

# Food Traceability and Information System for Local Standard of the High Safety Agri-food No.8 in Chachoengsao Province

Chatchai Tritham, Nitchichaya Naratapanon, Kreangsak Tamee and Ajchara Vararuk

**Abstract**—Food safety represents an increasingly important issue for many governments and the latest developments from the information and communication technology (ICT) has started to be developed and implemented systems that can provide a better risk management in food industry. This study presents the integrated traceability system and information system to manage a local standard for safety food in Chachoengsao province. This standard called “The High Safety Agri-Food No.8” by using the set of 8 indicators mentioned previously to certify for “Food Certification” of the province as well as to enhance an efficiency of database management for safety food. Furthermore, consumers can trace the source of manufacturing, process, food transformation and harvest, food distribution with High Food Safety Information System (HFSIS) and Food Traceability Information System (FTIS). In this paper will present an overall, this system can also help elevate the community health to restrain the environmental issues that affect public health. The traceability can alert community for any of unusual product may cause diseases and poor hygiene accordingly.

**Keywords**—Food traceability, high food safety information system, food traceability information system, high safety agri-food no.8.

## I. INTRODUCTION

**T**HIS study presents the integrated traceability system and information system to manage a local standard for safety food in Chachoengsao province. The province in Eastern

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Thailand has established a project, the development of high safety agriculture products in Chachoengsao province. The project is main objective to encourage the integration of program on the development of farmers' income and occupation. Chachoengsao Agriculture and Cooperatives Office (CACO) is a major project responsibility and minor 9 related provincial agencies need to centralized database for data integration along the manufacturing, marketing and product development and public relationship to enhance the high safety of agricultural products, high value-added form quality that meet the needs of the market effectively. Unfortunately, they are distributed database that difficulty to integrate for useful and a lot of food safety general standard, also small-scale farmers non-available to success and consumer can't access to traceability products for trust its.

Food safety represents an increasingly important issue for many governments and the latest developments from the information and communication technology (ICT) has started to be developed and implemented systems that can provide a better risk management in food industry. A key element in ensuring the food safety is related to food traceability, therefore food traceability systems represent the foundation for every food safety system. Many food and feed business operators have implemented food traceability systems, but maximized capabilities of those systems it is obtained by interconnecting them in order to obtain the high safety agri-food no.8 information system.

This study presents the integrated traceability system and information system to manage a local standard for safety food in Chachoengsao province. The total 815 registered farmers in this study were from various agricultures as a control group to consider using the standard procedures determined by local authorities. This standard called “The High Safety Agri-Food No.8” by using the set of 8 indicators mentioned previously to certify for “Food Certification” of the province as well as to enhance an efficiency of database management for safety food. Furthermore, consumers can trace the source of manufacturing, process, food transformation and harvest, food distribution with High Safety Food Information System (HSFIS) and Food Traceability Information System (FTIS).

Finally, all information is stored in a central database by Cloud which users can access data from web applications and

mobile applications. The farmers can also use this system easily with common technology already provided and staff can handle unified data, accuracy and expeditious. At last, consumer can be confident with local standards and farmers can sustainable earn more. Overall, this system can also help elevate the community health to restrain the environmental issues that affect public health. The traceability can alert community for any of unusual product may cause diseases and poor hygiene accordingly.

## II. FOOD SAFETY AND FOOD TRACEABILITY

### A. Food safety and Traceability

The existing food safety policies have as a central point minimizing the concerning of final consumers related to food safety and maximizing the degree of achievements for requirements regarding foodstuffs quality, safe and security [1, 2]. European Union consider it is necessary to be adopted an integrated approach related to food safety in order to be assured “a high level of food safety, animal health, animal welfare and plant health within the European Union through coherent farm-to-table measures and adequate monitoring, while ensuring the effective functioning of the internal market”.

One of the most important issues in food safety is related to food traceability, therefore all national and international regulations and standards defines the concept of food traceability.

- ISO 22005:2007 defines traceability as “the ability to follow the movement of a feed or food through specified stage(s) of production, processing and distribution”.
- GS1 defines traceability as “the ability to track forward the movement through specified stage(s) of the extended supply chain and trace backward the history, application or location of that which is under consideration”.
- GLOBALG.A.P. defines traceability as “the ability to retrace the history, use or location of a product (that is the origin of materials and parts, the history of processes applied to the product, or the distribution and placement of the product after delivery) by the means of recorded identification”.
- Codex Alimentarius Commission defines traceability as “the ability to follow the movement of a food through specified stage(s) of production, processing and distribution”.
- Regulation (EC) No 178/2002 of the European Parliament and of the Council (in article 3) defines traceability as the ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution”.

- Law no. 150/2004 regarding food safety of the Romanian Parliament defines traceability as the ability to identify and trace through all stages, production, processing and distribution, of a food or animal feed, food-producing animal or any substance which will be incorporated in a foodstuff or animal feed”.

### B. Inter-organizational Information System and food traceability systems

Inter-organizational Information System was designed in order “to support and implement cooperation and strategic alliances between two or more organizations” [3], nowadays IOIS have “the potential to produce synergistic effects on supply chain performance” [4]. Cost reducing, productivity improvements and a better product or market strategy are benefits obtained by implementing inter-organizational information system [5]. Moreover, in the food supply chain, an IOIS is essential in order to increase food safety and quality. Ariezo et al. [6] consider that chain traceability system represents an inter-organizational information system designed to fulfill complete food traceability from farmers to distributors/retailers.

Accessibility, reliability, response time, flexibility, and integration represent the key factors that must be taken into consideration in order to evaluate the quality of the IOIS obtained by interconnection organizational Information System [7].

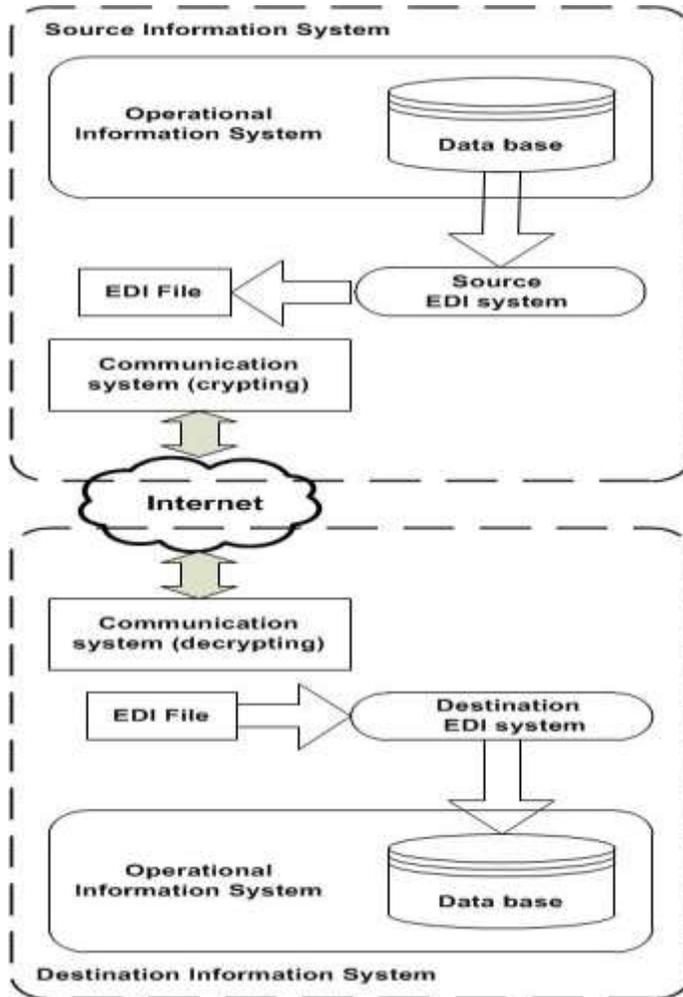


Fig. 1 Electronic data interchange in inter-organizational information system

In the same time, in any IOIS there are involved electronic data interchange (EDI), in order to facilitate the exchange data between Information System without human intervention [8]. The electronic data interchange process from an inter-organizational information system is presented in Fig. 1.

*C. The development of high safety agriculture products in Chachoengsao province project*

Chachoengsao province in Eastern Thailand is subdivided into 11 districts, 93 sub-districts and 859 villages. The province has established a project, the development of high safety agriculture products in Chachoengsao province. The project is main objective to encourage the integration of program on the development of farmers' income and occupation. The government office in Chachoengsao province that is responsible role in village and community development has integration activities target groups and how the budget together. Theoretic concepts of sufficiency economy theory and new development projects, including the project under the royal initiative of his majesty the king. As well as planning and allocation mission to develop a system of production, marketing, product development and public

relations to enhance high safety agricultural product to have added value in the form or quality, in line with market demand. Organic vegetables and organic products were designated as the master in the development of this project.

Chachoengsao Agriculture and Cooperatives Office (CACO) is a major project responsibility and minor 9 related provincial agencies as follows; Agriculture Office, Fisheries Office, Livestock Office, Land Office, Land Development Office, Irrigation Office, Commercial Affairs Office, Public Health Office, and Provincial Governor's Office need to centralized database for data integration along the manufacturing, marketing and product development and public relationship to enhance the high safety of agricultural products, high value-added form quality that meet the needs of the market effectively. Unfortunately, they are distributed database that difficulty to integrate for useful and a lot of food safety general standard, also small-scale farmers non-available to success and consumer can't access to traceability products for trust its.

The activities and methods of operation of 12 activities: 1) Improving the soil with organic matter 2) Production of compost from waste materials 3) Development of effective reservoir water 4) Promote the production of agricultural products safe 5) Developing the efficiency of vegetables spread out nets 6) Develop farming and processing 7) Development of chicken production 8) Development of broiler production 9) Promoting agricultural market places 10) Test residues agricultural products and toxins in the body 11) Promote and develop safe, high quality products, agricultural products and 12) Management of agricultural development of high safety. The process of the project is presented in Fig. 2.

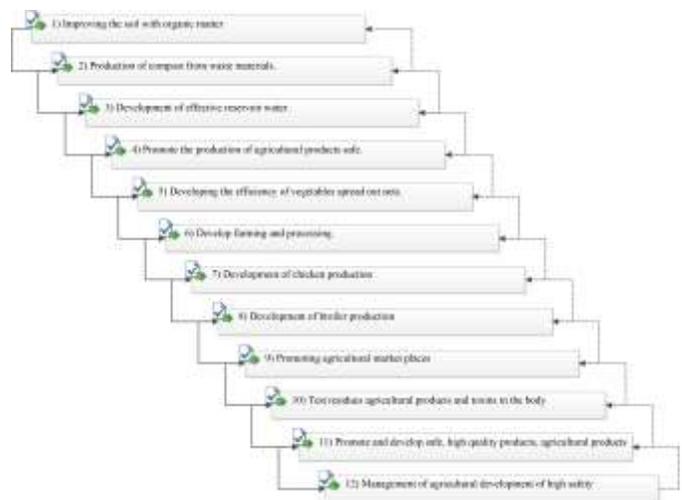


Fig. 2 The activities and methods of operation of 12 activities

*D. Local Standard for the High Safety Agri-food No.8 in Chachoengsao province*

Local standard of “The High Safety Agri-food No.8” in Chachoengsao province defined set of 8 indicators as follows;

- 1) No chemical fertilizers.
- 2) Do not use pesticides.
- 3) Do not use hormone.
- 4) No Genetically Modified Organisms (GMO).
- 5) Use clean water.
- 6) Proper soil.
- 7) Water harvesting.
- 8) Certify for “Food Certification” by Chachoengsao Public Health Office.

The total 815 registered farmers in this study were from various agricultures as a control group to consider using the standard procedures determined by local authorities. This standard called “The High Safety Agri-Food No.8” by using the set of 8 indicators mentioned previously to certify for “Food Certification” of the province as well as to enhance an efficiency of database management for safety food. Furthermore, consumers can trace the source of manufacturing, process, food transformation and harvest, food distribution with High Safety Food Information System (HSFIS) and Food Traceability Information System (FTIS).

The system designed for friendly users that can be divided into four groups as following;

- Staff of local government authorities responsible to manage 815 farmers’ data to Local Standard Management Information System (LSMIS). Operate agricultural products data from district to the provincial level. Monitoring and ensure the food certification issued correctly.
- Farmers will be trained to process strictly guidance and information needed by themselves.
- Retailers can view food production details for decision making to order.
- Consumers can traceability all food products decided prior to purchase.

### III. GENERAL ARCHITECTURE OF FOOD TRACEABILITY AND MANAGEMENT INFORMATION SYSTEM FOR LOCAL STANDARD

In this section, we present the general architecture of food traceability and management information system for local standard of the high safety agri-food No.8 in Chachoengsao province as follows:

- Registration of high safety agricultural products and organic farmers.
- The province define set of 8 indicators for local standard of “The High Safety Agri-food No.8” in Chachoengsao province guidelines for practice’ small-scale farmers.
- Assessment of “The High Safety Agri-food No.8” in the district and provincial levels of the production, production facilities, processing places, storage, production, and distribution.
- Registered “The High Safety Agri-food No.8” trademark for small-scale farmers, who has assessed set of 8 indicators.
- The consumers can traceability the source of the

manufacturing, process, transforms, how to pick and place distribution.

### IV. HIGH FOOD SAFETY INFORMATION SYSTEM

The official governments can assessment, process, monitor and report data and certified “The High Safety Agri-food No.8” trademark with HFSIS. The province defined set of 8 indicators for local standard of “The High Safety Agri-food No.8” in Chachoengsao province.

High Food Safety Information System (HFSIS) is major activities that are running at each stage from the food supply chain are presented in Fig. 3 as the following:

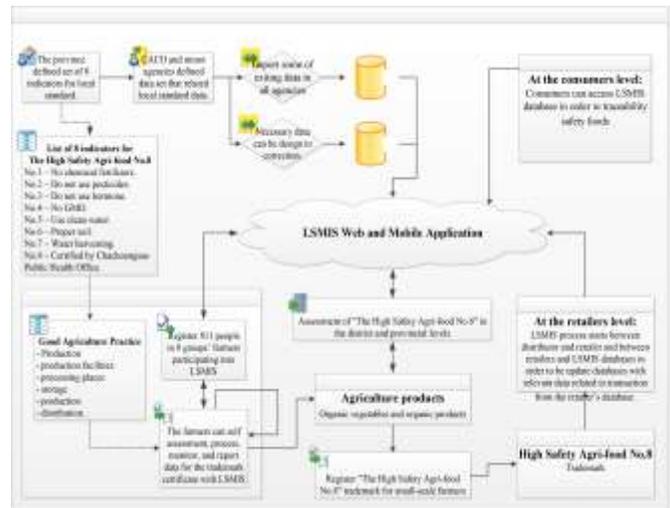


Fig. 3 High Food Safety Information System (LSIS)

#### A. At the official governments level:

- The province defined set of 8 indicators for local standard of “The High Safety Agri-food No.8” in Chachoengsao province.
- Major project responsibility, CACO and minor agencies defined data set that related local standard data. Analysis and design to correction to be initialize data to create centralized HFSIS database.
- Some of exiting data in all agencies; famer, distributor and retailer’ database that related with data set import to new integrated database.
- Otherwise necessary data can be design to web and mobile application is created for add, edit, delete and search data to HFSIS. An official government, famer and consumers can access HFSIS in level of user, who registered in system.
- Assessment of “The High Safety Agri-food No.8” in the district and provincial levels of the production, production facilities, processing places, storage, production, and distribution.
- Register “The High Safety Agri-food No.8” trademark for small-scale farmers, who has assessed set of 8 indicators.

*B. At the farms level:*

- Register 811 people in 8 groups’ farmers participating data into HFSIS database.
- The farmer’s database is updated with relevant data regarding the acquired resources.
- HFSIS process starts between farm and official governments and between farm and HFSIS databases in order to be update databases with relevant data related to transaction from the farmer’s database.
- The farmers can self assessment, process, monitor, and report data for the trademark certificate with HFSIS.

*C. At the retailers level:*

- The retailers’ data is updated with relevant data regarding the acquired goods from HFSIS’s database.
- When retailers delivers goods to consumer, HFSIS process starts between distributor and retailer and between retailers and HFSIS databases in order to be update databases with relevant data related to transaction from the retailer’s database.

*D. At the consumers level:*

- The consumers can access HFSIS database in order to traceability safety foods in next step.

**V. FOOD TRACEABILITY INFORMATION SYSTEM**

Food Traceability Information System (FTIS) is minor activities that are running at each stage from the food supply chain are presented in Fig. 4 as the following:

*A. At the official governments level:*

Staff of local government authorities responsible to manage 815 farmers’ data to High Food Safety Information System (HFSIS). Operate agricultural products data from district to the provincial level. Monitoring and ensure the food certification issued correctly.

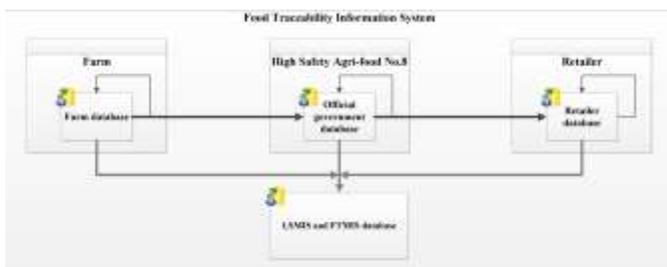


Fig. 4 Food Traceability Information System (LSIS)

*B. At the farms level:*

Farmers will be trained to process strictly guidance and information needed by themselves with HFSIS and FTIS.

*C. At the retailers level:*

Retailers can view food production details for decision making to order.

*D. At the consumers level:*

Consumers can traceability all food products decided prior to purchase.

All information is stored in a central database by Cloud which users can access data from web applications and mobile applications. The farmers can also use this system easily with common technology already provided and staff can handle unified data, accuracy and expeditious. At last, consumer can be confident with local standards and farmers can sustainable earn more.

**VI. CONCLUSIONS**

This study presents the integrated traceability system and information system to manage a local standard for safety food in Chachoengsao province. The total 815 registered farmers in this study were from various agricultures as a control group to consider using the standard procedures determined by local authorities. This standard called “The High Safety Agri-Food No.8” by using the set of 8 indicators mentioned previously to certify for “Food Certification” of the province as well as to enhance an efficiency of database management for safety food. Furthermore, consumers can trace the source of manufacturing, process, food transformation and harvest, food distribution with High Safety Food Information System (HSFIS) and Food Traceability Information System (FTIS).

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