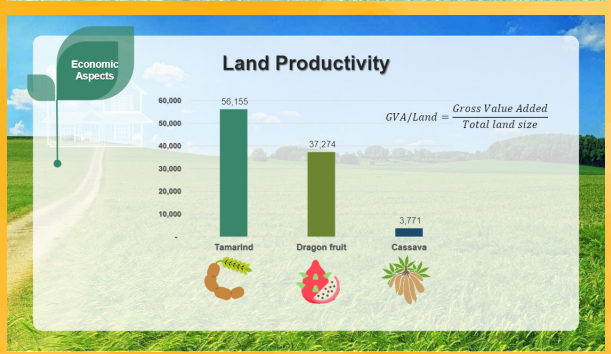


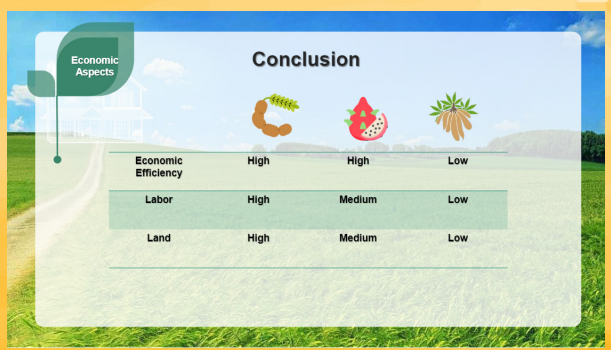


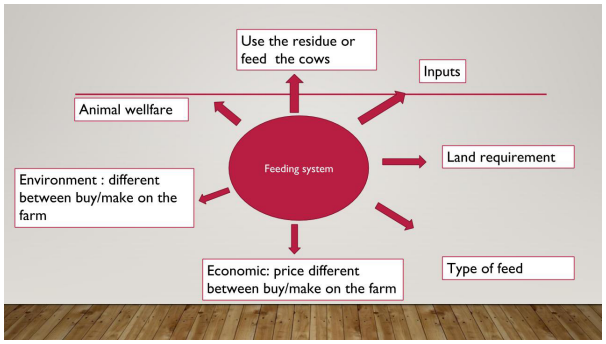


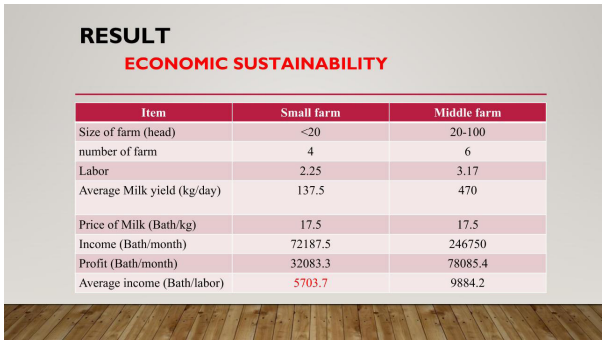












RESULT

ECONOMIC SUSTAINABILITY

Item	Small farm	Middle farm
Size of farm (head)	<20	20-100
number of farm	4	6
Labor	2.25	3.17
Average Milk yield (kg/day)	137.5	470
Price of Milk (Bath/kg)	17.5	17.5
Income (Bath/month)	72187.5	246750
Profit (Bath/month)	32083.3	78085.4
Average income (Bath/labor)	5703.7	9884.2

ENVIROMENTAL

CARBON EMISSION

feed production		transportation	
type of feed	CO2 emission (KgCO2/kg)	type of transport	KgCO2 / tonne.km
hay	0.154	truck 12T	0.461
Fresh grass (~pasture grass) **add the use of tractor if need !!**	0.0347		
corn silage	0.2	truck 7.5T	0.848
beer residues (~brewery barley)	0.412		
soybean (~peas)	0.21		
Cassava (~patatos)	0.0861		
Concentrate	0.7250125		
soybean	0.21		
bean (~peas)	0.21		
sunflower seed	0.545		
corn	0.349		
rice bran (~rice)	3.59		
cassava (~patatos)	0.0861		
molasses malt (~brewery barley)	0.412		
barley	0.398		

Figure 21 : The carbon foot print of the current dairy cows feed

For historical reasons, there is currently in Pak Chong no integration of crop production and cattle and dairy production. More than 90% of the feed is “imported” from elsewhere, while none of the crop production is used in the feed industry. Organic fertilisation with manure is low, and this has negative consequences on the acidification of the soils. As a consequence, efficiency of the fertilisers is decreasing, precisely at the moment their use is higher than ever.

When more integration is an avenue for sustainable agriculture in this area, the conditions are that the profitability of the dairy production with local feed is encouraging, which goes together with producing and selling quality milk, sold at a higher price.

PISAI Project

Economic & Social assessment of milk price depending of the quality level

Adrien Déplat - Noémie Montant - Nguyen Phuong Mai - Nongnaphat Jongkraijak - Niyaporn Khwanket - Laksanaporn Sriyapunt

PISAI 2017-2020

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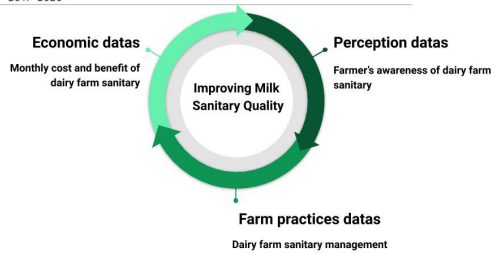
1. Preliminary work

1. Investigation documents



4

2. Social results

4. Social summary

- Farmers are **well aware** about sanitary actions such as :
  - reduces the **disease** (*Mastitis, ...*) ;
  - reduce cost of **veterinary** medicine ;
  - increase the milk **quality** level.

- Farmers **Level 1** and **Level 2** want to improve their **sanitary action** but farmer **Level 3** cares only when he is warned by the cooperative
- Farmers have to follow Cooperative criteria to sell their milk production at **Level 1** and **Level 2**

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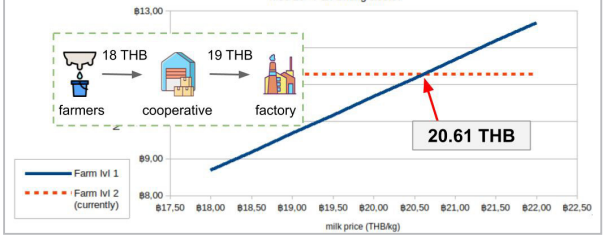
3. Economic results

2. The profitability of the milk price

Evolution of the NAV for the farm lvl1 function of the milk price

Moo 10 - Pak Chong district

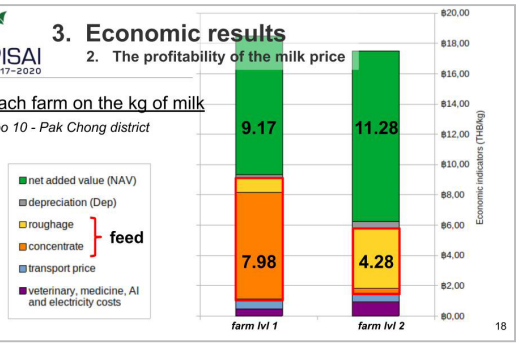


3. Economic results

2. The profitability of the milk price

NAV of each farm on the kg of milk

Moo 10 - Pak Chong district



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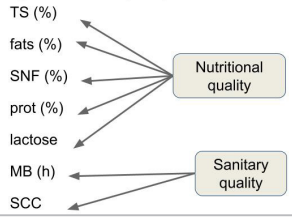
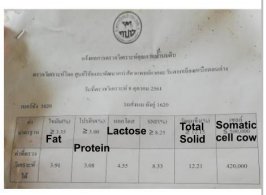
III. Results

Sub question 2 : What parameters represente milk quality ?





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3. Economic results

2. Economics Summary

Farmer **Level 1** spend more time to cleaning acts than farmer **Level 2** → sanitary acts allow better milk price *(especially cows body and animal path)* for farmer **Level 1**.

The **Level 1** farm management is less profitable than **Level 2** farm, even with a better price of milk. (NAV/kg of milk)

The ideal **Level-1**-milk price for farmer **Level 1** to reach the same NAV as farmer **Level 2** would be too high for the supply chain and the cooperative → a reduction in feed costs seems much more profitable, even with a decrease in cow milk productivity and milk price *(linked to reduction of milk components)*.

With similar food management, farm **Hypo Level 1** earns more NAV : sanitary acts worth the effort !

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For dairy production, comparisons of strategies held by farmers demonstrate that quality production is possible at moderate costs of production. To reach high levels of quality of the output, together with good levels of productivity, the optimisation of the feed is then in question.

5 Conclusion

16-19 DAYS

Days 16 & 17, the groups continued their investigations, while in the meantime they more and more concentrated on preparing the communication of their results.

Finally, on **Day 18 morning**, the groups of students gave a presentation of their results in a feedback session at Suwan farm, where the representatives of the farmers and local heads of villages had been invited. The conclusions raised were actively discussed, and the point of view expressed by the local participants could enrich the diagnostic raised by the students.

In the afternoon, however, all students left Suwan farm to get back to Bangkok, certainly with a lot of regrets that they did not have enough time to get more from all the stakeholders interviewed.

On **Day 19**, a closure ceremony was organised at Kasetsart University. Once again, the students presented their results, this time to a set of academics, which is a different exercise than the one done on the previous day, while certainly equally important for the graduates. Dr Sudsaisin Kaewruang, Associate Dean for Academic Affairs, Faculty of Agriculture, Kasetsart University, congratulated the students for their work and offered certificates of attendance on behalf of the university. Wishing that the module will be useful for the rest of the studies within PISAI or in the partner universities, Dr Sudsaisin then closed officially the module.

List of Student Participants
of First Batch

14 March to 8 April, 2019

1. Miss Keminee Tongma	Prince of Songkla University
2. Mr. Poramet Kaewprasert	Prince of Songkla University
3. Miss Warin Klakankhai	Prince of Songkla University
4. Miss Laksanaporn Sriyapunt	Prince of Songkla University
5. Miss Chattamas Promdach	Prince of Songkla University
6. Miss Nongnaphat Jongkraijak	Prince of Songkla University
7. Mr. Natthidech Beesa	Kasetsart University
8. Miss Niyaporn Khwanket	Kasetsart University
9. Miss Jureeporn Sukhatiphum	Khon Kaen University
10. Mr.Sornnarin Suangto	Khon Kaen University
11. Miss Apinya Saentho	Khon Kaen University
12. Miss Wantanee Meeloon	Khon Kaen University
13. Miss Chatnapa Nowat	Khon Kaen University
14. Mr. Seksan Duangsingtham	Chiang Mai University
15. Miss NOEMIE MONTANT	Montpellier SupAgro
16. Miss HELENE FRITSCH	Montpellier SupAgro
17. Miss Coline Marguet	Montpellier SupAgro
18. 18. Mr. Adrien Déplat	Montpellier SupAgro
19. 19. Miss Sancie Castan	Montpellier SupAgro
20. 20. Mr. Jérémy MARTEL	Montpellier SupAgro
21. Miss NGUYEN PHUONG MAI	Tropical Agr., Kasetsart University
22. Mr. ANASRULLAH ANASRULLAH	Tropical Agri., Kasetsart University
23. Miss Rosawadee Sukkum	Agri. Economics, Kasetsart University
24. Mr. Do Huy Hung	Agri. Economics, Kasetsart University
25. Miss Henzel Abellanosa Pateno	Agri. Economics, Kasetsart University
26. Mr. Johnrell Zuniega,	University of the Philippines (UPLB)
27. Ms. Ma. Lourdes Edano	University of the Philippines (UPLB)
28. Ms Ei Thinzar Kyaw	Yezin Agricultural University

List of Student Participants

of Second Batch

23 February to 7 March, 2020

1.	Mr. Suppanat Thaneerat	Prince of Songkla University
2.	Miss Kanokwan Maaiad	Prince of Songkla University
3.	Miss Sudarat Chantakam	Prince of Songkla University
4.	Miss Timaporn Artnafai	Prince of Songkla University
5.	Miss Qhithiwe Anna Seko	Prince of Songkla University
6.	Miss Phornthawon Phanbut	Kasetsart University
7.	Mr. Chutisorn Deemak	Khon Kaen University
8.	Miss Jirattikan Yontawong	Chiang Mai University
9.	Miss Kawinthip Kongin	Chiang Mai University
10.	Miss Ammarin Auparakat	Chiang Mai University
11.	Miss Ploiphailin Tantiwit	Chiang Mai University
12.	Mr. Weerachai Pengple	Chiang Mai University
13.	Mr. Natcha Ketpanich	Chiang Mai University
14.	Miss Sanida Koonpanich	National Bureau of Agricultural Commodity and Food Standards
15.	Miss Salla Siivonen	University of Helsinki (UHEL)
16.	Mr. Lim Techhong	Czech university of Life Sciences Prague (CULS)
17.	Miss Ek Sreykhouch	Czech university of Life Sciences Prague (CULS)
18.	Miss Kasia Planiol	VetAgro Sup, Clermont-Ferrand

Sustainable
Agricultural Production

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Module 3 Report

Challenges and Opportunities for Sustainable Agricultural Production