



修平科技大學  
Hsiuping University  
of Science and Technology

**Accept Letter for Sus-LaB3 2019**

Your presentation ID: **A68**  
Miss. Yuphin Somkhumphee,  
Sakon Nakhon Rajabhat University

January 15, 2019

Dear Miss. Yuphin Somkhumphee:

On behalf of the Program Committee, it is my pleasure to inform you that the abstract you submitted to "2019 3rd Advanced Multidisciplinary Views on Sustainable Life & Business (**Sus-LaB3 2019**)" has been accepted. You have our most welcome to join this riveting activity and give us an ORAL presentation with the following title:

**Title: Agricultural Extension Approach To Good Agricultural Practice: the Case of Small-Scale Tomato Farmers in Sakon Nakhon Province of Thailand**

We greatly hope that you will accept our invitation. A detailed schedule, including all the presentation time, location, papers and the chairs of presentation, will be found in the online **Advanced Program** on the SusLab3 official website before January 31. Please verify that all the information is correct for the upcoming **Conference Proceedings**. We also invite you to submit your full length paper as Sus-LaB3 2019 *Special issue* on **HSIUPING JOURNAL** (ISSN: 1817-2954) before February 21.

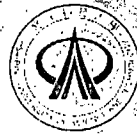
Note that foreigner visitors whose citizens must have visas should apply to Taiwan, R.O.C consular office or diplomatic mission in your respective country. For those who require official documents prepared by the Sus-LaB3 secretariat, if any, please contact us by e-mail to the general secretariat *Dr. Susan-Lee* ([smlee@hust.edu.tw](mailto:smlee@hust.edu.tw)) before January 22. Please find the payment instructions file for the registration fee, and notice that the due time for **early bird** registration is January 31. As our honorable guests, do feel free to send me any inquiries and comments.

Sincerely,

Vice President Prof. Hsun-Cheng Lin  
Sus-LaB3 2019 General Chair

Sus-LaB3 2019 Secretariat  
Hsiuping University of Science and Technology  
No.11 Gongye Rd, Dali Dist., Taichung City 412-80, Taiwan, R.O.C  
Phone: +886-4-23696430, Fax: +886-4-2496-1187  
E-mail: [suslab3@mail.hust.edu.tw](mailto:suslab3@mail.hust.edu.tw)

*Sincerity, Integrity, Excellence, and Innovation.*



修平科技大學  
Hsiuping University  
of Science and Technology



RAJITANAKOSIN  
RMITR

## CERTIFICATE OF ATTENDANCE

This is to certify that

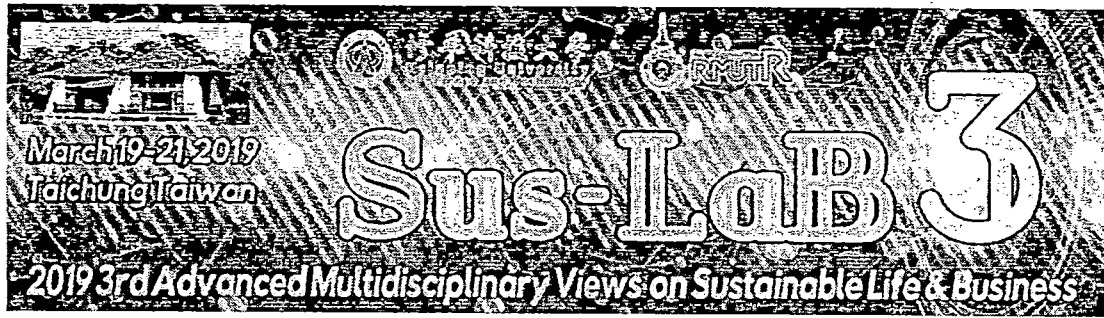
**Yuphin Somkhumpee, Piyachint Paddamadilok**

attended the 3rd Advanced Multidisciplinary Views on Sustainable Life & Business (Sus-LaB3)  
held in Hsiuping University of Science and Technology, Taichung, Taiwan, R.O.C.

March 19-21, 2019

Hsun-Cheng Lin

General Chair, 2019 Sus-LaB3



## Conference Proceedings



修平科技大學  
Hsinchu University  
of Science and Technology

(<http://www.hust.edu.tw>)

(<https://www.rmutr.ac.th/>)



RATTANAKOSIN  
RMUTR

## Contents

Overture - Welcome to SusLaB3 2019.....	2
Preface.....	3
Organization.....	9
Sus-LaB3 2019 Agenda.....	11
Keynote Speakers.....	15
Sus-LaB3 Preview of Advanced Track with Session Motif.....	23
Abstract Papers.....	24
Session(1) Agriculture & Enviroments .....	24
B51.....	25
A67.....	26
A68.....	27
E96.....	28
B105.....	29
Session(2) Creative Thinking.....	30
D4.....	31
E27.....	32
M28.....	33
L29.....	34
C90.....	35
L104.....	36
Session(3) Creative Design.....	37
L38.....	38
E39.....	39
L53.....	40
D93.....	41
L102.....	42
D103.....	43
Session(4) Electrical Engineering.....	44
E35.....	45
E42.....	46
E86.....	47
E88.....	48
E97.....	49
E107.....	50
Session(5) Material & Optics I.....	51

**Agricultural extension approach to good agricultural practice: the case of small-scale tomato farmers in Sakon Nakhon province, Thailand.****Yuphin Somkhumphee<sup>a,\*</sup> and Piyachint Paddamadilok<sup>b</sup>**<sup>a</sup>Faculty of Agricultural Technology, Sakon Nakhon Rajabhat University, Sakon Nakhon province, Thailand.<sup>b</sup>Faculty of Management, Sakon Nakhon Rajabhat University, Sakon Nakhon province, Thailand.

\*Correspondence: yuphin666@gmail.com

**Abstract**

According to the ASEAN Free Trade Agreement (FTA) for safety and quality of food crops and to improve farmers' competitiveness in the global market, Thailand has developed Thai agricultural standard (TAS 9001-2013) that is good agricultural practices (GAP) for food crop. However since then, there was only a small number of certified small-scale farmers, especially in Sakon Nakhon province which is the major tomato growing area in Thailand. The objectives of this research were to 1) study good practices of certified small-scale tomato farmers, 2) develop the agricultural extension approach to good agricultural practice for tomato, and 3) evaluate the implementation of that approach by small-scale tomato farmers in Sakon Nakhon province. The research were conducted in the year 2015 to 2017 by using mixed methods. The populations were 776 small-scale tomato farmers in Sakon Nakhon province which were purposive sampling of 9 certified small-scale tomato farmers for lessons learned. According to connoisseurship, it was found that good practice of GAP for tomato at small-scale farmers was based on 4 key success factors as (1) leadership, (2) community farmer enterprise, (3) resource and (4) extension. The agricultural extension approach to good agricultural practice for tomato was the participatory agricultural extension approach to good agricultural practice for tomato (PAE to GAP for tomato). The implementation of the PAE to GAP for tomato approach at the farm level of 6 voluntary farmers found that the pre-test and post-test scores of all farmers practices were significantly different at  $P < 0.05$  in all provision of GAP and complied with the GAP standard. Further study the implementation of the PAE to GAP for tomato approach to small-scale tomato farmers in other provinces is suggested.

**Keywords:** GAP, Thai agricultural standard, Small-scale farmer, Tomato, Sakon Nakhon province.

## 1. Introduction

According to the growing environmental and health concerns associated with modern agriculture, several countries around the world has adopted the standard of Good Agricultural Practices (GAP) to ensure safe and qualified food supply. In 2003, Thai government announced the national food safety policy under two authorizations i.e., Ministry of Agriculture and Cooperatives and the Ministry of Public Health. In 2005, the “Framework on Monitoring and Control of the Quality of Agricultural Commodity and Food” was formulated. Meanwhile, the concept of food safety from farm to table has been included in the plan of both ministries. Ministry of Public health controls food for domestic consumption while Ministry of Agriculture takes responsibility for trade and export of agricultural products. Thai agricultural commodity standards were announced continually to facilitate trade (Korpraditskul *et al.*, 2010). Good Agricultural Practice (GAP) was announced as a standard for producers and be promoted ever since. In 2013, Thailand has developed Thai agricultural standard (TAS 9001-2013)<sup>[4]</sup> that is good agricultural practices (GAP) for food crop as a voluntary standard which announced the domestic concern rather than international market. This agricultural standard covers provisions of good agricultural practices (GAP) for food crops such as vegetables, fruits, field crops, spices and herbs on every step on farm and postharvest handling where produce is packed and/or collected for sale in order to obtain safe produce of proper quality for consumption by taking into account the environment, worker’s health, safety and welfare.<sup>[4]</sup> Currently, this GAP for food crop standard is implemented locally to build capacity of smallholder farmer group and individual small scale farmer.<sup>[3]</sup> The Farmers who are willing to apply to get certified for their products are assessed on their processes of production. The GAP for food crop standard consists of eight key elements as 1) water 2) planting area 3) pesticides 4) pre-harvest quality management 5) harvest and postharvest handlings 6) holding, moving produce in planting plot, and storage 7) personal hygiene and 8) Record keeping and traceability which related to modules of food safety, produce quality, environmental and worker health, safety and welfare<sup>[4]</sup>. The Department of Agriculture (DoA) is mainly responsible for its inspection and control whereas, extension work at the farm level goes to agricultural extenists at the provincial and districts offices which under the Department of Agricultural Extersion (DoAE). They cooperate to promote the GAP for food crop standard implemented locally to build capacity of smallholder farmer group and individual small scale farmer.<sup>[4]</sup> However, since 2013, the number of cetified farm is slightly increased, especially at the provincial level, such as Sakon Nakhon province in Northeast Thailand which is the major area of tomato growers in Thailand, there are 9,213 tomato farmers with the total area of 5,259 rai (841.44 ha) but since then there are only 208 (2.25 %) farms with the total area of 602 (11.44%) rai (96.32 ha) are

certified<sup>[1]</sup>. therefore, certified tomato farm and their good practices should be lessons learned for the rest. Moreover, the cause of not being certified including growers poor understanding of GAP requirements,<sup>[3]</sup> poor record keeping, low motivation and incentives to implement GAP,<sup>[3]</sup> lack of agricultural extension services and supportive system,<sup>[5]</sup> unhygienic practices in production, and inappropriate use of pesticides.<sup>[1]</sup> Therefore, if the above weaknesses have not been resolved, it may affect the goal of agricultural development that focuses on increasing production efficiency in safe produce of proper quality for consumption by taking into account the environment, worker's health, safety and welfare, lead to create the strength of the farmers' institutions And enhance the potential for people in the agricultural sector.<sup>[1]</sup>

For the reasons mentioned above, agricultural extension approach to good agricultural practice for small-scale tomato farmers in Sakon Nakhon province is needed by study good practices of certified small-scale tomato farmers, 2) develop the agricultural extension approach to good agricultural practice for tomato, and 3) evaluate the implementation of that approach by small-scale tomato farmers in Sakon Nakhon province. By doing this lessons learned from certified tomato farm expanding and disseminating knowledge to both small scale farm and agencies that promote GAP to apply the approach to be a certified farm which is the primary national standard to develop food production to step into international food standards.

## 2. Methods

This study was conducted in 2014 to 2017. Using a mixed research method, consists of 3 steps as follows:

Step 1: Study of good practices of certified small-scale tomato farmers according to GAP for food crops requirements by studying in 2014. The population is small scale tomato production farm in Sakon Nakhon Province 9,213 farms was purposived sampling of 8 farms to botain lessons learned by using in-depth interviews and farm visit. Content analysis was use to obtain good practices according to the criteria of the GAP for food crop standard consists of eight key elements as 1) water 2) planting area 3) pesticides 4) pre-harvest quality management 5) harvest and postharvest handlings 6) holding, moving produce in planting plot, and storage 7) personal hygiene and 8) Record keeping and traceability. Connoisseurship was used to synthesize and organize groups of factors that result in good practices of tomato farm in managing food production according to the GAP standards (TAS 9001-2013).<sup>[4]</sup>

Step 2: Develop the agricultural extension approach to good agricultural practice for tomato, in 2015 by applying the study results Step 1 to organize the connoisseurship by using expert group seminar to determine the draft the agricultural extension

approach to good agricultural practice for tomato, including identify step to operation using content analysis method.

Step 3 Trial the agricultural extension approach to good agricultural practice for tomato. Study in 2016 to 2017 by using semi-experimental with 6 volunteer small-scale tomato farmers. Data analysis uses the evaluation according to the assessment to certify the GAP for food crops (TAS 9001-2013).<sup>[4]</sup>

### 3. Results and Discussions

#### **Good practices of certified small-scale tomato farmers according to GAP for food crops,**

The results of the connoisseurship found that factors that result in good practices of small-scale tomato farmers to comply with the GAP for food crops standard resulting from the following 4 factors:

1) Leadership, is important in the success of small scale tomato farmer because community leaders or farmer group focus on food production in accordance with standards, ability to transfer knowledge to members and other farmers to understand the process of requesting certification, and also as a good source of information to contact the extension agencies that is corresponds to the concept of participatory management style of Lichart<sup>[2]</sup> that executives or group leaders will set up a common purpose, accept members' comments, progress assessment and has 2-way communication, making it an effective leader and also finding higher productivity<sup>[2]</sup> as well, which is consistent with Piyachint<sup>[5]</sup> found that the leaders who lack of knowledge and skills in organizational management, both in production and marketing, directly affect the group's failure.

2) Community farmer group, help to promote the success of the farmer group by participation as well as constantly pursuing learning in self and group development. As a member of the farmer group has advantage in sharing all resources of both in cash and in kinds.<sup>[2]</sup> In accordance with Piyachint<sup>[5]</sup> that summarizes the factors that are effective towards community enterprise development for self-reliance are participation, sacrifice, unity, cooperation of members and families directly affecting the success of the group.

3) Resources, the appropriate resources management of the farmer group leads to the success and resources is also one of the 7 key elements of community enterprises that must have and emphasize the use of capital, raw materials, resources and labor within the community which towards self-reliance.<sup>[1]</sup>

4) extension, the extension and support from the agencies to create learning and group development especially the opportunity to learn and participate by practicing for



self-learning are important which corresponds to John's Dewey learning concept, who said that learning was based on the actual practice of learners that is learning by doing<sup>[2]</sup> and in accordance with Department of Agriculture<sup>[1]</sup> pointed that the success of community farmer group in food production must be implemented as continuous to make the learning process step by step in order for food growers to begin accepting decisions and changing practices that are consistent with Roger's acceptance theory that says accepting innovation is a process that takes place in a person by acting on their own or together with the collection of experiences from others to be processed to make decisions for acceptance to Direk<sup>[2]</sup>. Piyachint<sup>[5]</sup> found that academic services from educational institutions and universities both in the area and outside are one of the factors that affect the success of farmer group including the participation of scholars,<sup>[5]</sup> making farmer groups develop faster without needing to develop repeatedly follow the steps when having enough potential but must not be too leapfrog by consider the readiness of the group in terms of resources in 4 areas<sup>[5]</sup> (human resources, finance, raw materials and management).

#### **Develop the agricultural extension approach to good agricultural practice for tomato,**

Based on the connoisseurship the agricultural extension approach to good agricultural practice for tomato was the participatory agricultural extension approach to good agricultural practice for tomato (PAE to GAP for tomato) which comprise with 3 elements as follows

1) P: Participation of small-scale tomato farmer to review of production results to know themselves, to know the world, to plan the production and determine the solution to the problem by using the self-learning process.

2) AE: Agricultural Extension, extension and development of participatory small-scale tomato farmer by self-practice (learning by doing), with 5 roles of extension agencies as (1) sponsor (2) consultant (3) coordinator (4) instructor and (5) mentor to extension and develop small-scale tomato farmer to be self-reliant.

3) to GAP: By using the participatory agricultural extension approach to good agricultural practice for tomato (PAE to GAP for tomato) small-scale tomato farmer and community tomato group practice of eight key elements as 1) water 2) planting area 3) pesticides 4) pre-harvest quality management 5) harvest and postharvest handlings 6) holding, moving produce in planting plot, and storage 7) personal hygiene and 8) record keeping and traceability complied to the GAP for food crops.

Implementing the the participatory agricultural extension approach to good agricultural practice for tomato (PAE to GAP for tomato) should be done continuously in 5 steps including

Step 1 Establish the PAE to GAP for tomato team using an integrated working principle.

Step 2 Selecting target small-scale tomato farmer and community tomato group to set goals and create a collaborative plan.

Step 3: On farm extension and development of GAP for food crops at the farm level by farmer self-practice (learning by doing).

Step 4 Participatory evaluation Continuously

Step 5: Certification of GAP for food crops.

Development of the participatory agricultural extension approach to good agricultural practice for tomato (PAE to GAP for tomato) in accordance with the transformation of the agricultural development and promotion paradigm that focuses on the important philosophy<sup>[2]</sup> is 1) every human has the potential when receiving the opportunity, 2) helping him to help himself and 3) learning from doing (Learning by doing) and using integrated role between the target farmer or group who are actor and the extension officers, they are supporters.

#### **Trial the agricultural extension approach to good agricultural practice for tomato,**

The implementation of the PAE to GAP for tomato approach at the farm level of 6 voluntary small-scale tomato farmers found that the pre-test and post-test scores of all farmers practices were significantly different at  $P < 0.05$  in all provision of GAP and complied with the GAP standard as shown in Table 1.

#### **4. Conclusions**

From factors that result in good practices of small-scale tomato farmers to comply with the GAP for food crops standard resulting from four factors including (1) leadership, (2) community farmer group, (3) resources and (4) extension. The agricultural extension approach to good agricultural practice for tomato was the participatory agricultural extension approach to good agricultural practice for tomato (PAE to GAP for tomato). The implementation of the PAE to GAP for tomato approach at the farm level of 6 voluntary farmers found that the pre-test and post-test scores of all farmers practices were significantly different at  $P < 0.05$  in all provision of GAP and complied with the GAP standard. Further study the implementation of the PAE to GAP for tomato approach to small-scale tomato farmers in other provinces is suggested.

Table 1 Pre and post evaluation of the control groups and the treatment groups apply the PAE to GAP for tomato approach.

GAP for food crops provision	Control groups					Treatment groups				
	Mean		S.D.		t-values	Mean		S.D.		t-values
	Pre	Post	Pre	Post		Pre	Post	Pre	Post	
1. water	4.00	6.33	1.00	1.15	.192	3.67	14.00	0.58	0.00	.001*
2. planting area	5.67	7.00	0.58	0.00	.057	4.67	10.67	0.58	0.00	.003*
3. pesticides	11.00	11.33	1.00	1.15	.423	11.00	19.00	1.00	1.00	.005*
4. pre-harvest quality management	10.33	10.67	0.58	1.15	.742	12.33	18.00	0.58	0.00	.003*
5. harvest and postharvest handlings	5.67	6.33	0.58	0.58	.184	7.00	13.33	1.00	1.15	.034*
6. holding, moving produce in planting plot, and storage	5.00	6.33	1.00	0.58	.184	7.33	9.00	0.58	0.00	.038*
7. personal hygiene	4.67	5.00	0.58	0.00	.423	5.00	7.33	0.00	0.58	.020*
8. record keeping and traceability	10.33	10.67	0.58	0.58	.423	11.67	19.67	3.79	0.58	.031*

\* significantly different at  $P < 0.05$

### Acknowledgments

Thank you to Sakon Nakhon Rajabhat University for granting scholarships and thanked extension and development agencies and small-scale tomato farmer and community tomato group in Sakon Nakhon province that cooperate in research studies.

**References**

- [1] Department of Agriculture, (2015). DoA GAP online [On-line], <http://gap.doa.go.th/>  
(In Thai)
- [2] Direk Rerkharai. (2013). Trend of development direction and promote agriculture. handout Advanced Seminar Course on Agricultural Extension and Development Department of Agriculture and Cooperatives Sukhothai Thammathirat Open University: Nonthaburi. (In Thai)
- [3] Korpraditskul, R; Suwannamook, S, Adulyarattanapan, S and Damsiri, W,. (2010). Comparison study of GLOBALGAP, IGAP and ASEANGAP standard, Research and Development for Agricultural Commodity Standard Center.
- [4] National Bureau of Agricultural Commodity and Food Standards (ACFS), 2013, Thai Agricultural Standard (TAS 9001-2013) : Good Agricultural Practices for Food Crop.
- [5] Piyachint Pattamadilok et.al., (2016). Value added process and value of tomato products by participation of Ban Nangoi community, Tao Ngoi Subdistrict, Tao Ngoi District, Sakon Nakhon Province. Research report: Sakon Nakhon Rajabhat University. (In Thai)