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Development of Integrated Policy for Local Food Security and School Lunch, in Mae Rim District, Chiang Mai Province

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Abstract

The research presented in this paper aims to analyze demand-supply and local policy of food security and school lunch system in Mae Rim District, Chiang Mai Province, based on the concept of participatory action research (PAR). Data was collected from 574 school administrators, teachers in charge of school lunch program, parents and students, 1362 farmers, and 85 local administrative officers, community leaders and key informants, by questionnaires, in-depth interviews, focus group discussion and participatory assessment of activity-based learning outcome. The results showed that; 1) Total demand of agriculture products for lunch ingredients was only 37%, such as rice, vegetables, fruits, and eggs, produced by local farmers. The management process of school lunch services based on government regulations framework, especially procurement and school lunch budget (20 baht) per person per day, that's difficult for selecting quality raw materials and increasing nutrition or essential nutrients for school-age children. 2) Mae Rim district had enough farmland for food crop production and food security, especially rice, the most production (64.3%), vegetables-herbs and fruits (20.7%) but organic agriculture production is only14 percent of total farming. 3) The most concern in blood testing of 400 cases, from 245 farmers and 155 students, found that only 14.8 % were in normal and safe levels but 55.5% in risk and 29.7% unsafe, indicating the health risk of farmers and school-age children that needs to be monitored, followed up, and changes their consumption behavior. 4) The development of local policy to promote local food into school meal depends on the key success factors and strategic management to reach sustainable goals. The local administrators should have authorize to manage themselves and could be linked between farmers and consumer's demands. The most necessary is to implement a strategic management process, along with creating local leaders as change agent. 5) The proposed strategies were I-FLAT, representing of 5 process activities; Integration-Farming-Lunch-Adaptation-Transformation, as a local movement model to bring healthy food from local farms

to school lunch. The issue of food security became a major concern on improving well-being of school-aged children, as well as increasing everyone's awareness on environmental and economic challenges, regarding food literacy, health behavior and agriculture systems. However, all improvement requires external support factors to take more seriously and continually for supplying organic products to school meals, such as national policies, budget allocation and procurement regulations, etc.

Keywords: Development Integrated Policy, Food Security School Lunch

Introduction

School lunch program is one of the government's policies, implemented more than 40 years, to provide free school lunch to students in preschool and primary school for improving nutritional status and physical and mental health. At present, the Office of Basic Education (OBEC) is the main host responsible for school lunch services, more than 29,000 schools all over country.[1] The budget allocated to school, at 20 baht per person per meal for 200 school days, to purchase rice, vegetables as raw material and ingredients for cooking in school's kitchen where involved teachers and parents take turns or hire external service of private sectors in cooking. According to school policies and announcement, all meals will be prepared in ensuring food quality, safety and healthy with continuous monitoring and evaluation at school level, not only to improve nutrition status but also to educate children about health, food and agriculture through learning activities. [2]

In addition, schools and communities are encouraged to grow organic fruit and vegetable and bring raw materials into the school lunch menus, support more campaign on safe food consumption. Only a few schools have been successful in farming and can be a learning center of communities, while many are unable. Most children would not eat fresh fruits and vegetables from farms but they tended to eat meat, western snacks and fast-food.[3] Regarding to the fact that some parents and teachers lacked of knowledge and practical skill in nutrition quality and quantity that children should get but provide what children like. That will affect children health problems, country economy, and social impact in long-term. Therefore, it is necessary to encourage and develop children health to achieve age-appropriate development, especially physical development which may affect their intellectual, emotional, mental and social development and should work closely together with the parents, teachers and all involved sectors in community.

The Fourth National Health Examination Survey of Thai population, data collected between 2008 and 2009, indicated that 9.3% or 1,080,000 of Thai children aged 1-14 years were overweight and obese, 520,000 children (4.4%) were stunted with body weights, 580,000 children (4.1%) lower than standard and some were malnourished of iron, iodine and vitamins. In addition, it showed that Thai children consumed only 1.4 portions of vegetables and fruits daily, three times lower than WHO criteria (not less than 5 portions/ day). [4] The SEANUTS research, also indicated that more children will be overweight, shorter and have lower IQ over the next decade. However, under the National Strategy on Food Management (2017-2036), it has been found the key focus that Thailand is food security, nutrition, important food source of the world that high quality, safe and nutritious. [5]

The specific objective of this research focus on public policy process to promote local food and seasonal product from organic farm to children's meal in school and families, by participatory learning development. The proposed policy can be implemented to improve food crops and distribute to school, as best practice policy model for other area.

Research Objectives

The objectives of this research article were 1) to analyze the current situation of school lunch service systems and the demand of organic products as raw materials in the school meals, 2) to develop farmer's capacity and productivity management in supply systems and 3) to synthesize the local public policy in food security development and increasing organic products and community involvement to school lunch program by local participation.

Literature reviews

Food security

Food security was defined in the 1974 World Food Summit as "availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices". In 1983, FAO expanded its concept to include securing access by vulnerable people to available supplies, implying that attention should be balanced between the demand and supply side of the food security equation: "ensuring that all people at all times have both physical and economic access to the basic food that they need" [6].

School Lunch Program

School Lunch Program (SLP) has been considered as an important contributor to children's health outcomes as well as to improve education access when children are fed at school, they tend to stay and learn better. In Thailand, SLP has been implemented more than 30 years to reduce the number of children who were underweight. Ministry of Education transferred the responsibility of managing school lunches in government primary schools across the country to the Ministry of Interior, In accordance with the 1999 act to decentralize authority to local government organizations. Therefore, the school lunch project was transferred to local government organizations beginning in the fiscal year of 2001. In 2002, the Budget Bureau issued specific principles and regulations for budget management, which tasked the local government organizations with distributing and supervising the management of school lunches in their relevant areas. In 2008, the cabinet resolved to increase the subsidies for school lunches to ten baht per person, further increased to thirteen baht per person in 2009, and again to twenty baht per person in 2013. The rate of twenty baht per student is still being used today (The Secretary of Cabinets, 2013). [7]

However, the school lunch budget cannot be allocated for students above the sixth grade. This means that schools categorized as an opportunity expansion school, providing instruction for grades seven to nine, will not receive funds from this budget. The source of the budget for the school lunch program comes from 3-main sources, are: (1) Local government organization subsidy (2) Funding sources that receive benefits from the school lunch project in primary school, and (3) Other sources, including donations (School Lunch Project Fund Bureau, 2016).

Organic Agriculture Policy

As a national agenda (2005-2007), organic agriculture policy consisted of four goals including to transform from conventional farming to organic farming, involving 4.25 million farmers in the organic conversion system, to decrease the use of agriculture chemicals by 50 percent within four years, to increase the organic farming area to 85 million rais, and to increase the growing organic market.

The cabinet approved the first national strategic plan for organic agriculture development 2008-2011 in 2008 in order to provide a framework to implement an organic agriculture policy to achieve the goals of enhancing the quality of life of people, both producers, farmers and consumers, by changing to environmentally friendly farming, of achieving food safety and food security, and increasing the number of organic farmers and organic area with full supply chain management and allocated budget to promote using of organic fertilizer instead of chemicals.

The draft of the 2nd national strategic plan for organic agriculture development (2013-2016) states that vision in the new plan of organic agriculture development is to make Thailand a hub of ASEAN's organic agriculture based on Sufficiency Economy Philosophy. The objectives for organic agriculture development were to increase organic farmland by 10 percent per year, increase production and consumption by 10 percent per year, and to develop at least eight organic products which meet the standards and reduce chemicals in agriculture by 5 percent per year. [8]

The organic agriculture policy, at local community level, has been implemented mainly by Office of Provincial Agricultural Extension and Land Development Department in order to promote organic fertilizer, to encourage farmer 's development and promote community farm enterprises in term of transferring technology, providing materials for organic production, supporting and supervising. However, the main tasks are training in several topics, such as soil analysis, land use planning and development, conducting experiment in soil improvement by biotechnology and water conservation practices, seed production for cover crops.

Activity-based Learning

The activity based learning, problem-and project-based learning (PPBL) program are innovative learning in 21st century were used in the study area, with the goal of offering experience-based guidance for methodology/approach. The findings can inform and support the ongoing transformation in sustainability education with the ultimate objective to build students' capacities to address and solve wicked sustainability problems in the real world, competently collaborating with partners from government, business and civil society. The case study presented the diverse ABL/PPBL activities for pilot group and evaluating learning outcomes [9]

Research Methods

Research Design

Based on the concept of participatory action research (PAR) and quantitative research were used. The data were collected from 574 school administrators, teachers in charge of school lunch program, parents and students, 1362 farmers, and 85 from local administrative, community leaders and key informants, by questionnaire, in-depth interview and focus group discussion. The qualitative data were analyzed by using content analysis whereas quantitative data were analyzed by using descriptive statistics.

Part 1 : Data collection from target group were 11 sub-districts in Mae Rim District, Chiang Mai Province, as a study area, which consisted of 21 primary schools under OBEC (Office of Basic Education Commissions), 5 schools and 23 kindergarten centers under Sub-district Organization: SAO). The total number of students approximately is about 7,082 students received lunch service.

Part 2: Learning process and practices, the number of participants were from 4 pilot group under local collaborative agreement, consisted of

1) primary school and kindergarten,
2) farmers,
3) local officers and policy makers and
4) District Health Promoting Hospital.

Research Process

The process of this research has developed into 5 steps, consisted of document review, concept analysis, research tools and measurement design, data collection, pilot project operation, learning outcome assessment and proposed the local policy, as following;

1) Documentary reviews from primary sources; research articles, books, and other related documents,
2) Data collection from target group, at study area, to analyze current situation of demand-supply systems of organic farming and school lunch.
3) Training & demonstration & practice of pilot group, through activity-based learning, collaboration & agreement.
4) Operating pilot project, monitoring & evaluation and learning outcome assessment.
5) Synthesize local policy process for food security from farm to school lunch and propose integrated policy by SWOT and TOWS analysis.
6) Proposed integrated policy for local development.

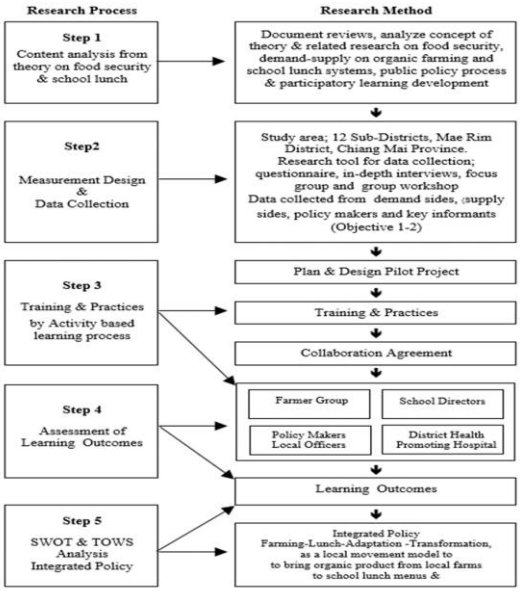


Fig.1 *Research process & methodology for Integrated Policy of Local Food Security to School Lunch Development*

Results

The results are classified in 4 aspects, as describe below;

Situation analysis for Mae Rim district

A situation analysis and document reviews of current circumstances and review of relevant research publications, as well as brainstorming with representatives from all sectors.

Mae Rim is the second largest district in Chiang Mai Province, consists of 11 local administrative organizations, five sub-district administrative organizations and six sub-district municipalities. There are 92 villages, 37,662 households in total area of 455 km2 (or 284,275 rai), and the population is estimated at 94,337 people, some of ethnic group population about 10%. Currently, Mae Rim districts lost agricultural land in between the production year 2000/01 and 2016/17, of 29.9%. It has been developed quickly in every aspect and becoming several types of business, increasing of infrastructure makes farming area becomes housing project, restaurants, coffee shop, resorts in tourism industries.

The main career of villagers are farmers and some developed their farms into flower gardens as one of the most travel destinations, surrounding with natural resources, such as mountains, forest, waterfalls, streams. Due to the decreasing of farmland and increasing land prices, the more development of infrastructure, the more small-scale farmers need to develop their career to earn more income and utilize limited land efficiently for local consumption. However, Mae Rim District still has high level of biodiversity, associated with local resources, farmlands and agricultural labors which are the key factors to produce sufficient food supply chain for internal and for external markets.

There are many problems found in farming area, not only land used and deforestation but also water resources in drought season, flooding in rainy season, insufficient and unclean water, because of lacking of good management in rural area. Natural resources were utilized, both directly and indirectly for production. Most of farmers focus on growing economic crops or cash crops with a rapid return, good yield, and supported markets. Fertilizers and chemical pesticides were brought to use into farming, and impacting negatively on farmers' health, environment, soil fertility loss, as well as air pollution found in atmosphere.[11] These are main reasons why many small-scale farmers could not produce as much as expected, according to low production, low prices, but high cost of production.

Fig 2. Organic farming area, represented to self-sufficiency and food security of Mae Rim District

School lunch situation and consumer demand for organic fruits and vegetables into school lunch.

Result from quantitative study, collected from 49 schools and preschools under the Office of Basic Education Commission (OBEC) and local administrative organizations, total number of students were about 7,082 persons who have received lunch service. Total 574 informants in step-II were school administrators, teacher in charge of lunch menu and meal makers, including students and parents. During step-III, the number of participants in pilot project and activities were 866 students from 9 school, the result are following ;

The schools, at least 77.5%, have established plan and policies on school lunch program, for improving student nutrition problem, only 42.7% using the Thai School Lunch (TSL) as a tool for preparing and serving school meals with healthy and safety standards required, by calculated the list of ingredients and assessed the nutritional value of food such as energy, protein, fat, carbohydrates, iron, vitamin B1, B2, C, fiber, sodium and sugar.

There are at least three persons to involve with school lunch system; the first one is school administrators, in charge of policy level, the second and third ones are operating level to prepare school menus, such as nutritionist/ teacher assistant or cook/food services management. However, the schools mostly prefer operate their school lunch services, by outsource contractors due to the limitations of budget and time.

The management process of school lunch based on government regulations framework, especially procurement and school lunch budget (20 baht) per person per day, that's difficult for selecting quality raw materials and increasing nutrition and essential nutrients for school-age children.

Total demand and estimated cost of organic product for school lunch ingredients average was only 37%, such as rice, fresh fruits and vegetables, and eggs which produced by local farmers.

Rice	*	35,042	17.2 %
Vegetables	*	30,792	15.1 %
Fruits	*	41,403	20.3 %
Eggs	*	13,980	6.9 %
Meat		59,517	29.2 %
Garnish/Misc.		22,925	11.3 %
		203,660	100.0 %

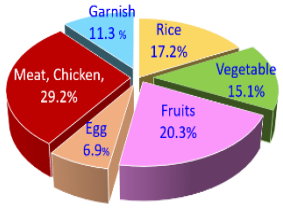


Fig.3 *Estimated cost and demand of raw materials*

Actually, the school mostly purchase raw materials from external big stores or supermarkets more than in local farm in their community. Therefore the income of fresh products will be income for outside traders not local farmers

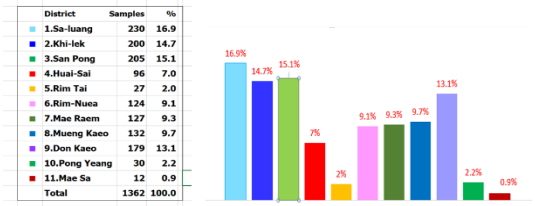
Consumer satisfaction surveys on lunch services and management, it found that the total average score was at a moderate level ($\bar{x}$ = 4.17), with the observation note that some items had lower score than the others responses and should be focused on development, as follows: (1) quality of vegetable production, raw materials that should be chemical free (2) budget for raw material procurement (3) adequate amount of food according to student needs (4) taste, easiness eating (5) variety of menus (6) nutritional status and development according to age.

Agriculture Situation & Food Supply Chain

Result from quantitative study, collected from 1,362 farmers, found that 65% of the sampling farmers were male and average age of 59.5 years old (lowest: 31 years old and highest: 80 years old). Most of them (85.2%) had primary education level, average experience in agriculture longer than 20 years (69.7%), had low potential in production. The average size of farmland holding was 3-6 rais and most of farmland in the district were within national forest reserves. It was 81.5% of agriculture as main career and yearly total income is over 30,001baht/year. The most of farmers have high level skill in farming but lacking of knowledge in organic standard and production, include trading techniques, especially online media platform in modern trade.

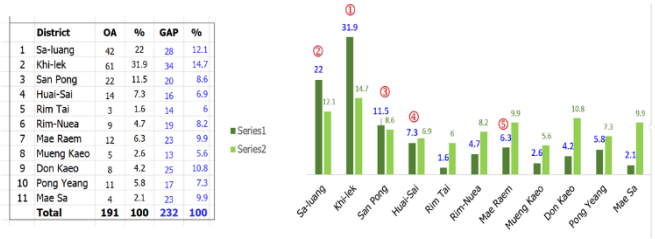
Farmland and Agricultural Products

The results indicated that Mae Rim had enough farmland for food security and sufficient for food crop production, but the proportion of organic farming is only 14% and GAP 17%, as showed in Fig.4 and Fig 5.



	District	Samples	%
	1.Sa-luang	230	16.9
	2.Khi-lek	200	14.7
	3.San Pong	205	15.1
	4.Huai-Sai	96	7.0
	5.Rim Tai	27	2.0
	6.Rim-Nuea	124	9.1
	7.Mae Raem	127	9.3
	8.Mueng Kaeo	132	9.7
	9.Don Kaeo	179	13.1
	10.Pong Yeang	30	2.2
	11.Mae Sa	12	0.9
	Total	1362	100.0

Fig.4 *The percentage of farmland and farmer household in each sub-district*



	District	OA	%	GAP	%
1	Sa-luang	42	22	28	12.1
2	Khi-lek	61	31.9	34	14.7
3	San Pong	22	11.5	20	8.6
4	Huai-Sai	14	7.3	16	6.9
5	Rim Tai	3	1.6	14	6
6	Rim-Nuea	9	4.7	19	8.2
7	Mae Raem	12	6.3	23	9.9
8	Mueng Kaeo	5	2.6	13	5.6
9	Don Kaeo	8	4.2	25	10.8
10	Pong Yeang	11	5.8	17	7.3
11	Mae Sa	4	2.1	23	9.9
	Total	191	100	232	100

Fig.6 *The comparison between organic farming and Good Agricultural Practice (GAP) in each sub-district*

As showed in Fig. 5-6, the areas with highest number of organic farming in top 5 sub-districts, were Khilek (31.9%), Sa-luang (22%), San-pong (11.5%), Huai-sai (7.3%) and Mae Ram (7.3%).

Agriculture Products & Standardization.

Many kinds of plants can be grown in Mae Rim district, especially rice (64%) the most, fresh herb, vegetables and fruits (26 %), including eggs (4%), and others (6 %), such as grains and several kinds of beans. There are a few types of farming, consisted of chemical farming (36%), mixed crop-livestock farming (24%), GAP or Good Agriculture Practice (17.1%), organic farming (14%) and others (9.0%), such as agroforestry or home garden cultivation. In addition, the results indicated that most farmers have never been certified by any standards (71.5%), the rest (28.5%) were certified by following standardization;

- 71.5 % non-standard certification
- 15.3 % GAP (Good Agriculture Practices),
- 7.0 % PGS or Participatory Guarantee System,
- 5.6 % Organic Agriculture Certification Thailand
- 0.6% International Organization for Standardization respectively, as shown in Fig.6

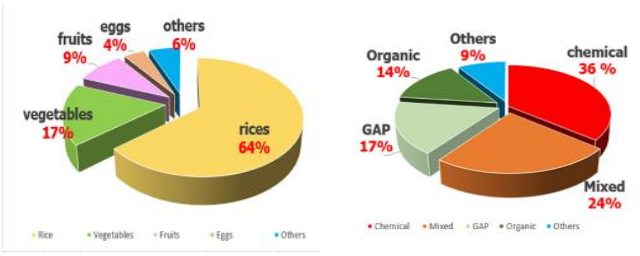


Fig.6 *Proportion of total products and types of farming in study district.*

Problems and limitations in organic farming

Soil and water are very essential natural resources for organic agriculture, as a and based on natural techniques which does not use chemicals and does not contaminate through toxic chemical. Success farming in small scale rely on local conditions of soil and water, as the main factors of production, but many of them still lacking of knowledge and productivity

improvement. What farmer need to know about soil and water improvement, land used development, seed production and technology transferring.

Regarding to the insufficient processing, the following limitations have become increasingly important to discuss.

a) There was no standard certification system available for organic products and lacking of local distributors, as a management unit of demand-supply chain services for fruits and vegetables to school.
b) Duration of organic farming, farmer requires at least 1-3 years to develop their organic process, the pilot group have been engaged in organic farming operation at least 3 years. The longer time of organic farming operation depends on the different type of organic standards.
c) The total number of organic fruits and vegetables in pilot group was less than from conventional farms because of the duration of development while fresh products from chemical farming were the main raw materials for school meals.
d) Moreover, the price of organic products still stable and higher than conventional vegetables which depend on market prices, therefore the organic products supply never been increased in short-term demand.

Agricultural Practices

Regarding to pilot project and collaborative agreement, there were 3 sub-districts of organic groups were selected and were conducted for shortly 3 months. It found that supporting knowledge, technology, innovation and markets can help organic farming at local level, especially for these farmers who have more experience and well understand the concept of sufficiency economy. The on-site training (short courses), demonstration and practices on organic farming were designed for farmers in pilot group, as shown in Fig.7

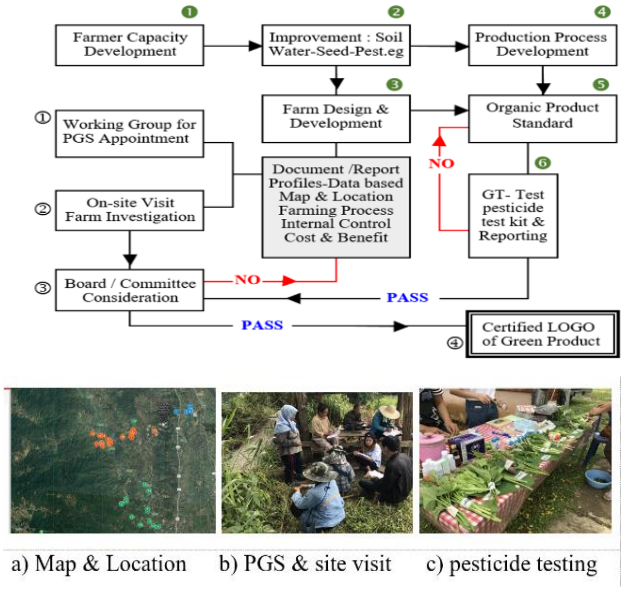


Fig 7.*Agricultural practices of food Safety in organic farm in 3 sub-districts*

As shown in Fig.7, it is one kind of an alternative model for strengthening of farmers' occupation groups, making more confidence in product quality standards and focusing on information management system of agriculture and food products, farmer's profile information, location, production process standard of food sources and quality product, all are important for sustainable consumption.

Awareness of health issues

Blood testing is one of the most important evidence to keep track of overall physical well-being which also indicating the risk of surveillance,

Farmer Cases; the results of blood testing, or the enzyme choline esterase levels of 245 farmers from 3sub-districts, indicated that only 27.4 % were in normal and safe levels but 38.8% in risk and 33.8% unsafe, as shown in Fig.8

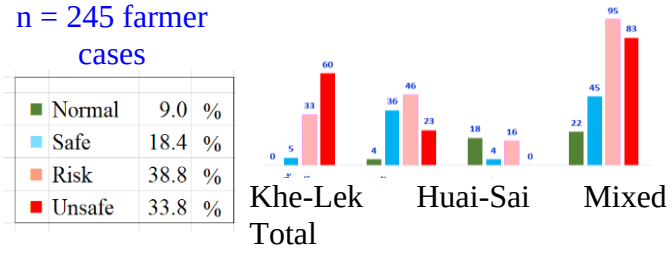


Fig.8 *Comparison of blood testing of 245 farmer*

Student cases, the results of blood test from 155 students, the result showed that only 14.8 % were in normal and safe levels but 55.5% in risk and 29.7% unsafe, indicating the risk of school-age children health that need to be monitored, followed up and changes their consumption behavior for eating more fruits and vegetables.

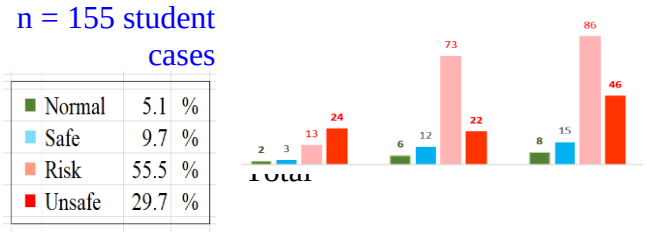


Fig.9 *Comparison of blood testing of 155 student cases. Between school 1 and school 2*

Local Policy Development for Food security

The key informants were representative policy makers from 11 sub-districts, 83.5% of total target (103 persons) by in-depth interviews, focus group and public hearing. Most of them were male (65%), aged between 50-59 years (73.9%), had primary/ secondary education (62.8%), mostly working in current position as leadership less than 5 years of (54.3%) consisted of village leaders (45.3%), local administrative and municipal officer (30.5%), and others (24.2%). Some leaders engaged with farming, trading and self-employed (76.8%), some served as community leaders only (23.2 %t) but most of them were in debt (68.5 percent), the result are following;

From National Vision to Local Policy; Due to the organic agriculture production became a national policy influenced by the global trend of food safety and food security and international markets competition and trading agreement that do not allow chemical contamination in food. To promote food security and food safety into school lunch ingredients rely on key success factors and strategic process to achieve the sustainable goals. SWOT analysis and TOW matrix are used (in step 5), as a tool for establishing strategic plans and effective policies which local administrative organizations are involved and need more authorize to manage by themselves, along with creating local leaders as change agent and make engagement between producers and consumers.

SWOT analysis; Reviewing the relationship between strengths, weakness, opportunities, and threats of Food Security Development, the results are in Table 1

Table 1 *SWOT analysis of Food Security Development*

Strengths	Weaknesses
S1: There is agricultural area large enough for food crop production with different location of plain and highland areas, and climate is conducive to the cultivation of many types of vegetables, fruits and herb as consumer demands. **S2;** Rice is main productions that farmers can produce and it is one of school meal and all groups of consumers need. **S3:** Organic farmer Groups can produce a lot of local plants and vegetables that contain a high nutrition for health benefits **S4:**There are farmer leaders and number of farmers with experience in farming enough to produce food crops into school meals, **S5;** There are large number of population and consumption in Mae Rim and variety demand of food products to schools, hospitals, businesses, hotel and government agencies. **S6;** Surrounding with beautiful environment & natural resources that attract tourists come to visit and generate income in tourism and food services.	**W1**;Most of farmers focus on increasing product quantity more than quality, chemicals were used in farming and destroy the environment, still burning of waste, especially on farms, **W2**; Only a few small farmers can produce organic farming, because of the process period of quality control that takes time, at least three years, to improve all processes of production factors standard, such as soil quality, water resources, seed . **W3;** Community still lacking of health literacy, nutritional food for children/household. **W4;** Food Makers need to know and practice on good hygienic nutrition and quality of raw materials from outside markets to use in cooking **W5**; Allocated budget for lunch per head is insufficient to cover the cost of quality ingredients. **W6;** No QC system: Quality Control and standard quality inspection in raw materials, vegetables, fruits, and food
Opportunities	**Threats**
O1;SDGs and National strategy focus on green growth, food safety, sustainable agriculture (SDG-2), health of school-age children (SDG-3), sustainable production and consumption (SDG-12) **O2**. National policy on organic agriculture promotion increase opportunity in various aspects, such as academic knowledge, health, budget, and marketing **O3:** The increase of consumer' s demands for organic products and healthy food, good quality, safe food products with high Nutritional value continuously supported by the government to expand organic markets. **O4** Policy to promote lifelong learning, skill development to all people, especially the young people and adults in farming skills	**T1**; The increase of tourism business and housing effect on water resources and users between the business sector and agricultural cultivation. **T2**; Numerous conditional of organic agriculture policy from government agency to local communities were not supported **T3;** The effect of unstable political stability and policy changes affect the direction of local development and policy on self-management **T4;** climate change affecting natural situation, forest, water floods, landslides, droughts, agricultural waste, etc. **T5** Some law and regulations are too old for moving on organic farming development

TOWS Matrix to make decision on Strategic Plan and integrated support policy of food security and food safety development. as show in Fig 10

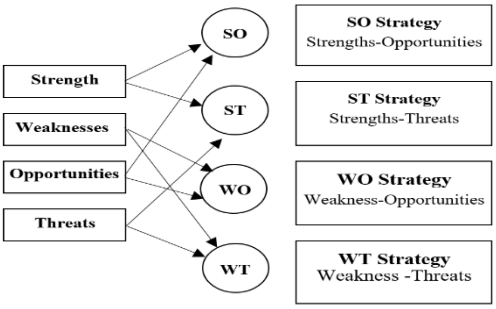


Fig.10, *TOWS matrix were used for integrating the related policies on food supply chain and organic agricultural product of sustainable agriculture, the results showed the 4 alternative strategies as follows:*

Strength-Opportunity (SO) Strategy: as the proactive strategy, use strengths as selling points while opportunities comes, consisted of making collaboration agreement with local authority, private sector together with community engagement,urgent support in any development programs for organic farming improvement, eg. open green market for organic product, develop the quality standard of product- production process through supply chains, capability building for farmers (producers), gain more knowledge & skill, to meet consumers and market demands, encourage new young farmers to participate in the organic farming network.

Strength-Threat (ST) Strategy or defensive strategy, consisted of organize training and practice on production technology in farming in risk situation, develop an alternative market system / green market / online market for product distribution, submit an action agreement between producers and consumers, improving product process from upstream to downstream process, monitor and evaluate local policy, plan and budget supported.

Weakness-Opportunity (WO) Strategy to support the production factors, consisted of ; take action seriously to solve the problems of the integrated agricultural system, in land used , water resources and environment management, promote BCG in action for agricultural products development, food waste, by-products, high-value products from waste,

improve quality control standards systems and mechanism, establish technical support to be QC working group, raise more awareness and improve knowledge of health literacy, food literacy and nutrition for everyone, develop learning space for all in local area, and support self-access system via digital learning society

Weakness-Threat (WT) Strategy: consisted of review and integrated approach of strategic plan, encourage local sector on self management, development support how to solve problems by themselves, revise appropriate guideline for production development of food and nutrition menu. improve discipline, manners, food consumption behavior of children, closely with teachers and parents. incentives children to eat vegetables and fruits, reduce sweet, oily, salty food Junk.

The proposed strategies were I-FLAT, representing of 5 keywords (1) Integration (2) Farming (3) School Lunch (4) Adaptation (5) Transformation. That's is a local movement model to bring healthy food from local farms to school, which become important issue on well-

being of school-aged children, as well as increasing awareness of environmental and economic challenges local food and agricultural systems, as shown in Fig,11

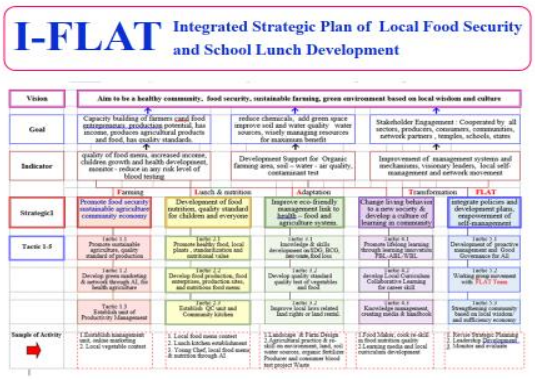


Fig.11, *proposed strategies based on I-FLAT concept*

Discussions

Demand for organic fruits and vegetables to be used as raw materials in the school lunch system;

The results found that the demand of organic fruits and vegetables to be used as raw materials and ingredient in school lunch and total value was 325,828 baht, from rice, vegetables, fruit, eggs, meat, seasonings and milk but farmers can supply only 37% (trading value of 121,216 baht/month). Therefore the income of fresh products will be income of outside traders not local farmers. It was indicted that the important supporting factors for the development of nutrition food towards sustainable goal, all stakeholders need to make clear their vision, missions, plan and policies, along with their collaborative agreements. This can be explained that was no guideline for inspecting the quality standard of product and ingredients because of no clear policy and other supporting factors that consistent with Usawadee's research which confirmed that important supporting factors of nutrition food development was the clear policies and missions at all levels, such as local policy and national policy that promotes the production of organic crops to school meals, in cooperated with the key stakeholders such as school, parents, farmers, community and local policy makers.

Farmers' Capacity and Productivity Development

Learning process is one best way for human being development by enhancing knowledge, health literacy, food literacy, food security and farming through the activity based learning, like "farming–lunch cooking-process improvement - transformation" used in this research. It can contribute to enhancing everyone's potential in various dimensions, including knowledge, skills and attitudes, and will lead to positive behavior change in the future, especially for children's development. This is consistent with Usawadee's study, which indicates that the learning activities through farming for lunch project helped to promote students' knowledge, skills, and abilities and integrated learning of students. Moreover, it promote food menus from local vegetables to households and communities, also making food sources both at home and school.

It also was found that farmers were able to produce rice the most, vegetables, herbs and local products. It can be an opportunity and possibility for school to buy rice products from farmers, including local vegetables as raw material/ ingredients to school lunch menus, but the government agencies must be sincere in solving the structural problems of agricultural

production in land used, water resources, and main production factors for farm management. However Sub-district Health Promoting Hospital, as a local health promotion sector should be the main unit in enhancing knowledge of health and food literacy for taking care of people health while local administrative organization have to support some kind of tools, materials, equipment for chemical residues testing in all kind of food products.

Conclusion

The research aimed to analyze current situation of school lunch service systems and demand of organic products as raw materials in the school meals, to develop farmer's capacity and productivity management in supply systems and to synthesize the local policy in food security development and increasing organic products and community involvement to school lunch program by local participation., based on the concept of participatory action research (PAR). The data was collected from 574 school administrators, teachers in charge of school lunch program, parents and students, 1,362 farmers, and 85 local administrative, community leaders and key informants, by questionnaires, in-depth interviews focus group discussion and participatory assessment of activity-based learning outcome. The results showed that;

1) Total demand of agriculture products for ingredients was only 37%, from rice, vegetables, fruit, and eggs, produced by local farmers. The school lunch management based on government regulations framework, especially procurement process and budget per person per day, that's difficult for selecting raw materials and increasing nutrition and essential nutrients for school-age children.
2) Mae Rim district has enough farmland for food crop and food security, especially rice, the most production (64.3%), vegetables, herbs, fruits (20.7%), the proportion of organic agriculture production is only 14%. Most producers are small farmers who used to sell their product through middleman. The management by grouping should be an appropriated model for strengthening farmers' group, by making more confidence in quality standards of outstanding products and paying more attention on information management system on food production and consumption.
3) The most concern about blood testing of 400 cases, from 245 farmers and 155 students, found that only 14.8 % were in normal and safe levels but 55.5% in risk and 29.7% unsafe, is indicating the risk of school-age children health need to be monitored, followed up the changing in their consumption behavior more than before.
4) The development of local policy to promote local food into school meal depends on the key success factors and

strategic management to reach sustainable goals. Local administrators should have authorize to manage themselves and could be linked between farmers to consumer's demands. The most necessary is to implement a strategic management process, along with creating local leaders as change agent.

The proposed strategies are I-FLAT, representing of 5 process activities; **I**ntegration, **F**arming, School **L**unch, **A**daptation and **T**ransformation, as local movement model to bring healthy food from farms to school lunch. This is very important to raise social concern on improving well-being of school-aged children, as well as increasing everyone's awareness on environmental and economic challenges of local food and farming systems.

However, all improvement requires external support factors to take more seriously and continually for supplying organic products to school meals, especially national policies, budget allocation and procurement regulations.

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