

KNOWLEDGE MANAGEMENT AND LEARNING PROCESS OF COMMUNITY
FOOD PRODUCT PRODUCTION

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การศึกษานี้ต้องการค้นหากระบวนการจัดการความรู้และการเรียนรู้ของผู้ผลิตอาหารชุมชน และปัจจัยสำคัญเพื่อกำหนดนโยบายการพัฒนากระบวนการจัดการความรู้และการเรียนรู้ของผู้ผลิตอาหารชุมชน โดยทำการศึกษาเชิงคุณภาพในกลุ่มผู้ผลิตอาหารชุมชน จำนวน 6 กลุ่ม จำแนกเป็นศูนย์การเรียนรู้ด้านการผลิตอาหารจำนวน 3 กลุ่มและกลุ่มผู้ผลิตอาหารชุมชนทั่วไปจำนวน 3 กลุ่ม ตั้งอยู่ในจังหวัดนนทบุรีและจังหวัดลำปาง ในระหว่างเดือนมิถุนายน 2554 – พฤษภาคม 2555 ด้วยวิธีสัมภาษณ์เชิงลึก สังเกตการณ์ และประชุมกลุ่มแบบไม่เป็นทางการ การศึกษาพบว่า กระบวนการจัดการความรู้ของผู้ผลิตอาหารชุมชนแตกต่างจากธุรกิจทั่วไป ได้แก่การเข้าถึงข้อมูลและถอดความรู้จากแหล่งความรู้ภายนอกและการถ่ายทอดความรู้ภายในกลุ่มสู่ภายนอกกลุ่ม จากความสัมพันธ์เชิงเครือข่ายของผู้ผลิตชุมชน กระบวนการจัดการความรู้อื่น ได้แก่ การสร้างความรู้เพื่อใช้ภายในกลุ่ม การถอดความรู้แฝงในบุคคลและแบ่งปันความรู้แก่สมาชิกในกลุ่ม และการถอดชุดความรู้ให้เป็นความรู้ที่ชัดเจน กระบวนการเรียนรู้ได้แก่การเรียนรู้จากผู้ชำนาญการ นอกจากนี้พบว่า ความรู้ในการผลิตอาหารชุมชนส่วนใหญ่เป็นความรู้ที่แฝงในบุคคลมากกว่าความรู้ที่ชัดเจน และมีกระบวนการถอดความรู้และแบ่งปันความรู้ด้วยวิธีถ่ายทอดจากบุคคลสู่บุคคลมากกว่าการถอดเป็นชุดความรู้ที่ชัดเจน กลุ่มผู้ผลิตชุมชนที่เป็นศูนย์การเรียนรู้ด้านการผลิตอาหาร มีกระบวนการจัดการความรู้ด้านสูตรตำรับอาหาร ไม่แตกต่างจากกลุ่มผู้ผลิตชุมชนทั่วไป ขณะที่การจัดการความรู้ด้านวิธีการที่ดีในการผลิต กลุ่มผู้ผลิตชุมชนที่เป็นศูนย์การเรียนรู้ด้านการผลิตอาหารมีการถอดชุดความรู้ให้เป็นความรู้ที่ชัดเจนและถ่ายทอดความรู้สู่ภายนอกกลุ่มที่ชัดเจนกว่ากลุ่มผู้ผลิตชุมชนทั่วไป ปัจจัยสำคัญในการส่งเสริมการจัดการความรู้และการเรียนรู้ของผู้ผลิตชุมชน ได้แก่ อัตลักษณ์ร่วมของกลุ่ม ภาวะผู้นำ ความสัมพันธ์ทางสังคม เป้าหมายองค์กร และการสนับสนุนจากภาครัฐ ผู้วิจัยเสนอให้มีการส่งเสริมการจัดตั้งศูนย์การเรียนรู้และเครือข่ายผู้ผลิตอาหารชุมชน เพื่อส่งเสริมการเข้าถึงความรู้ การแบ่งปันในกลุ่มและถ่ายทอดแก่ผู้ผลิตชุมชนอื่น โดยเฉพาะด้านวิธีการที่ดีในการผลิตเพื่อส่งเสริมการปฏิบัติเพื่ออาหารปลอดภัยแก่ผู้ผลิตชุมชนทั่วประเทศ

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WATTANAPONG LUECHOOWONG: KNOWLEDGE MANAGEMENT
 AND LEARNING PROCESS OF COMMUNITY FOOD PRODUCT
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This study aims to explore knowledge management and learning process of community food product production and propose key factors for formulating strategy in order to improve knowledge management and learning process on local food production. The qualitative research design was conducted in 6 community food producers. Those were 3 learning center of food production and 3 common community producers which located in Nontaburi province and Lampang province. The data was collected between June 2011-May 2012 with in-depth interview, observation, and informal focus group method. The findings were: the knowledge management processes of each community food producer were differed from other business organization. Those were accessing and capture knowledge from outside sources, and knowledge transfer to outside community through relation of community network. Other KM processes were knowledge creation for use inside community, tacit knowledge capture and sharing, knowledge codifying to explicit knowledge. Learning process was the process which mainly acquired knowledge from master to novice. Most knowledge in community food production was more tacit knowledge than explicit knowledge. There have been more knowledge capture and sharing with people-to-people approach than codifying knowledge. The learning center community producers and the common community producers were not different in managing knowledge of food formulation whereas they have more codifying and transfer of GMP knowledge than the common community producers. The key factors that influenced to KM and learning were collective identity, leadership, social relation, organization goal and public support. The recommendation were to establish learning center and community food production network in order to promote knowledge acquisition, sharing and transferring to other communities, especially to GMP knowledge to promote food safety practice to nationwide community producers.

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LIST OF ABBREVIATIONS

CAR	Corrective Action Request
CSR	Corporate Social Responsibility
FDA	Food and Drug Administration
GMP	Good Manufacturing Practice
KM	Knowledge Management
OTOP	One Tambon One Product
SOP	Standard Operating Procedure
TPC	Total Polar Compound

CHAPTER I

INTRODUCTION

1. Rational and Statement of the Problem:

Since the OTOP (One Tambon One Product) has been promoted by Thai Government policy in 2001, the community producers have produced and marketed a number of food and health products. To increase the community capability in food production and improve products' quality, the public sectors have continuously emphasized and provided educational training to those community producers.

For example, the Community Development Department focus on strengthening community involvement and supporting learning process through the project e.g. Knowledge Based OTOP (KBO): the utilization of local wisdom to produce local product and services; the Department of Agricultural Extension emphasize on given know how to produce prepared agricultural product; the Department of Industrial promotion support domestic production and marketing management strategies; the Department of Export Promotion aim to promote local and community products to international market as well as the Food and Drug Administration (FDA) has provided the knowledge for improve health products' quality to the standard. Meanwhile, FDA performs regulation and monitoring of food products as well.

The mismatched of previous community producers' development tools

The increasing of community food and health producers from 7,909 communities in 2002 to 13,017 communities in 2009 (Supakan Jantavong, 2010), Thai FDA has provided many interventions to support the community producers' practice according to the regulatory standards. Those standards are Good Manufacturing Practice or GMP and specific product standards.

Since FDA has carried on the Community Health Product Quality Improvement Project according to OTOP policy for about 10 years, *most*

interventions are conventional educational interventions: formally in-class seminar and training on good manufacturing practice and health product standards as well as supporting learning material such as handbooks and newsletters. *A few of interventions*, non-conventional intervention occasionally done in some area, are study trip and observation on any role model of community health product production e.g. community health product learning centers, and support the exhibition and trade fair of standard food and health products (Wattanapong Luechoowong, 2009).

However, those interventions have not been evaluated by specific academic measure. There have been monitored only standard of production and quality of health product by annually surveillance program.

In contrary, FDA has continuously supported many development activities to those community producers, some community producers could not provide competitive and adaptive capability and still found that many of food and health products are substandard and caused to consumer health risks.

The nationwide systematic sampling survey on 54 types of food and drinking water production plants in compliance with GMP by FDA in 2006 indicated that there were some *substandard food productions*, especially on cleanliness of production plant (31.71 percent), processing control and sanitation (26.17 percent), and non-compliance of personal hygiene (18.9 percent) (Food and Drug Administration, 2006). Furthermore, from annual monitoring of community health products by FDA 2007-2010 shown that there are slightly decreased of *substandard prepared foods* from 15.68 percent in 2005 to 7.44 percent in 2009 (Food and Drug Administration, 2007, 2008a, 2009 2010a). Although the overall quality of food products seems to increase, some kind of foods are still risky to consumers. For example, the survey of dried-shrimp chilli paste in Public Health Region 7 (Phuket, Krabee, Ranong, Trang, and Pangnga) found that 14.7 percent of 34 dried-shrimp chilli pastes from 27 enterprises was over limit of chemical preservatives (Benzoic acid and Sorbic acid) at 2.05-4.54 times of the standard and 52.94 percent of them was over limit of microbial amount (yeast, mold, and total microbial count) (Food and Drug Administration, 2011). The systematic sampling survey of processed meat and seafood product in

2008 indicated that 30.49 percent of 728 samples was added synthetic color, especially in shrimp ball, sausage, and dried shrimp (Food and Drug Administration, 2008b). Moreover, in 2009, the food safety surveillance program found polar compound in cooking oil was over limit at 7.31 percent of 4,213 oil samples, especially in fried pie, fried potatoes, and fried sausage as well as in meat product found insecticide at 16.78 percent from 4,856 items, especially in local fermented fish (Pla-ra), sweeten fish, and salted fish (Food and Drug Administration, 2009).

Therefore, substandard food is still found harmful to consumers as well as the negative news of community food from public media such as “Find again OTOP Products contaminated over-added preservative” (Daily News, 2007). These circumstances tend to indicate remaining risk in community products and also decrease consumers’ trust. The survey of population’s opinions on One Tambon One Product Project indicated that there were increasing rate of the opinion “the OTOP products were substandard” from 29.1 percent in 2004 to 34.4 percent in 2007, respectively (The National Statistic Office of Thailand, 2004, 2007).

In 2008, the Study of the Community Health Product Manufacturer Status in Uthai thanee Province by interviewing of community enterprises’ leader that some community producers lacked of knowledge on production technique to improve their product quality (Jamras Nimitpornchai, 2008). Moreover, The study of effectiveness of knowledge improvement on using preservative of Moo Yor sausage in Mukda harn Province in 2008 revealed the level of over limit using of preservative in Moo Yor, before and after of training on using preservative of Moo Yor sausage in 11 producers, was not different at statistical level at 0.01 and their level of knowledge are still at medium and low level (Prayoon Wongsakulwiwat, 2008).

It might be supposed that the previous interventions are not enough to promote safety and quality of local health products because of insufficient intensity and coverage of applying interventions. Also, its pattern or process of improvement might not appropriate to improve those products to achieve standard.

Gap of improvement: the flaw of interventions

When looking back to government sectors' tools of improvement for community enterprises, there has been some notion on the limitation of those interventions. It was found that most of previous interventions have had similar patterns. Those interventions are formal education with conventional technical terms. Moreover, it never been adjusted to each level of learning ability and community nature.

The work on perspectives into learning at the workplace pointed that learning in the formal educational system and learning at work is different. The former is based on formal, intentionally planned educational activities, learning from explicit knowledge, uncontextualized, and separation of knowledge and skill while the latter is mostly informal in nature, learning through socially shared activity and tacit knowledge, characterized by contextualized reasoning and no distinction of knowledge and skill (Tynjälä, 2008).

Since interventions by government sectors have been utilized to educate those community producers, it blossoms some skillful community entrepreneurs to produce the marketable products and long lasting businesses to domestic and international levels. Moreover, some local enterprises have sufficient potential practice and were selected to be the learning center on production practice and/or business management while some community producers are not.

It indicated that learning in local production workplaces have been both best practice and lesson learned occurred in communities. It is interesting that what they have learned, and how they have learned from past production practices since Tynjälä (2008) suggested that *"it is worth remembering that learning does not always involve desirable matters but may also strengthen existing negative features of the workplace"* (Tynjälä, 2008).

By different nature of learning, the conventional interventions should be adapted to fit with those characters. In this view, there are some questions that what

learning in workplace's characters of community food producers are, how context influence their learning, and how they apply local wisdom in their production.

Knowledge management and learning in the workplace

To improve the intervention to fit with learning characters of community producers, it needs to find what their knowledge management and learning are. Since the main part of knowledge management process defined as an integrated knowledge management cycle are composed of *knowledge capture and creation* stage, *knowledge sharing and dissemination* stage, and *knowledge acquisition stage and application* stage (Dalkir, 2005). In each stage, it will be divided into sub stage as Bukowitz and Williams (2000:9) proposed their knowledge management constituent (Bukowitz & Williams, 2000) .

It starts with "Get" stage referred to seeking out information needed in order to make decisions, solve problem, or innovate. In this stage, if the producers have some problems in their production, where knowledge management diverges from information management is that getting of content encompasses both traditional explicit and tacit knowledge (Bukowitz & Williams, 2000). In real life, most of explicit knowledge is always from the government sectors training while tacit is from inside community. It triggers that how they select the corrected source of information, from inside or outside organization, or from explicit or tacit knowledge, and how they get knowledge from any sources.

Next, "Use" stage deals with how to combine information in a new and interesting ways in order to foster organizational innovation and primarily use to the knowledge to solve problems (Bukowitz & Williams, 2000). It elicits that how lay producer produce the new knowledge to solve problem from information they got, how they evaluate the knowledge they got and decided to application.

The "Learn" stage consists of the process of learning from experiences as a mean of creating competitive advantage. An organizational learning becomes possible from success (best practice) and failure (lesson learned) (Bukowitz & Williams, 2000). In this stage, Paavola, Lipponen, and Hakkarainen (2004) presented a

metaphor of learning, knowledge creation. In their view, learning is seen as the creation of new knowledge by participating in the practices of social communities (Paavola S., Lipponen L., & Hakkarainen K., 2004).

The former 3 stages of Bukowitz and Williams KM cycle -Get, Use, and Learn- is defined as the sub stage of *knowledge creation* and it includes learning as its component. This stage urge the questions how community producers generate their knowledge, how they learn and manage their knowledge, what influence or obstruct knowledge creation, what the value they gave to and how they apply the knowledge from the lessons learn or best practice.

Later, *sharing or contribute stage* is the fourth stage of Bukowitz and Williams knowledge management cycle (Bukowitz & Williams, 2000), the “Contribute” stage deals with getting the members to post what they have learned to the communal knowledge based. This stage trigs the questions how community producers distributed their knowledge through community and what knowledge they want to share.

Moreover, “Application” is the final stage in the knowledge management cycle when the knowledge that has been captured, shared, and otherwise made available is put to actual use. Bukowitz and Williams (2000) also described this stage with 3 sub stages: the “Assess” is the evaluation of intellectual capital and require that that the organization define mission-critical knowledge and map current asset against future knowledge need; the “Build and sustain” is to allocate any resources to the growth and maintenance of knowledge in order to keep an organization viable and competitive; the “Divest” means the examining of their knowledge capital, if they are no longer creating value, it should not hold on to asset. It is interesting that what knowledge that community producers use in real situation, how they apply their innovative knowledge into their practice (Bukowitz & Williams, 2000).

Since learning process are specified by their experience, practice and share idea among members (Orr, 1990), in this study, I aim to investigate knowledge management and learning of community producers to explore what knowledge

management process are in community food production as well as what learning component in the stage of knowledge management are. This will be beneficial to formulate the measures to promote safety food processing practice and increase capability of community food production.

2. Objectives:

- 2.1 To explore the knowledge management process on food production of community producers
- 2.2 To analyse the learning constituents of community food producers through the stage of knowledge management cycle
- 2.3 To propose key factors for formulating strategy in order to improve knowledge management and learning process on local production of food product

3. Conceptual Framework:

	Creation and Capture	Sharing and dissemination	Application
Knowledge Management	<ul style="list-style-type: none"> • Get/Use <ul style="list-style-type: none"> • Knowing what • Knowing how • Knowing why • Learn <ul style="list-style-type: none"> • What to learn • How to learn • Create <ul style="list-style-type: none"> • What to create • How to create 	<ul style="list-style-type: none"> • What to share • How to share 	<ul style="list-style-type: none"> • What to apply • How to apply

This study uses *the process perspective* -- the process of knowledge management which information is turned into actionable knowledge and made readily available in applicable forms to utilize.

4. Research Questions:

- 4.1 What is the knowledge management process of food production of community producers?
 - 4.1.1 Knowledge creation
 - 4.1.1.1 What knowledge do community producers create?
 - 4.1.1.2 How do community producers create their knowledge?
 - 4.1.2 Knowledge sharing
 - 4.1.2.1 What knowledge do community producers share?
 - 4.1.2.2 How do community producers share their knowledge?
 - 4.1.3 Knowledge application
 - 4.1.3.1 What knowledge do community producers apply?
 - 4.1.3.2 How do community producers apply their knowledge?
- 4.2 What is the learning constituent of community food producers in the stage of knowledge management cycle?
 - 4.2.1 What do community producers learn from their production?
 - 4.2.2 How do community producers learn from their production?
- 4.3 What are the key factors influenced to knowledge management and learning process on local production of food product?

5. Operational Definition

Knowledge management refers to the process of creating, sharing, and utilizing of knowledge to achieve the goal of enterprises which are safety and quality of products as well as business competitive advantage.

Learning refers to the way of community members acquiring new or modifying existing knowledge, behaviors, skills, or values and may involve synthesizing different types of information.

Knowledge creation refers to the process to obtain the information and/or knowledge by sourcing, using, and learning.

Knowledge sharing refers to the process of distributing the information and/or knowledge to contribute other members of community.

Knowledge application refers to the process of utilizing the information and/or knowledge including assessing, sustaining, and divesting of knowledge.

Community producer refers to the producers who are being and cooperative producing of food product in local area and be registered to the government sectors such as the Department of Agricultural promotion, or the Department of Community Development.

Food product refers to the processed food or prepared food which is under the responsibility of Food and Drug Administration.

Food production refers to commercial food production

Product standard refers to the regulatory standard of food product to which control and monitoring the property of food in order to ensure safety and quality to the consumer.

6. Expected Contributions:

The understanding of knowledge management process and learning of community producers will be beneficial to formulate strategies and/or interventions to promote knowledge management to community food producers. This process will increase capability of the community producers to be the knowledge-based enterprises. The knowledge management of food production will empower the community producers and also provides food safety to the consumers.

CHAPTER II

REVIEW OF LITERATURES

This study is mainly focused on seeking the understanding of knowledge management process of community food production, especially in food processing and products through the knowledge management cycle as a frame for analysis. It will find the characterization of learning elements within the community contexts.

Review of related literatures will be divided into 2 parts. First, the law abiding standards of food production and product will be reviewed since it is crucial to understand what community producers need to learn and internalize to good production practice. Second, the knowledge management and learning literatures will be overviewed. The main component of knowledge management theories were described and illustrated what processes in community managing their knowledge are. Moreover, this part will explain the interrelation among knowledge management and learning which is the core element to drive the knowledge management process to the learning organization and sustained self reliance for community health product production.

Part I: Food regulation and food control standard

In Thailand, food control activities are responsible by several organizations. Especially, the Minister of Public Health is designated by law to be in charge of the execution of promulgate regulations and set other approaches in order to provide facilities to this act. The Food and Drug Administration and the Provincial Offices are responsible for legal food control operations while the support of food analytical services are under responsible of the Department of Medical Sciences.

The Food Act of B.E.2522 (1979) is the major law aimed to protect and prevent consumers from health hazards happening from food consumption. The regulations compose of the procedures for applications for manufacturing and importation licenses and registration including the labeling of food products for exports, the identification card of the competent officers, and the rates of fees.

The Food Act (B.E.2522) classifies foods into three main categories as follows:

1) *Special Controlled Foods* – In this category of foods, registrations are required. Legal provisions are related to food quality standard, specifications, packaging and labeling necessities, as well as other aspects of good hygienic practices. The Food Committee may make proposal of specifying specially controlled foods to the Minister of Public Health.

2) *Standardized Foods* – This kind of foods does not require registration. Their quality and labeling must be met the standard necessities as indicated in the Notification of the Ministry of Public Health.

3) *General Foods* – Foods, processed or non-processed, preserved or non-preserved, raw or cooked, which are not listed under category one or two will be considered as general foods. This kind of foods does not require registration but they are controlled according to safety, hygiene, labeling and advertisement. Foods in this category may be subcategorized into (a) foods that must bear standard labels and (b) other general foods.

The control measures for these food categories are different; special controlled foods are most strictly controlled and the application for product registration is required before producing or importing. For standard foods, they must be produced up to the prescribed quality or standard but the application for such permission is not required. For labeled foods, the main objective is to control the labeling of product in order to prevent misleading of consumers; however, there will be fewer problems of quality, compared with foods in other categories (Food and Drug Administration, 2010b).

Under the Food Act B.E.2522, all kind of food products are controlled according to safety, hygiene, labeling and advertisement. There have been much food promulgations to determine food production and product standards. For example, the production process must be conformed to Good Hygienic Practice (GHP) or Good Manufacturing Practice (GMP) which is the standard to ensure that food production

processes would be qualified and have ability to produce products with safety and quality as an output of the processes.

Good manufacturing Practice (GMP) was promulgated 2 notification of the Ministry of Public Health (Bureau of Food Control 2013).

- 1) Notification of the Ministry of Public Health (No. 193) B.E. 2543 (2000):
Production Processes, Production Equipments, and Foods Storages
- 2) Notification of the Ministry of Public Health (NO 342) B.E. 2555 (2012) :
Manufacturing Procedures, Production Equipment and Appliance, and
Food Storage of Prepackaged Processed Foods.

It will be prescribed and considered to the followings:

- a. Location and manufacturing buildings
- b. Tools, machineries and production equipments
- c. Control of production process
- d. Sanitation
- e. Cleaning and maintenances
- f. Personnel and hygiene workers

Those parts of GMP are to ensure food product safety by control or eliminate the sources of contamination of physical, chemical and biological hazard such as dust, part of insect, agrochemical compound or pathogenic contaminated to raw material, production process or finish products.

Moreover, any food products must conform to the product standards which are specified the quality of food product including containers and labels. It determines the acceptable or allowable limit of physical, chemical and biological properties of food.

Since the major products found in this study were frying products, drying products, and grinding product which are processed food, Some related food product standards were shown in Table 2.1.

Table 2.1 The related food product standards in community food production

The notification of the Ministry of Public Health	Issues
No.182 B.E.2541 (1998)	Nutritional labeling
No.194 B.E.2543 (2000)	Food labeling
No.205B.E.2543 (2000)	Fat and oil
No.237 B.E.2544 (2001)	Labeling of prepared food and ready to eat food
No.281 B.E.2547 (2004)	Food additives
No.283 B.E.2547 (2004)	Limitation of Total Polar Compound in cooking oil
No.295 B.E.2548 (2005)	Standard of plastic container
No.305 B.E.2550 (2007)	Labeling of some kinds of ready-to-eat foods
B.E.2550 (2007)	Food standard on pathogenic microorganisms
No.347 B.E.2555 (2012)	Method for food production with repeated frying oil

Sources: The notification of the Ministry of Public Health (Bureau of Food Control 2013)

The knowledge related to Good Manufacturing Practice and food standards is fundamental knowledge which food producers have to understand and conform to. However, these kinds of knowledge were mostly transferred to the producers by formal education with technical terms. By this method, there have been some difficulties in learning of lay producers.

Part II: Knowledge management

This part provides the overview of knowledge management and the interrelation with learning constituent in order to apply with the situation of community food production. It is composed of 5 sections: framework of knowledge management, knowledge creation, knowledge capture and codifying, knowledge sharing and community of practice, and knowledge application.

Framework of knowledge management

Since knowledge has been recognized as a valuable source of competitive advantage and value creation of business and organization management in areas such as planning, marketing, products, customer services, structure, and organizational resources management, knowledge that organizations acquire is a dynamic resource that needs to be carefully nurtured and managed (Massa & Testa, 2009).

Davenport and Prusak (1998: 2) describe distinctions between data, information, and knowledge as follow (Davenport & Prusak, 1998).

Data is defined as a set of separate objective facts about events, especially numerical facts collected together for references. Data describes only a part of what occurs in the organizational activities. It provides no interpretation or judgment and no sustainable basis of action.

Information is described as a communication of knowledge usually in the form of a document or an audible or visible communication. It is happened among senders and receivers and is meant to alter the way receivers perceive their views. This means information has an impact on interpretation and practice.

Knowledge is defined as a “combination of shaped experience, values, contextual information, and expert insight that provides a framework for assessing and manipulating new experiences and information. In organizations, it often becomes embedded in organizational routines, processes, practices and norms as well as in documents or repositories.” Knowledge is also transform to information through comparison, consequences, connections, and conversations (Davenport & Prusak,

1998). The knowledge can be divided as two kinds of knowledge: explicit and tacit. (Liao, 2002; I. Nonaka, Reinmoeller, & Senoo, 1998)

Explicit knowledge can be expressed in words and numbers. This type of knowledge is more obviously and easily articulated and shared. This knowledge is transmittable in systematic and formal language.

Tacit knowledge is subconsciously comprehended and applied, hard to articulate, and embedded in contexts and actions. Tacit knowledge is usually shared through participated experiences, and interactive conversation. This type of knowledge is harder to formalize and extracted it in knowledge storage.

The distinction among data, information, and knowledge is that data expresses facts, which are organized or systemized with other data into information. Then, information in turn becomes individuals' knowledge when it is analyzed, linked to other information, and used to solve a problem or apply in any circumstances (Anantatmula, 2005) .

Knowledge management becomes an important process that is widely applied in many organizations. There are many different definitions about knowledge management in many literatures.

“Knowledge management refers to a systematic and organizational specific framework to capture, acquire, organize, and communicate both tacit and explicit knowledge of employees so that other employees may utilize them to be more effective and productive in their work and maximize organization's knowledge (Davenport, 1998a).”

“Knowledge Management is a business process. It is the process through which firms create and use their institutional or collective knowledge. It includes three sub-processes:

Organizational learning—the process through which the firm acquires information and/or knowledge

Knowledge production—the process that transforms and integrates raw information into knowledge which in turn is useful to solve business problems

Knowledge distribution—the process that allows members of the organization to access and use the collective knowledge of the firm (Sarvary M. & . 1999).”

“The management of knowledge goes far beyond the storage and manipulation of data, or even of information. It is the attempt to recognize what is essentially a human asset buried in the minds of individuals, and leverage it into an organizational asset that can be accessed and used by a broader set of individuals on whose decisions the firm depends (Maier R., 2004).”

“Knowledge management is defined as the process of continuously creating new knowledge, disseminating, and embodying it quickly in new products/services, technology, and systems perpetuates change within the organization (Takeuchi & Nonaka, 2004).”

Although there are distinctions between many definitions of knowledge management, thus, the mutual published definitions of knowledge management in 1990s are emphasizing specific attributes of knowledge management such as knowledge identification, knowledge creation, knowledge codification, knowledge sharing, reuse, and application (Nevo & Chan, 2007).

Moreover, Dalkir (2005) propose an integrated knowledge management cycle, which was synthesized from many KM models. It summarizes stages of KM components into 3 related major stages. Those are:

1. Knowledge capture and/or creation
2. Knowledge sharing and dissemination
3. Knowledge acquisition and application

It is illustrated as Figure 2.1 :

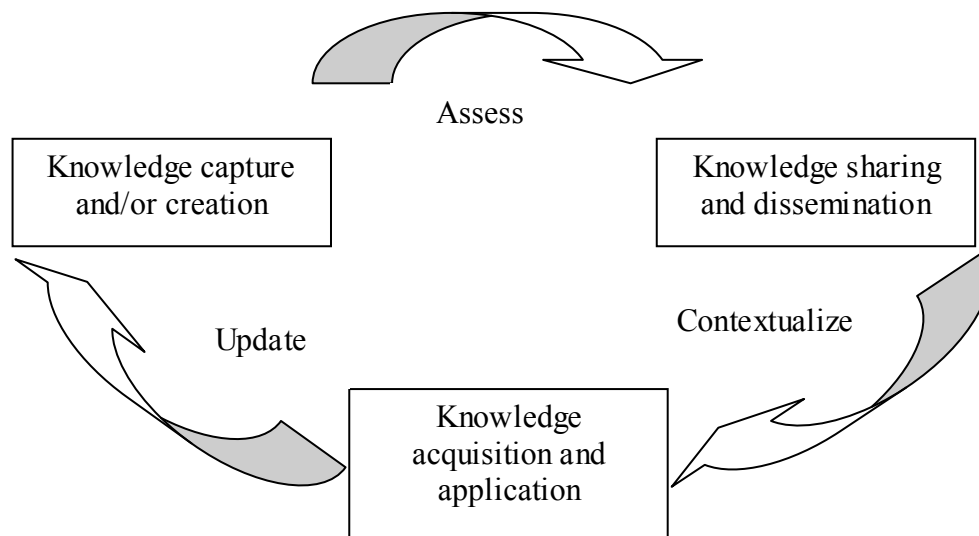


Figure 2.1: Integrated knowledge management cycle (excerpt from Dalkir, 2005:43).

Knowledge capture refers to the identification and subsequent codification of existing internal knowledge and know-how within the organization and/or external knowledge from the environment. Knowledge creation is the development of new knowledge and know-how innovations that did not have a previous existence within the company (Dalkir, 2005:43). Knowledge sharing and dissemination refers to the processes of transferring, disseminating and distributing knowledge in order to make it available to those who need it. Knowledge acquisition and application can be defined as the process of understanding and incorporating knowledge into an organization's products, services and practices to derive value from it (Massa & Testa, 2009).

The critical processes throughout the knowledge management cycles are to assess the value of content based on organizational goals and contextualize content in order to better match with a variety of users. Then, they are continuously updated with a focus on updating, achieving as required, and modifying the scope of each knowledge object. (Dalkir, 2005:46)

Knowledge creation

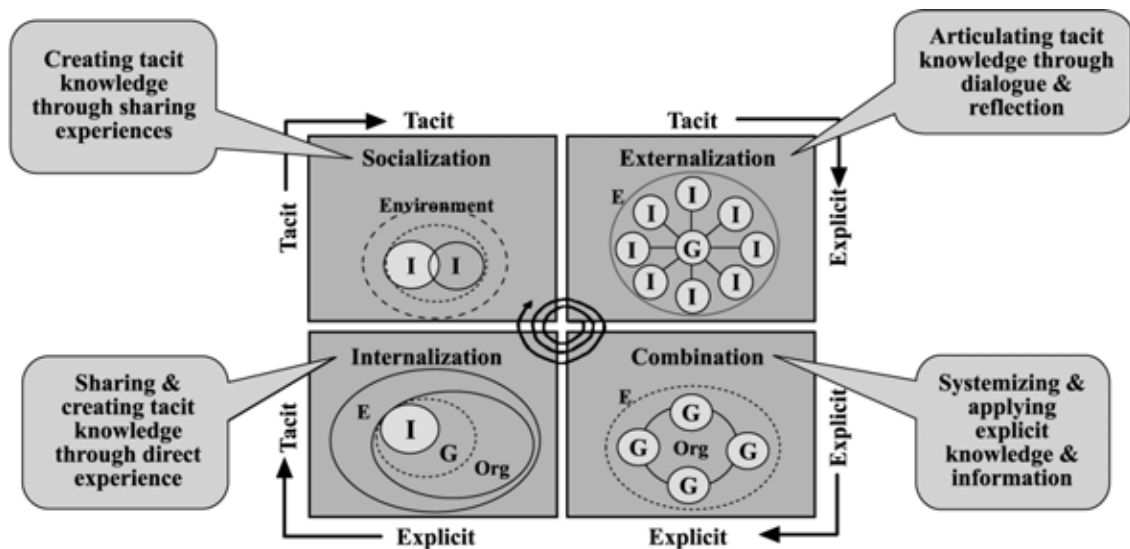
The organizational capability to create and utilize new knowledge and innovation is considered as one of the main sources of the competitive advantage (Camisón & Forés, 2011; Martín-de-Castro, López-Sáez, & Navas-López, 2008; I. Nonaka, & Takeuchi, H 1995). The SECI knowledge creation model (I. Nonaka, 1998; I. Nonaka, & Takeuchi, H 1995; Takeuchi & Nonaka, 2004) has been the most influential theory which is applied in the organizational knowledge management.

Knowledge creation refers to the development of new knowledge and know-how innovations that did not have a previous existence within the company (Dalkir, 2005:43). Likewise, I. Nonaka, Toyama, & Konno (2000) define knowledge creation as “*a continuous, self-transcending process through which one transcends the boundary of the old self into a new self by acquiring a new context, a new view of the world, and new knowledge*” (I. Nonaka, Toyama, & Konno, 2000).

They propose a knowledge creation model composed of three components: the SECI process, the process of creating knowledge through transformation between tacit and explicit knowledge; Ba, the shared context for creating knowledge; and knowledge assets—the inputs, outputs, and moderator of the knowledge creation process (I. Nonaka, Toyama, & Hirata, 2008; I. Nonaka, et al., 2000).

This model is emphasized on the conversion of tacit and explicit knowledge in order to creating knowledge through each level of the organization: from individual to individual (socialization), from individual to group (externalization), from group to organization (combination) and from organization to individual (internalization) (I. Nonaka, 2000; I. Nonaka, & Takeuchi, H 1995). The figure... showed the SECI Model of knowledge creation (Gray & Densten, 2005; I. Nonaka, & Takeuchi, H 1995).

Figure 2.2: The SECI Model of knowledge creation



Notes: I = Individual; G = Group; O = Organization; E = Environment

Source: Developed by Nonaka and Takeuchi (1995) and adapted by Gray and Densten (2005)

Socialization was a process of sharing individual tacit knowledge through shared direct experiences in everyday social interaction to create new tacit knowledge. Since tacit knowledge was not easy to formalize and was situated in a particular time and place, it could be shared among collaboration in a particular world. The apprenticeship system was a basically method of sharing knowledge through socialization where the newcomer observed the master to acquire know-how through imitate and practice. Moreover, socialization was a process in which the apprentice abandoned preconceive beliefs and empathized shared value and ideas with others through commitment, discovery and action (I. Nonaka, et al., 2008) .

Externalization was the process that tacit knowledge of individuals was articulated into explicit knowledge through image, model, language and other mode of expression and then shared with the group. This process allowed tacit knowledge was verbalized in 2-way dialogue. Dialogue was to articulate, conceptualize, refine individual's tacit knowledge and shared with others. Through externalization, firms could communicate acquired knowledge more efficiently to many people (I. Nonaka, et al., 2008).

Combination was the process that explicit knowledge from inside and outside the organization was collected, edited, and processed to form systematic sets of explicit knowledge. Then, this new explicit knowledge was disseminated throughout the organization (I. Nonaka, et al., 2008).

Internalization was the process of explicit knowledge, such as product concept or operating procedure, has to be applied and use in practical and become as one's own knowledge. This process could be called "learning by doing". Explicit knowledge could be embedded through experiment and simulations as well. Internalization was also the reflexive process of what we have learned from our action and transform explicit knowledge into skill (I. Nonaka, et al., 2008).

According to this theory, an organization creates new knowledge when individuals share tacit knowledge, learn from others' experiences and absorb the tacit knowledge through observation and learning-by-doing (socialization and internalization). Therefore, they express the knowledge into understandable explicit form (externalization), and systematize this knowledge to generate new ideas (combination) (Sherif & Xing, 2006). We can see knowledge creation processes includes both knowledge generation and knowledge transfer since they are the conversion of two knowledge types from individuals to over organization (Choi & Lee, 2002).

Moreover, this term was alternately defined by Davenport and Prusak (1998: 52) as "**knowledge generation**". The knowledge generation is considered in 4 components: acquisition, dedicated resources, fusion and adaption, and knowledge network.

Knowledge acquisition refers to acquire the knowledge from the outside sources through searching, sourcing, and grafting (King, Chung, & Haney, 2008). The organization does not only create their own new knowledge, but they can access to resided knowledge sources to apply with their organization. For example, firm can buy other companies' knowledge to generate additional revenue, to achieve a strategic goal, to gain the skills of a senior management team, and to get access to new markets.

Dedicated resources mean to establish special units or groups for a definite purpose such as to found the R&D department to generate new products.

Fusion and adaptation focus on to bring people with different perspectives to work on a problem or tasks. This allows people to work together to overcome a mutual answer. Some normative believe that holding a various talents and backgrounds enhances the opportunity of a successful outcome. Moreover, a company's adaptability is based on having current internal resources and capabilities that can be applied in new ways, as well as being open to a high "absorptive capacity"(Camisón & Forés, 2011).

Knowledge network comprises of communities of experts or knowledge workers with shared interests, which participates in sharing expertise and solve problems together. An informal network can create knowledge when each participant adds an incremental sharing (Davenport & Prusak, 1998).

Hence, the knowledge creation process is much important to increase the knowledge capital in the organization. The valuable knowledge can be acquired from both outside and inside knowledge sources. The strategy to elicit tacit knowledge, to set off the new knowledge generating, and to consequently systematize this content in a codified knowledge in order to share throughout the organization is should be considered in knowledge capture and codification.

Knowledge capture and codification

Since the organization knowledge is mostly embedded in expertise of knowledge workers. Dalkir (2005:80) describe that the tacit knowledge management is the process of capturing of tacit knowledge -the individuals' expertise and experience- in the organization and making it available to share and use. Moreover, the capture of explicit knowledge is the approach of articulating, systemizing, and enhancing information in order to make it easy to find, and facilitates learning (Dalkir, 2005).

Moreover, in various literatures are mostly attended to how to connect and collect the tacit knowledge that is commonly difficult to explain or express by developing process to acquire that knowledge (Balconi, 2002; Lazaric, Mangolte, & Massué, 2003; Schulz & Jobe, 2001). The mechanism that allows the tacit knowledge to become the organization knowledge capital is divided in two approaches: “codification” and “personalization.” (García-Muiña, Pelechano-Barahona, & Navas-López, 2009; Román-Velázquez, 2005).

Codification is a people-to-document based approach, and it uses information systems to codify knowledge and keep as organization repository (Román-Velázquez, 2005). Codification is involved to a commodity view of knowledge, where tacit knowledge are collected, stored and explicitly represented (García-Muiña, et al., 2009). The four principles of successful codification of knowledge are: (Davneport & Prusak, 1998)

- To define what companies’ goals that the codified knowledge will serve
- To identify existing knowledge in various forms which appropriate to reach to the goals
- To evaluate the benefit and suitability of knowledge for codification
- To identify an appropriate tools for codification and dissemination

Personalization is a people-to-people based approach or a community view of knowledge (García-Muiña, et al., 2009; Román-Velázquez, 2005). This term is also used in the same meaning of *capturing tacit knowledge* (Dalkir, 2005). It is the acquiring of tacit knowledge by direct contact from person-to-person (Román-Velázquez, 2005). In addition, the tacit knowledge capture is always used interchangeably with *knowledge acquisition* in the meaning of transfer and transformation of valuable expertise from a knowledge source to a knowledge repository (Dalkir, 2005; Gaines, 2013). It allows the flow of uncoded tacit knowledge from expert to store in organization members. It is addressed on dialogue among people, and groups of workers both in formal and informal situations. The tacit knowledge capture can enhance the workers to achieve deeper insight by participating

in an open dialog. The information systems may be used to help communicate the knowledge, but not for storage (Román-Velázquez, 2005).

Both codification and personalization/capture are also the strategies involve the transformation of tacit knowledge. The codification is converted tacit into explicit knowledge in order to enhance transfer of organizational knowledge while personalization/capture keep organizational tacit knowledge in order to prevent flows of knowledge to competitors (Schulz & Jobe, 2001).

Knowledge sharing and community of practice

Knowledge sharing refers to the process of distributing and transferring what knowledge peoples have created and learned to the communal knowledge based (Dalkir, 2005). Since the knowledge is created through the interaction between tacit and explicit knowledge, Takeuchi and Nonaka propose 4 modes of knowledge creation and sharing through this types of knowledge. These are socialization, externalization, combination and internalization processes (Takeuchi & Nonaka, 2004).

These 4 modes of knowledge transformation flow through community of interaction from individual to individual, group, and organization through socialization, externalization, and combination. Then, the knowledge turns from organization to individual again through internalization. The knowledge is transferred throughout the organization and amplified knowledge as the knowledge spiral (Takeuchi & Nonaka, 2004).

Another interchangeable term with knowledge sharing is *knowledge transfer*. This term commonly refers to the process by which knowledge is intentionally flowed across organizational boundaries to leverage an organization's knowledge base (Argote & Ingram, 2000; Patriotta, Castellano, & Wright). Knowledge transfer in organizations occurs through a variety of mechanisms. These mechanisms include observation, training, communication, technology transfer, "reverse engineering" products, replicating routines, patents, scientific publications, and presentations, interactions with suppliers and customers, and alliances and other forms of inter-

organizational relationships (Argote, Ingram, Levine, & Moreland, 2000). In addition, knowledge transfer are also moved by some channels such as documentation, mentoring system, job transfer, and community of practice (Wang & Lu, 2010).

Moreover, the social construction perspective views knowledge has created through the shared understanding from social interaction. The organization members have mutually influenced each other's views and generate shared construction of reality. The knowledge is contextualized and embedded inside the knower (Lave & Wenger, 1991). Then, the community of practice is considered to apply with knowledge sharing in community settings.

Community of practice (CoP) is defined as a social process of collaborative learning among people who have common interests. Tacit and explicit knowledge are learned by interacting with other community members. Community of practice has 3 basic characteristics: joint enterprise, mutual engagement, and shared repertoire.

- *Joint enterprise* meant the reason for interacting that bind members together.
- *Mutual engagement* referred to the membership role and responsibility to achieve the goal of CoP that allowed member became a part of community.
- *Shared repertoire* was the shared workspace in which members could communicate and shared knowledge.

Since the community is formed, the community members has cooperative functioned to prolong the community with learning and their common interests. Then, community members developed the shared repertoire through their mutual engagement (Wenger, McDermott, & Snyder, 2002).

Through the CoP, knowledge was most transferred through ***situated learning*** that happened in *legitimate peripheral participation* or apprenticeship learning. The apprentices learned from master by participation in certain tasks of community. Over time, the apprentices moved from peripheral to full participation in the community. They also learn a common understanding about what it was and what it meant for their lives and their community (Lave & Wenger, 1991; Ribeiro, Kimble, & Cairns,

2010).

The way in which people shared knowledge was raised from their knowledge vision. It was based on the community aesthetic value of truth, and goodness, which defined the ideal image of how organization want to be. It determined the collective ideal missions that give the direction of the organization (I. Nonaka, et al., 2008).

Knowledge application

Knowledge application or utilization is defined as a process of elaboration, infusion, and thoroughness. The *elaboration* is the development of different interpretations. The *infusion* is identification of underlying issues. The *thoroughness* is the development of multiple understandings by different individuals or groups. These processes are applied in order to facilitate innovation, collective learning, individual learning, and/or collaborative problem solving. It may also be embedded in the systems, practices, and relationships of the organization through the creation of knowledge based organizational capabilities (King, et al., 2008).

Knowledge application happens at all level of management activities in organizations. A popular form of knowledge application is to adopt the best practice and lessons learned from other leading organizations, and apply it. Then, internalization may convert to new knowledge(Leea, Leeb, & Kang, 2005).

In this study, each concept of knowledge management cycle is considered to be a frame in exploration of the knowledge management and learning process of community food production. Some related concepts are articulated and combined in order to explain the real situation in community food production that I found in the fields. These knowledge management concepts are later illustrated with the cases in chapter IV.

CHAPTER III

METHODOLOGY

Methodological design

This research used the qualitative approach to study how community producers manage their knowledge on food production and what learning processes in community production are. Since the community producers have faced to dynamic environments of food production which need adaptive capability to adopt the information and knowledge about food production techniques, food related standards, Good Manufacturing Practice as well as the business managements. There were a lot of questions to explore in community food production such as how community producers access to sources of information and knowledge, how they acquire that knowledge, what knowledge they created, how they share that knowledge to members inside community, what knowledge they transferred to network outside community, what types of knowledge they have captured and codified. To answer these questions, it required deep understanding about community perspective of food production since the community enterprises had their own social and cultural context that differ from the manufacturing businesses.

I was aware that the environment of acquiring and managing knowledge of community producers were influenced by informal circumstances and interrelation among their community members and other social networks such as community production networks, customers, distributors, and regulators.

The nature of food production method and type of products which determine the different ways of managing knowledge was also my concern. Since complexity and diversity of knowledge according to each type of product are not similar, the management and acquiring this related knowledge is product specific and related to each community capability to learn.

Based on the questions of my study, the nature of community food production, the interrelation among community members and social networks, the diversity of

product specific knowledge, and my commitment to understand knowledge management and learning from the point of view of those community producers in the community contexts by which it cannot be separated the knowledge from the knower, it was clear that the qualitative methods were more suitable to use in exploring the community realities of managing knowledge in this study.

Research methods:

This study required the qualitative research design with multi-technique to collect data from the field such as in-depth interview, observation, and focus group. The main techniques were theme list in-depth interview and observation which helped me to collect data and interpret information or finding as nearly as reality.

The in depth interview is the non-structured interview which is informal and naturalistic inquiry to explore the reality of phenomenon and their context deep to detail related to the participant. It assists to fulfill the information gap by other method and helps to investigate the clue did not reveal by commonly interview (Liamputtong P. & Ezzy D., 2005). As a part of interview, storytelling is used to expand vivid description of ideas, beliefs, personal experiences, and life-lessons through stories or narratives that evoke powerful emotions and insights. (Serrat, 2008) I applied the in depth interview and storytelling approaches in this study because little was known about knowledge management and learning in Thai community food production and it was not possible to set a specific question beforehand. Moreover, I was not sure as to whether the wording of preset specific questions would be understood in the same way by me. The flexibility of the in depth interview allowed me more appropriate to follow up the dynamics and complex ideas of community knowledge management and learning in their community circumstances. In addition, the storytelling was suitable to remind the community memory about the lessons learned and best practices as well as learning processes that they have acquired the critical knowledge in development of food production.

The observation is the collecting data method by observe the unit of analysis in naturally situation without any setting up of condition or interfere the common

activities of target group. This method will depict the information about target's behavior under specific situation and environment which give more detail of both content and context for understanding the objects (Kanato M., 2008). I also used the observation method to collect the natural evidences in food production that they have applied the knowledge as well as sharing their experiences through the everyday production practices. This method allowed me to keep data without disturbance of food production flow; the community members have explained their knowledge application directly through their actions.

The focus group is mostly informal focus group. It is the method that combines the focused interview and natural group discussion together and enhances the data collecting from the homogeneous participants in the focused issue. Meanwhile, this method provides collecting data and observation of the interaction behavior between those participants. This technique is also used to recheck the collected information from other method with other key informants and allow developing a complex picture of the phenomenon being study under the concept of triangulation. (Liamputtong P. & Ezzy D., 2005: 75-99; Kanato M., 2008:149-158). I included this method to the study to collect data among the natural group discussing in daily food production. Since the interaction between community members were happened while the daily production progresses, the communication in working is always related to apply and share knowledge and information of everyday life and production. I kept this chance to move informal focus group in the natural communication of these producers. This method allowed me to observe and collected the data about the accessing, providing, and managing the production knowledge in their working; I also observe the interrelation among the leader and the members as well as leadership and knowledge vision of community through this group discussion.

Selection of population, the site of study and access

Since this research aims to explore the knowledge management process and analyse the learning constituent of community food production, I proposed the targets of analysis by divided into 2 groups conform to the different past experience to

governmental support and the growth of enterprises in order to explore the learning capability.

First group is “*Best practice*” group. Its inclusion criteria are:

1. The production period of community food producers, since it founded and proceeding production till current date, should be at least 7-10 years. Because OTOP development program has been perform for about 10 years, the enterprises that joined this program early will be at about 10 year of business. In this point, the age of production period indicates the experience of producers to overcome problems and learning through the period of improvement.
2. The community entrepreneurs have been continuously supported the knowledge and practice on good production of health product by the public sectors, especially by the Provincial Health Office and Thai Food and Drug Administration. Besides, they have experienced on extra course of FDA learning center development or other equivalent courses which are non-conventional intervention. It will be beneficial to investigate the learning competence respond to those interventions of improvement.
3. The community entrepreneurs should be selected as learning centers or the good production practice role models for other communities and/or received the certificate or award related good production of health product and/or got the OTOP Product Champion contest at 4-5 stars in order to assure that their production practice is qualified and could be transfer the knowledge to other community correctly.

Second group is “*Common practice*” group. Its inclusion criteria are:

1. The production period of community food producers would be less than 7 years to indicate that they are joined in OTOP development program lately as well as have less experience and learning through the period of improvement.

2. The community entrepreneurs have been less or discontinuous supported the improvement intervention by government sectors and never got the extra course of FDA learning center development or other equivalent courses from the Provincial Health Office or Thai FDA.
3. The community entrepreneurs should not be selected as learning centers or the good production practice role models for other communities and/or never received the certificate or award related good production of health product and/or got the OTOP Product Champion contest at 1-3 stars.

Then, the efficient way to find community producers who met these criteria, I used the OTOP Product Champion 2010 database to select 10 communities per groups. However, the characters of the community producers in the database were not totally matched to all criteria.

Since Nontaburi province is not far from Bangkok which I live in, I select the Nonthaburi province as my target area to find the target community. Moreover, my work at FDA has connected with the Nontaburi Provincial Community Development Office which is directly responsible in community development. Then, I ask them to recommend the communities which closely comply with the criteria.

I got the name and call number of 6 communities from the officers. Then, I called to each community to ask for permission to visit their community. However, two communities are “the community in record” that mean they are not real community. They are the individual enterprises which employ the workers from community. Another community I called has stopped working. Later, I got three real communities as my target. Two communities are the learning center of food production and another is the common community.

Since I started collecting data in July 2011, there has been the flooding crisis in Nontaburi province, especially in my study areas, in September 2102. Then, I move to Lampang province which is my hometown. At this area, I started finding the new communities to be my working sources. I applied the way of accessing the communities in Nontaburi province to access the community in Lampang province as

well. Later, I got three communities which two communities are common communities and another community is the food production learning center.

Table 3.1 The community food producers

	The community food producers					
	The learning centers of food production			The common community of food production		
Province	Nonthaburi		Lampang	Nonthaburi	Lampang	
Pseudonym (code*)	Learning center 1 (L1 _N)	Learning center 2 (L2 _N)	Learning center 3 (L3 _L)	Common community 1 (C1 _N)	Common community 2 (C2 _L)	Common community 3 (C3 _L)

* L=learning center, C=common community, Subscript=province

Selection of key informants, approaches and their characteristics

As stated earlier, the data sources of this study are the community producers as shown in Table 3.1. Based on the feasibility of access, approaching participants, the natural phenomena, and my personal circumstances, I decide to conduct my study in both Nonthaburi and Lampang provinces. Due to limitation of time and expense, I decided to use purposive sampling in selection of the key informants from each community enterprise.

The criteria for selecting those key informants are;

- 1) The key informants are the leader and/or members who fully participated into production processes. They have rich information about managing knowledge and learning in production practice.
- 2) The informants have involved in the past development of community producers. They have lessons learned and best practices from the past experiences.

- 3) They are not the new members who are partially socialized by community experiences.

Since the members who participated in food production of these communities were 8-15 persons, the sample size of key informants from each community enterprise in depth interview is 3-4 persons. Most of key participants in depth interview are the leader, the head of production, the production members, and the secretary of the community. Moreover, the key informants in informal focus group are 5-8 persons to be the representatives of their community. These members in informal focus group are mostly the production members in real situation of food production. The amount of each type of participants is showed in Table3.2.

Table 3.2 The key informants of community food producers

Pseudonym (code*)	The community food producers					
	Learning center 1 (L1 _N)	Learning center 2 (L2 _N)	Learning center 3 (L3 _L)	Common community 1 (C1 _N)	Common community 2 (C2 _L)	Common community 3 (C3 _L)
Production members / Total community members	12 / 33	15 / 103	10 / 30	8 / 8	15 / 15	8 / 8
Key informants in depth interview	3	3	3	4	3	4
Key informants in informal focus group	5	6	5	6	5	8

* L=learning center, C=common community, Subscript=province

Approaching the participants

After I informed each community leader through the telephone call and received the permission to visit their communities, I made an appointment to meet the leader and their members at the date of production. Because some community was not continuing their production every day, I select the day that most community members joined in the production. This day, I could introduce myself to all members as well as to observe the natural production practices.

The approach to make an appointment to each community, I asked for speaking with the community leader. Then, I introduce myself that I was the student in doctoral program of the faculty of Pharmaceutical science, Chulalongkorn University. I conducted my dissertation on knowledge management and learning process of community food product production and I would like to collect data and information from their community. I told them that I got the recommendation from the Provincial Community Development Officer who is familiar with them to suggest the true community producer of food product. Then, I asked for appointment in the appropriate date that the leader and their members would perform the production.

First appointment, when I reached to each community, I introduced myself to the leader or the member who was responsible for the appointment. I started giving information about the objectives of interviewing, observing and informal focus group as well as time period that I would visit to the community. I asked the leader to allow me to make interviewing and observe their production processes. Since the mutual participation in food production of community members was commonly found, the leader was also introduced me to other community members while the food processing was continuing. After they have known me by this introducing, they feel free to continuing their work while permitted me to observe as well as give me some data and information according to my questions.

In approaching, I always reached the communities in the time they allowed me because in some occasions they were not comfortable to treat the visitor more than

two groups in the same period. The information about their name, telephone number, and the route to the communities were recorded for use in the continuous attending.

Data collection Method

The information and data were acquired mainly through in-depth interview, observation and focus group interview approach. Qualitative techniques have been used to collect the contextual data and individual data related to food production knowledge management and learning of community entrepreneurs.

When the leader of community introduced me to their members, they gave me a chance to look around in their production processes and describe what they were doing.

For observation, I observed the interaction and involvement of community members' behavior in the general practice of production process and daily natural situation in order to collect the content and contextual circumstances of knowledge management and learning. I also asked the questions related to the situation in process of production. This method allow me to see the whole picture of their production before making an in depth interview directly to the knowledge management and learning. Some products of observation were used to link the situation to the main theme of interviewing.

Later, I asked the leader and/or the members who freed from their tasks to give me in depth information about their learning and managing knowledge in food production.

For interviewing, both open ended and in-depth interview conform to theme list was used; it usually combined with other techniques such as observation, storytelling and informal focus group since in community production nature was high involvement of community members and participated into this interview commonly. The interview was done by using informal manner and conducted for several times until collect enough data. The interview was focused to the general practice of production process including material selection, the production problems and solving,

adaptive respond to food standard in order to interpret the knowledge management and learning constituent of lay entrepreneurs.

I spent time in observation and in depth interview about 2-3 hours per visit. I mostly terminated the interviewing at noon or in the evening for 2 reasons. First, I would not bother the informants in lunching and /or the leisure time. Second, I could observe the informal social relation among the members of each community.

For focus group interview, it will be the triangulation strategy to conducted informally data and being used after collect data by other methods; it used to confirm and recheck the information from other key informants to overcome the personalistic biases that grounded from single observer or single methodology (Liamputtong & Ezzy, 2005: 40-41). I mostly used an occasion of “talking while working” in every day production of community members to apply informal focus group interview. Moreover, in some community, the appropriate event to do informal focus group interview was in their lunching since they have commonly joined lunching together every day. The issues I picked up in informal focus group interview was related to the job they worked, then I got high involvement from community members to give and exchange their information and opinions in this interview.

I do repeatedly visit each community for more observing and interviewing, as well as the occasionally informal focus group until the data was enough. Data collection activities have been conducted continuously and completely in about 6 months.

The me list for in-depth interview

1. What do community producers create, share, and apply their knowledge?
2. How do community producers create, share, and apply their knowledge?
3. What community producers know about the owner of knowledge (Knowing who), what knowledge they need to learn (Knowing what), and how to access that knowledge (Knowing how)?
4. What knowledge do community producers learn from their food production practice? (Best practice/Lesson learned)

5. How do community producers learn from their food production practice?
(Situating learning)
6. What are learning conceptions of lay producers?
7. What do community producers learn from conventional interventions?
8. Do community producers know about good manufacturing practice?
How do they know? What kind of knowledge they did not know?

Data analysis

Since the data collection and data analysis occurs simultaneously, both parts cannot be absolutely separated (Dierckx de Casterlé, Gastmans, Bryon, & Denier, 2012). In this study, data analysis started with data coding and interpreting according to the sufficient of data conform to the theoretical framework; it was conducted between data collecting periods.

In coding, after finished interviewing, I always took note of things that observed from the communities such as the special events in communities, the relation among their members and leader or social networks. The interview transcription was done by me. Each transcription was code by myself, using hand coding and the underline to specify which part of the transcription fitted with which code. The master code was the main issues such as the knowledge access, knowledge capture, knowledge creation, knowledge sharing, knowledge codifying, and knowledge transfer.

In sorting, each transcription which was coded was rechecking in order to make sure that each part of the transcription was coded properly. Then, the steps of sorting data were done. The sorting data referred to collecting and grouping data together which had the mutual code. For instance, the data under the code “knowledge creation” from each community producers’ transcription were extracted, sorted, and group together into new file. Lather, each file of sorted data was carefully looking under the theme and categorizing the immerging issues from the data.

The data analysis was conducted by examining the characteristics of data which was mostly found and rarely found in each file. In this way, the data were

presented in the variation according to the knowledge management and learning process, and the different of these characteristics among the learning center and the common communities. I also examined the relationship and the connection among the immerging themes.

When the data could not fit to explain the phenomenon, reinvestigations was done to fill in the completely data. Those useful concepts for analyze data are:

1. Knowledge management cycle : Integrated KM cycle
2. Situated learning and Community of Practice
3. Gap analysis of learning constituents and public intervention characteristics

Ethics

In this ethical issue, I concerned the honestly disclosure of myself to the participants. I introduced myself as a doctoral program student who fully conducted the research. I also told them about my working background at the Food and Drug Administration but the current condition, I have taken study leave and was not in position of a regulator.

I was aware the voluntary participation (Babbie, E.,1998:438). I informed the participants clearly about the research, objectives, methodology and the way to keep the data confidentially before starting the data collection and how they would be involved. This research needed natural and informal atmosphere without any nervous feeling of informants in collecting the information. It was not appropriated to use the consent form filling since signing the consent form will bring them the formal atmosphere and the information might be bias. Then, the details of research processes were revealed clearly.

I asked for permission from communities' leader to conduct my research in their communities and also asked for permission from all key informants after I have told the objectives and the way to conduct my research. I told them about their right to

refuse the participation in this study any time, and there was not any negative consequences (Babbie, 1998).

Besides, I informed the process and consequences of this study to the informants that it would not bring any harmful to them. Any time to record their voice and other data, I always asked for permission from them and the individuals' data were kept as confidential and anonymous.

Lastly, I applied concept of rigorous reflexivity (Liamputtong & Ezzy, 2005: 43-44) that I am the instrument of the research; it is essential to understand myself and identify the discourse which have impacted on the lenses through which I view the world and participants, especially on the role of regulatory officers I am.

This study has already approved by The Ethic Committee of The Faculty of Pharmaceutical Sciences, Chulalongkorn University in 2011.

CHAPTER IV

RESULTS AND DISCUSSION

Introduction

Presently, knowledge management is widely adopted and applied in most public and private organizations to achieve to organizations' goal (Hallin & Marnburg, 2008; Office of Public Sector Development Commission, 2012; Savvas & Bassiliades, 2009; Sedera & Gable, 2010) In contrast, it was unfamiliar to local community organizations. In community food production, producers have not been trained about knowledge management; however, they have worked with knowing “what they know” and “what they do not know”. They also have applied seeking, generating, sharing, and utilizing knowledge in food productions. Some or all knowledge based practices of the community producers are considered as their ability to manage knowledge in community contexts.

This study, I aim to investigate: How do the community producers manage their knowledge? What knowledge do they manage? Do they well manage their knowledge in community food production? Since, nowadays , knowledge management shifts to focus on valuing of intellectual assets which is the knowledge with the objective of adding value to the organizations (Dalkir, 2005), I also express on the questions: Do the knowledge they managed is value based knowledge? What are the valuable knowledges in community producers' perspectives? How do they manage the valuable knowledge?

To explore how community producers manage their knowledge, the perspective of knowledge management was applied here. There are three different perspectives (Dalkir, 2005) that were beneficial to use:

The business perspective considers the knowledge constitutes of business activities as a definite concern of business as strategy, policy and practice at all level

of the organization; and making a direct connection between organizations' knowledge assets and positive results of business.

The cognitive science perspective views the knowledge that insights, understanding, and practical know-how, is the fundamental resources that allow user to function intelligently. It is also transformed to other things such as books, technology, practices, and traditions to increase the organization effectiveness.

The process perspective regards the process of knowledge management which information is turned into actionable knowledge and made readily available in applicable forms to utilize.

Since the focus of this study was on the process of managing knowledge in community food production, I applied *the process perspective* of knowledge management rather than the business perspective and the cognitive science perspective to examine the knowledge management of community producers.

To identify the knowledge management constituents, the concepts of knowledge management were utilized. Although the knowledge management definitions are still lack of consensus, there is widespread agreement as to the goal of an organization that ventures knowledge management. That is to leverage knowledge to the organization's advantages. (Dalkir, 2005)

Srikantaiah and Koenig (2008) have explained the knowledge management process that co-evolve with the stage of organization development which was showed in Table 4.1

They described that in *introduction stage*, the product was new and organization need survival, then the organization had to share experiences and keep tacit knowledge diffusing intra organizationally through observation, imitation and practice. Then, in *growth stage*, the organization capability become process innovation and product development through the externalization techniques in order to gain the competitive advantage. In *maturity stage*, the new basis of advantage was cost management in order to increase efficiency through the combination

techniques or systematized explicit knowledge for organization exploitation. Last, the *beyond stage*, the organization need providing reputation as the rejuvenation of organization. This stage need internalization techniques to trigger a new spiral of knowledge creation (Srikantaiah & Koenig, 2008).

Table 4.1 The KM process and the stage of organization development

	Introduction	Growth	Maturity	Beyond
Goal	Survival	Growth	Stability	Reputation
Structure	Informal	Some procedure	Division Of labor	Small company thinking
Knowledge conversion mechanism	Socialization	Externalization	Combination	Internalization
Key success factors	Product technology	New product development	Efficiency	Decline of rejuvenation

Source: Srikantaiah, T. K. and Koenig M. E. D. (2008)

In community food production, the community producers have defined their knowledge need according to their stage of community development. In this study, the stage of community development was divided in 3 stages. These were initiative stage, growth stage and maturity stage. The knowledge content of each stage of community food production development was showed in Table 4.2.

Table 4.2 The knowledge content of community food production development

	Initiative	Growth	Maturity
Goal	Survival	Growth	Stability and Reputation
Knowledge content	<ul style="list-style-type: none"> • Formula and method of food production • Know-how to improve property of products • Know-how to keep sanitation/ prevent contaminant in food processing 	<ul style="list-style-type: none"> • Product differentiation • Know-how to improve quality of product 	<ul style="list-style-type: none"> • Know-how to increase efficiency in working • Know-how to perform responsibility to people and society
Examples	<ul style="list-style-type: none"> • Concept to design production plant and equipment of Common community 3 (C3_L) • Frying product formulary and method of Common community 2 (C2_L) • Method for solving non-crispy and cracking problem in Khao Tan production of Learning center 1 (L3_L) and Common community 3 (C3_L) 	<ul style="list-style-type: none"> • Method to do banana sheet of Learning center 1 (L1_N) • Method to identify product's shelf life of Learning center 1 (L1_N) and Common community 3 (C3_L) • Method to identify Total Polar Compound in cooking oil of Learning center 2 (L2_N) and Common community 3 (C3_L) 	<ul style="list-style-type: none"> • Innovation to reduce suffering from long stand cooking in elderly of Common community 3 (C3_L) (Small seat cover with stainless steel) • Know-how to codify production processes for teaching students of Learning center 3 (L3_L) • Quality assurance documentary and system for traceability of Learning center 2 (L2_N)

When they were in initiative stage of food production; they needed knowledge about (1) formula and method of food production, (2) know-how to improve property of products to customer satisfaction, and (3) know-how to keep sanitation/prevent contaminant in food processing. Then, when they were in growth stage, they needed knowledge about (4) product differentiation and (5) know-how to improve quality of product. Later, when they were in maturity stage, they needed knowledge about (6) know-how to increase efficiency in working and (7) know-how to perform responsibility to people and society. In each stage, the need of knowledge was the driver to manage critical knowledge in order to achieve their community goal. This knowledge was valuable for their community food production. The details of created knowledge according to each community need were described more in knowledge creation part.

To achieve the organization goal, the need of knowledge was initiated the organization knowledge management. Dalkir (2005) proposed the integrated knowledge management cycle which is the key concepts of knowledge management constructed by validating different knowledge management approaches through experience with knowledge management practices. The major stages of the knowledge management cycle are defined as knowledge capture and creation, knowledge sharing and dissemination, and knowledge acquisition and application. (Dalkir, 2005)

In addition, Ruggles proposed a key concept found in companies from a process perspective of what can be managed about knowledge. That key was accessing valuable knowledge from outside sources (Ruggles, 1998). Then, the main theoretical attributes of managing knowledge were integrated as follows:

1. Accessing valuable knowledge from outside sources
2. Knowledge capture and creation
3. Knowledge sharing and dissemination
4. Knowledge acquisition and application

These theoretical attributes were used to explore the knowledge management and learning in community food production environments.

The community food production context

The community producers are composed of 3 learning centers and 3 common communities. Those learning centers are learning center 1 (L1_N), learning center 2 (L2_N), and learning center 3 (L3_L). The common producers are common community 1 (C1_N), common community 2 (C2_L), and common community 3 (C3_L). These community producers had their specific characteristics of community contexts which were described below.

A. The community foundation and the role of leader

In Table 4.3, four communities were founded between 2540-2544, while two communities were founded in 2525, and 2532 respectively. Each production plants of learning center community was located in public area such as temple, police station's area, and local school area, while the production plants of common communities were located at leaders' house.

The production plants were the communal spaces for community members' meeting and working together. The establishment of community food production was influenced by the leader of each community. The leaders of learning center communities had firm relation and wide connection with the local public organizations such as local administration, police station, and temple. Then, they dealt for some part of public area to initiate community food production. For example, the leader of learning center 2 (L2_N) was the police's house wife who initiated a participation of most police's house wives and farmers in their local community for fried peanuts production. Furthermore, the leaders of common communities were also well-known in their communities since most leaders had responsibility in community activities for a long time such as the leader of common community 3 (C3_L) was a community treasurer, the leader of common community 1 (C1_N) was a public health volunteer. Then, they had high involvement in community activities. Later, when the community development officers or the agricultural officers had promoted community

food production, they persuaded their community members to initiate community food production and allowed using their house to be the production area. Moreover, these leaders also supported their local community activities such as the leader of learning center 3 (L3_L) gave the study funds to the students in their community; the leader of learning center 1 (L1_N) donated money for improvement of community temple and infrastructures; or the leader of common community 3 (C3_L) donated Khao Tan for flooding victims.

Besides, the leaders were key persons who linked the supporting from public and private sectors to their community. These community producers were supported by Public health office, Agricultural office, Community development office, Industrial office, Commercial office, Agricultural cooperative office, Local institute and university, Local administration, and 7Eleven. The supports from various units were production building and equipment, formulary, product development, food standard training, and market providing as showed in Table 4.3.

Table 4.3 The information of supports

Pseudonym (code*)	The community food producers					
	Learning center 1 (L1 _N)	Learning center 2 (L2 _N)	Learning center 3 (L3 _L)	Common community 1 (C1 _N)	Common community 2 (C2 _L)	Common community 3 (C3 _L)
Building and Equipment	- Public health office -Local administration - Community development office -Industrial office	-Agricultural cooperative office	- Public health office -Agricultural office -Industrial office	- Community development office -Local administration - Labour Protection office	-Occupational school	-Agricultural cooperative office -Local administration
Formulary	-Agricultural office	-	-Agricultural office - Community development office	-	-Agricultural office	-Agricultural office
Product development	-Local institute and university (STOU)	-7Eleven	-Local institute and university -Public health office	-	-Local institute and university	-
Food standard training	-- Public health office	-- Public health office -7Eleven	-Public health office	-Public health office	-Public health office -Agricultural office	- Public health office
Market providing	- Community development office -Industrial office -Commercial office	- 7Eleven -Community development office -Industrial office -Commercial office	- Community development office -Industrial office -Commercial office	- Community development office -Industrial office -Commercial office	-Commercial office - Community development office -Local institute and university	- Community development office -Agricultural cooperative office -Local administration -Agricultural office

* L=learning center, C=common community, Subscript=province

In addition, the leaders were master in food production as well. Since they were initiators of community food production, they were the representative of community to involve with outside knowledge sources. For example, the leader of each community (L1-3, C1-3) had been trained about GMP guidelines by the provincial health office. They also participated in other training and study visit courses by other supporters such as the leader of learning center 3 (L3_L) had participated in food production planning with the department of agricultural promotion at Bangkok . These collected experiences allowed them to be the knowledge repository of their community. Besides, the leaders always enhanced the acquiring food production knowledge to their members by created new techniques in food production and brought their members to study visit in other community productions. For example, the leader of common community 2 (C2_L) created the formula in making potato chip and other fried banana and jack fruit while the leader of learning center 3 (L3_L) brought their members to study visit Khao Tan making at expert community in Lampang province. They always demonstrated and shared their food production knowledge to their community members. For instance, the leader of learning center 3 (L3_L) always cleaned the floor and production equipments as well as explained the reasons why she had to do in order to encourage their members to know how to conform to GMP and to emphasize members to know how important it is. Likewise, the leader of common community 2 (C2_L) emphasized to their members that *“Our customers were students...If we do unclean products; the children will get a stomachache...the officers will find the causes...then they will revoke our food license”*

Each community producer, learning center and common community, the leaders have mostly influenced to their members in initiative and development of community food production. The characters of these community leaders presented the leadership which influenced their community members through the admiration in valuable practices and expertise of the leaders rather than the power from position of community leader.

Green (1999) argued that leadership is as a function of power. He summarized the 5 types of power as showed in Table 4.4 (Green, 1999).

Table 4.4 Type of power

Type of Power	Description
Reward power	The power to give rewards to follower if there are successes.
Coercive power	The power to give punishments to follower if there are mistakes.
Legitimate power	The power of position to make the request and the follower has the obligation to comply.
Expert power	The power of skill and special knowledge about the best way to do something
Referent power	The power of attractive to gain admiration from follower and give approval to them.

Source: Green, R. D. (1999). Leadership as a Function of Power. *PROPOSAL Management, Fall* 54-56.

There were some studies illustrated the relationship among leadership and knowledge management process (Girdauskienė & Savanevičienė, 2012; Jayasingam, Ansari, & Jantan, 2010; Yang, 2007). For example, the study of Jayasingam, Ansari, and Jantan (2010) explained that expert power has a positive influence on the extent of knowledge acquisition and dissemination practices while, legitimate power is found to impede knowledge acquisition practices (Jayasingam, et al., 2010)

In this study, the evidences revealed that the leadership of the community leaders was a definite factor in community contexts which enhanced knowledge management in community food production.

B. The collective identity through the representative of community

The collective identity is widely recognized as self-categorization. This word means identifying self as a member of a particular social grouping and also to feel proud of being a member of a particular group. The experiencing oneself as a member of a group provides them with a significant collective identity that is experienced as emotionally meaningful which is enough to trigger in-group loyalty, and adherence to group norms (Ashmore, Deaux, & McLaughlin-Volpe, 2004).

The community food production was a social group which community members were participated in local community activities. Since major occupation of communities' members were farmers, but two communities' members were retiree from government sectors and agriculture sector, they always involved in both production activity and other informal activity such as participation in rice harvesting, new year/Songkran celebration, religious celebration and other activities. This participation allowed the members of food production community became a fully membership of their group and local community.

Moreover, the food production was considered as belonging to their community. Through the development of community food production, the community producers as well as their products were collecting the proud of community belonging from many successes. For example, each learning center communities had the rewards about good production practices such as FDA learning center award, excellence community enterprise award, and excellence farmer award. In addition, all community products were produced from local raw materials such as sticky-rice, banana, potato, jack fruit, and herbs. Their products composed of dried banana sheet roll, fried peanuts with herbs, Fried Khao Tan (Fried sticky-rice cracker), Chili paste, Potato chips, fried-banana and jack fruit, and Khao Kriab (fried rice cracker). All products have certified by FDA standards and Community product standard, while two communities products have also certified with Halal. These community productions provided occupation and incomes to their community members. The average income of communities per month was varied from 2,500- 30,000 baht, while one community has average income at about 500,000 baht per month since their

market was expanded nationwide by made alliance with 7Eleven for product distribution. The details of each community and product were showed in Table 4.5 and Table 4.6.

Table 4.5 The information of community enterprises

	The community food producers					
Pseudonym (code*)	Learning center 1 (L1 _N)	Learning center 2 (L2 _N)	Learning center 3 (L3 _L)	Common community 1 (C1 _N)	Common community 2 (C2 _L)	Common community 3 (C3 _L)
Foundation in B.E. (C.E.)	2536 (1993)	2542 (1999)	2540 (1997)	2544 (2001)	2541 (1998)	2525 (1982)
Plant location	Temple's area	Police station's area	Local school's area	Leader's house	Leader's house	Leader's house
Reward	<ul style="list-style-type: none"> • FDA learning center 2546 • Excellence community enterprise 2555 • Excellence farmer 2553 	<ul style="list-style-type: none"> • FDA learning center 2550 • Excellence community enterprise 2555 	<ul style="list-style-type: none"> • FDA learning center 2546 • FDA learning center contest award 2549 • Excellence farmer 2544 	-	-	-
Members ages	40-60	40-60	40-60	70-80	50-60	70-80
Major occupation of members	Farmer and employee in local factory	Polices' housewife and farmer	Farmer	Government retiree	Farmer	Farmer retiree
Average income Bt./ month	12,000	500,000	N/A	18,000	30,000	2,500

* L=learning center, C=common community, Subscript=province

The involvement of community producers in local community activities and the productions of local community food products were socialized and embedded the

sense of community (Mannarini, Tartaglia, Fedi, & Greganti, 2006; Zhao, Lu, Wang, Chau, & Zhang, 2012). Each activity and product that they produced was considered as the representative of their local community. It was the community reputation that has to sustain and preserve for their community identity.

Table 4.6 The information of community food products

	The community food producers					
Pseudonym (code*)	Learning center 1 (L _{1N})	Learning center 2 (L _{2N})	Learning center 3 (L _{3L})	Common community 1 (C _{1N})	Common community 2 (C _{2L})	Common community 3 (C _{3L})
Products	Dried banana sheet role	Fried peanuts with herbs	Fried Khao Tan (Fried sticky- rice cracker)	Chili paste	Potato chips, fried- banana and jack fruit	Khao Tan and Khao Kriab (fried rice cracker)
Products' reward	• OTOP 4 stars 2555 • OTOP 5 stars 2547	• OTOP 5 stars 2555 • OTOP 5 stars 2547	OTOP 4 stars 2553	No contest	• OTOP 3 stars 2553 • OTOP 1 stars 2549	OTOP 1 stars 2549
Standard of product	FDA, Commun ity product standard, Halal	FDA, Commun ity product standard, Halal	FDA, Commun ity product standard	FDA	FDA, Commun ity product standard	FDA, Communi ty product standard
Product shelf life	6-8 months	6 months	3 months	15 -30 days	2-3 months	30 days

* L=learning center, C=common community, Subscript=province

The knowledge management attributes of community food production

Since I was investigated in the fields, some knowledge management constituents were linked together such as knowledge capture and sharing. There were the knowledge flow differed from in Dalkir's knowledge management cycle and Ruggles's suggestion. In addition, the knowledge management cycle is mainly focused on managing knowledge inside the common business organization. However, in the community food production, there were some knowledge acquisitions from outside sources and knowledge transferring to other community producers. Since most community producers had a sense of community (Mannarini, et al., 2006; Zhao, et al., 2012), and their own regular customers and markets, they were sufficient and uncompetitive with others. They had willing to transfer food production knowledge and preferred to help other communities getting occupation and income for self reliance. In this way, these community producers had interrelation with other community producers as a food production network and also got and shared some food production knowledge together. Then, the knowledge management attributes which were found in the community food production contexts were 5 attributes as below.

1. Accessing and capturing valuable knowledge from outside sources
2. Knowledge creation of community food production
3. Capturing and sharing valuable knowledge inside the community
4. Codifying knowledge of community food production
5. Transferring knowledge to outside community

1. ACCESSING AND CAPTURING VALUABLE KNOWLEDGE FROM OUTSIDE SOURCES

To acquire knowledge in community food production, I illustrated how the community producers access the knowledge from outside sources, what knowledge sources they access, what knowledge they capture from, and how valuable knowledge is captured.

From my interviewing of six community producers: Learning center 1 (L1_N), Learning center 2(L2_N), Learning center 3(L3_L), Common community 1(C1_N), Common community 2(C2_L), and Common community 3(C3_L), each community producer has previously accessed to the outside sources.

Table 4.7 The summary of knowledge need in food production

Type of knowledge need**	
Formulation	GMP
PF _d 1= How to solve dark color product PF _d 2= How to solve burnt product PF _d 3= How to differentiate product PF _f 1= How to solve partial cooked product PF _f 2= How to solve non-crispy product PF _f 3= How to solve cracking product PF _f 4= Frying product formulary PF _f 5= Cooking method PF _g 1= How to improve product taste PF _g 2= How to solve non-smooth texture PF _g 3= How to extend production scale	PG1= How to design production plant PG2= How to design production equipments PG3= How to reduce hot climate in production room PG4= How to prevent insects and animals PG5= How to identify Total Polar Compound in cooking oil PG6=How to use repeated frying oil PG7=How to identify product's shelf life
** P=Problem, F=Formulation, G= GMP, Subscript= type of production process: f= frying, d= drying, g= grinding Example: PF _f 1= Problem related to formulation of frying product PG1= Problem related to GMP	

To gain knowledge from other enterprises, the producers told that when they were a newcomer of food producers, they had directed experiences in food production but they found some obstacles needed to solve. Those types of problems were about food formulation and Good Manufacturing Practice (GMP). Then, they had to identify the knowledge needs in food production. The knowledge need was summarized in Table 4.7.

In food formulation, the major problems related to lacking of knowledge to food production as showed in Table 4.8 while knowledge need about GMP was showed in Table 4.9.

Table 4.8 The formulation knowledge need of community food production

The community food producers					
Learning center 1 (L1 _N)*	Learning center 2 (L2 _N)	Learning center 3 (L3 _L)	Common community 1 (C1 _N)	Common community 2 (C2 _L)	Common community 3 (C3 _L)
<ul style="list-style-type: none"> • How to solve dark color product (PF_d1) • How to solve burnt product (PF_d2) • How to differentiate product (PF_d3) 	<ul style="list-style-type: none"> • How to solve partial cooked product (PF_f1) 	<ul style="list-style-type: none"> • How to solve partial cooked product (PF_f1) • How to solve non-crispy product (PF_f2) • How to solve cracking product (PF_f3) 	<ul style="list-style-type: none"> • How to improve product taste (PF_g1) • How to solve non-smooth texture (PF_g2) • How to extend production scale (PF_g3) 	<ul style="list-style-type: none"> • How to solve partial cooked product (PF_f1) • How to solve non-crispy product (PF_f2) • Frying product formulary (PF_f4) • Cooking method (PF_f5) 	<ul style="list-style-type: none"> • How to solve partial cooked product (PF_f1) • How to solve non-crispy product (PF_f2) • How to solve cracking product (PF_f3)
<p>* L=learning center, C=common community, Subscript=province</p> <p>** P=Problem, F=Formulation</p> <p>Subscript= type of production process: f= frying, d= drying, g= grinding</p> <p>Example: PF_f1= Problem related to formulation of frying product</p>					

Table 4.9 The GMP knowledge need of community food production

The community food producers					
The learning centers of food production			The common community of food production		
Learning center 1 (L1 _N)*	Learning center 2 (L2 _N)	Learning center 3 (L3 _L)	Common community 1 (C1 _N)	Common community 2 (C2 _L)	Common community 3 (C3 _L)
<ul style="list-style-type: none"> • How to identify product's shelf life (PG7) 	<ul style="list-style-type: none"> • How to prevent insects and animals (PG4) • How to identify Total Polar Compound in cooking oil (PG5) • How to use repeated frying oil (PG6) 	<ul style="list-style-type: none"> • How to identify Total Polar Compound in cooking oil (PG5) • How to use repeated frying oil (PG6) 	<ul style="list-style-type: none"> • How to identify product's shelf life (PG7) 	<ul style="list-style-type: none"> • How to identify Total Polar Compound in cooking oil (PG5) • How to use repeated frying oil (PG6) 	<ul style="list-style-type: none"> • How to design production plant (PG1) • How to design production equipments (PG2) • How to reduce hot climate in production room (PG3) • How to identify Total Polar Compound in cooking oil (PG5) • How to use repeated frying oil (PG6)
<p>* L=learning center, C=common community, Subscript=province</p> <p>** P=Problem, G= GMP,</p> <p>Subscript= type of production process: f= frying, d= drying, g= grinding</p> <p>Example: PG1= Problem related to GMP</p>					

Capture knowledge from the outside sources

Food formulation

Learning center 3 (L3_L) and Common community 3 (C3_L) explained that they found some problems about Khao Tan (fried sticky-rice cracker) production. Their finished products were not thoroughly cooked and crispy (PF_f1, PF_f2). Moreover, some of fried Khao Tan was cracked (PF_f3). Then, they need better techniques to improve their products' properties in Khao Tan making processes. Those are:

- 1) Framing : to mix of steamed sticky-rice with seasoning liquid and put into the frame
- 2) Drying: to dry the framed sticky-rice by sunlight or hot air oven
- 3) Frying: to fry the dried sticky-rice until it turns crispy and thoroughly cooked

So, they visited to other community producers who had higher experiences on producing Khao Tan in their province. While they were visiting, they observed techniques in framing Khao Tan from visiting place. They also asked the questions and discussion pointed to how to do the crispy and thoroughly cooked Khao Tan and to proof their assumption about what cause to problem and how to solve problem.

“I want to know that they put the baking powder in Khao Tan to improve its crispiness or not...” Learning center 3 (L3_L) staff said.

Lastly, they got the desirable knowledge that, the optimal force of putting sticky-rice to the frame (KF_f1) and the proper amount of seasoning solution added (KF_f2) are critical techniques to prevent hard and non-crispy Khao Tan. Moreover, after they know each other with the visiting sources, when they have more questions later, they used telephone call to consult with them and received the needed answers.

Another producer is Common community 2 (C2_L). They needed how to formulate butter-flavored fried banana (PF_f4). Then, they visited the fried banana community producer at Sukhothai province to observe and ask question for method and ingredients in producing fried banana (KF_f3).

“I observe what (ingredients) they put in formulation then I note it...I ask them what it is...they reply to me but they did not tell me how much they use, so I notice how much they weight”

The community producers capture food production knowledge from expert communities by observing the demonstration of food production. They asked question and probing to their production problems in order to proof their assumption about what the cause of problem was and which process can solve their problem. They also create and keep relation with the expert community in order to consult and share production knowledge later.

GMP knowledge

Another problem in food production is about Good Manufacturing Practice which is the regulatory standard of food production including sanitation and control of production processes, production equipments, and foods storages at manufacturing level (Food and Drug Administration, 2001; The Ministry of Public Health, 2012a). To extend production scale from household cooking to mass-production scale, the community producers have to apply GMP standard to community food production. Since the community producers are unfamiliar with GMP, they need accessing knowledge from the outside sources. The GMP knowledge need of community food production is showed in Table4.3.

Learning center 3 (L3_L) told that they have visited the rice cracker industry at Rachaburi province to observe how to design production plant (PG1) and equipments (PG2) for applying to their community production. At the factory, however, they have seen the complex food production system and costly modern machines with high technology to prevent food contamination such as the electronics thermo-detection to screen high-fevered workers at the entrances. They revealed that they could not apply any knowledge from this visit to their production. Because of the different context of production, the community producers need to create their own knowledge to cope with this problem.

Learning in accessing and capturing knowledge from outside sources

The community producers have learned about how to access and capture external knowledge effectively as showed in Table 4.10. It was important to

community producers to prepare themselves to access to knowledge sources and ready to capture valuable knowledge from expert community.

Learning in capturing

The cases above revealed learning in capturing knowledge from the outside sources. The community producers were (1) identified their need of external knowledge to get food formulation and techniques for better products' properties as well as GMP knowledge. Then, (2) they visited the knowledge- rich enterprises with definite aim and objective. In this way, (3) they also made assumption about what cause to the problem of food production and how to solve that problem in order to make question specific to the point. Furthermore, (4) keys to access to the valuable knowledges were the problem-focused observing and asking questions. In addition, in order to get the definite aim and objective to access knowledge sources, (5) they have direct experiences in food production first to help articulating concepts in study visit.

Accessing to the outside sources

The cases revealed that the sources of knowledge were important to effective knowledge capture. The way to access the appropriate sources was to seeking the contextualized sources of knowledge. It meant that the knowledge source had the specific characteristics as followed. (1) They had willing to open and share experiences to others. (2) They had rich of knowledge from best practice and knowledge in food production. (3) The production processes of visit site were similar content and can be applied with the food processing environment of visitors. For example, when the visitors need how to produce frying products, they should visit to the sources which perform frying production. (4) They were in similar community context such as managing with high involvement of community members and shared capitals. Then, it was easy to understand and articulate those limitations of community producers to design appropriate way of problem solving in community cultures. (5) The distance and communication method of visiting source were considered. Since, the local sources which communicate with similar language were easy to make understanding and relationship to be further consulted and shared more experiences. Moreover, the cases also showed that the study visit at expert community in the same

province allowed them to access more details of knowledge than study visit in long distance community.

Table 4.10 Learning in capturing external knowledge and characteristics of the right source

Effective capturing	Appropriate source of knowledge
1. Identified their need, goal, and objective (What)	1. Willing to open and share experiences
2. Seek for right knowledge source (Who/Where)	2. Rich of knowledge
3. Making assumption about what cause to problem and how to solve problem	3. Similar content of knowledge
4. Problem-focused observing and asking questions (How)	4. Contextualized environment
5. Past direct experience (Why/articulate concept)	5. Close distance and connection

Key factors to enhance accessing and capturing knowledge from outside source

To acquire the secret recipe and experiential knowledge from expert community which cannot easily be acquired, taught, or transferred (Huber, 1991), it had some key factors enhancing capturing knowledge from outside source.

Close network relationship

Huber (1991) proposed that firms can effectively learn from the experience of others by built a close relationship with their network. In this study revealed that when the community producer acquired food production knowledge from expert community in the same province, the expert has more willing to open their method

and secret recipe to the community visitor which was the neighbor and provincial food production network. However, when the producer visited to long distance learning place, the expert mostly explained about main process and did not give details of ingredients' weight. Then, they needed to observe carefully to acquire secret recipe.

Moreover, some community had the way to build and keep the relationship with their knowledge sources in order to sustain and tighten their connection for further sharing knowledge together. For example, the learning center 3 (L3_L) which had ever learned the Khao Tan formulation from Community A, they always sold their dried Khao Tan to Community A in lower prices and also usually visited to each other community.

Approaching to capturing knowledge

Since the secret recipe and food production techniques were tacit and experiential knowledge, only observation could not enough to gain valuable knowledge from expert community. Then, the approach in capturing knowledge was critical factor to achieve their need. As mentioned above in "learning in capturing external knowledge", the appropriate approach was to identify their need of knowledge, making assumption to solve problem, visiting to right source of knowledge, asking and probing with definite aims, and articulating those knowledge to past direct experience in food production. This learning process was the important approach in capturing knowledge effectively.

2. KNOWLEDGE CREATION OF COMMUNITY FOOD PRODUCTION

The knowledge creation is defined as the generating of new knowledge and know-how that did not have a previous existence within the organization (Dalkir, 2005). Since some valuable knowledge in food production could not access from the outside sources, it need knowledge creation from inside community. In community food productions, I explore how these community producers create their knowledge, what knowledge they create, and how valuable created knowledge is.

Table 4.11 The summary of capture and create knowledge in food production

Type of knowledge **	
Formulation	GMP
KF _d 1= Drying with hot air oven KF _d 2= Press raw banana to be a sheet KF _d 3= Turn drying plate and banana sheet KF _d 4= Control drying time KF _f 1= Control force for framing KF _f 2= Control content of liquid seasoning KF _f 3= Provide method and formula in frying production KF _f 4= Control temperature of frying KF _f 5= Control time of frying KF _f 6= Control ages of peanuts KF _f 7= Drying with sunlight KF _f 8= Control dryness of Khao Tan KF _f 9= Slice thin piece of fruit KF _g 1= Adjusted formula to customer feedback KF _g 2= Separate grinding of different ingredients' texture KF _g 3= Use of grinding machine	KG1=Set up mosquito-net windows KG2= Carefully processing with protection tools KG3= Use alcohol and Dettol for insect repellent KG4= Create small seat cover with stainless steel KG5= Use Total Polar Compound test kit KG6=Set up measure to use repeated frying oil KG7=Use appropriate proportion of oil and product KG8=Observe shelf life through every day use of product KG9= Observe shelf life through planning period
** K=Knowledge, F=Formulation, G= GMP, Subscript= type of production process: f= frying, d= drying, g= grinding Example: KF _f 1= Knowledge related to formulation of frying product KG1= Knowledge related to GMP	

Each community producer has created their own knowledge to solve production's problems and/or improve their products' qualities in different ways. Table 4.11 shows the various created knowledge of the community producers.

Table 4.12 The formulation knowledge of community food production

The community food producers					
The learning centers of food production			The common community of food production		
Learning center 1 (L _{1N})*	Learning center 2 (L _{2N})	Learning center 3 (L _{3L})	Common community 1 (C _{1N})	Common community 2 (C _{2L})	Common community 3 (C _{3L})
<ul style="list-style-type: none"> • Drying with hot air oven (KF_{d1}) • Press raw banana to be a sheet (KF_{d2}) • Turn drying plate and banana sheet (KF_{d3}) • Control drying time (KF_{d4}) 	<ul style="list-style-type: none"> • Control temperature of frying (KF_{f4}) • Control time of frying (KF_{f5}) • Control ages of peanuts (KF_{f6}) 	<ul style="list-style-type: none"> • Control dryness of Khao Tan (KF_{f8}) • Control temperature of frying (KF_{f4}) • Control time of frying (KF_{f5}) • Drying with sunlight (KF_{f7}) 	<ul style="list-style-type: none"> • Adjusted formula to customer feedback (KF_{g1}) • Separate grinding of different ingredients' texture (KF_{g2}) • Use of grinding machine (PF_{g3}) 	<ul style="list-style-type: none"> • Provide method and formula in frying production (KF_{f3}) • Control temperature of frying (KF_{f4}) • Control time of frying (KF_{f5}) • Slice thin piece of fruit (KF_{f9}) 	<ul style="list-style-type: none"> • Control dryness of Khao Tan (KF_{f3}) • Control temperature of frying (KF_{f4}) • Control time of frying (KF_{f5}) • Drying with sunlight (KF_{f7})
<p>* L=learning center, C=common community, Subscript=province</p> <p>** K=Knowledge, F=Formulation</p> <p>Subscript= type of production process: f= frying, d= drying, g= grinding</p> <p>Example: KF_{f1}= Knowledge related to formulation of frying product</p>					

2.1 Creating knowledge in food formulation

I pick up 3 cases of knowledge creation in food formulation to describe how community producers created their knowledge in different product types. Those are

frying product (Khao Tan), drying product (dried banana sheet), and grinding product (chili paste). Table 4.12 indicates the knowledge related food formulation of community producers.

2.1.1 Khao Tan production

In accessing to the outside sources, Learning center 3 (L3_L) and Common community 3 (C3_L) have got some techniques in framing process to enhance thoroughly cooked & crispy Khao Tan. In practice, however, they also noticed that drying and frying processes were also critical steps to manage the cracking problem (PF_f3) of Khao Tan production.

These communities have repeatedly adapted their method of production until they found new techniques:

Drying: to dry framed Khao Tan in the sun (KF_f7) could prevent cracking of products in frying process, whereas to dry with hot air oven could be used only in raining day with carefully control of drying periods. In practice, each community applied this knowledge in their own ways.

Learning center 3 (L3_L) told *“when drying with hot air oven, it is alright, but some Khao Tan are also cracked...If drying with sunlight and then move to oven, we must hurry frying...do not leave it for long time since it will be cracked...if we dry it in the sun for too long, it will also be cracked...we must considerably apply.”*

Common community 3 (C3_L) explained *“If we dry in oven for 5 hours, it will be cracked when frying...it might be too dry...it is not good...but when we dry it in the sun, it does not crack...it might be consistently dried.”*

Frying: to control frying temperature (KF_f4) and moisture (KF_f8) of dried Khao Tan are critical techniques to prevent cracking as well as to enhance thoroughly cooked and crispy Khao Tan.

2.1.2 Dried banana sheet production

Since Learning center 1 (L1_N) started production of dried banana, they found a dark-brown color (PF_d1) of banana from sun-drying method. Then, they tried to

change drying method to different ways. Later, they found the way to keep natural color of dried banana with pressing ripe banana to be banana sheets (KF_d2) and then drying with hot air oven (KF_d1).

“It seems dark color...then I think why it is dark...I try to dry it in oven, then I press it to thin sheet...I see its color is better...since it has dried in the sun with open air, I found some dust and dirt in my product...its color is also not good...today I change to dry with oven only...”

However, because of unadjusted temperature hot air oven they got from government support, the dried banana was partially burnt (PF_d2). Then, they needed how to use this oven to make dried banana sheet without defects. They sought where heat generator located and tried to adapt for new production method. Lastly, the solutions were:

- 1) Turn the plate of banana sheet inside the oven every 2 hours (KF_d3)
- 2) Turn the banana sheet upside down in every plates (KF_d3)
- 3) Take drying times not more than 7 hours per batch (KF_d4)

“we must turn the plates..from lower part to upper part...to prevent it from burnt...and also turn the banana sheet in its plate to another side ”

2.1.3 Chili paste production

When Common community 1(C1_N) has initially produced chili paste which is the mixing of ground spicy, herbs and shrimp paste, the formulation was not met customer satisfaction (PF_g1). Then, they made repeatedly chili paste and sold to their neighbors, community members and regular customers to gain the feedback. Later, the formulation was adjusted as customers' demand (KF_g1). Those are increase a number of shrimp paste and leech lime peel as well as decrease lemon grass until it was tasty.

“ we do the chili paste because it is our local wisdom...we must not learn from others...there are the formula in our home...but we have to increase producing many kilograms of the paste...we must add more ingredients...in first year, the taste was not good enough, we must to adjusted until its taste is OK...”

Another knowledge they created was how to solve inconsistent texture of chili paste (PF_g2) when extended their production scale (PF_g3). They told that they used the grinding machine (KF_g3) to made chili paste but the texture was not smooth. Then, the technique, they found, were to ground separately of hard and soft ingredients (KF_g2) before mixing and grinding together. Examples of hard ingredients were lemon grass, and galangal, while soft ingredients were onion, chili, and leech lime peel.

2.2 Creating knowledge in GMP application

Since the outside sources were not contextualized to community productions, the community producers need to generate their knowledge in applying GMP to their production practice. In this part, I illustrated the way they apply GMP concepts to reduce risk of contamination, ensure product safety and prolong its quality in 3 issues.

- 1) Applying GMP concepts to prevent contamination
- 2) Control of Total Polar Compound (TPC) in repeated frying oil
- 3) Shelf life determination and extension

The knowledge related GMP of community food production was created by community food producers as showed in Table 4.13.

Table 4.13 The GMP knowledge of community food production

The community food producers					
The learning centers of food production			The common community of food production		
Learning center 1 (L1 _N)*	Learning center 2 (L2 _N)	Learning center 3 (L3 _L)	Common community 1 (C1 _N)	Common community 2 (C2 _L)	Common community 3 (C3 _L)
<ul style="list-style-type: none"> • Observe shelf life through planning period (KG9) 	<ul style="list-style-type: none"> • Use alcohol and Dettol for insect repellent (KG3) • Use Total Polar Compound test kit (KG5) • Set up measure to use repeated frying oil (KG6) • Observe shelf life through planning period (KG9) 	<ul style="list-style-type: none"> • Use appropriate proportion of oil and product (KG7) 	<ul style="list-style-type: none"> • Observe shelf life through every day use of product (KG8) 	<ul style="list-style-type: none"> • Use appropriate proportion of oil and product (KG7) • Observe shelf life through planning period (KG9) 	<ul style="list-style-type: none"> • Set up mosquito-net windows (KG1) • Carefully processing with protection tools (KG2) • Create small seat cover with stainless steel (KG4) • Use appropriate proportion of oil and product (KG7)
<p>* L=learning center, C=common community, Subscript=province</p> <p>** K=Knowledge, G= GMP,</p> <p>Subscript= type of production process: f= frying, d= drying, g= grinding</p> <p>Example: KG1= Knowledge related to GMP</p>					

2.2.1 Applying GMP concepts to prevent contamination

Although the regulatory standards of food production including GMP guideline were written in broadly concepts, the implementation of GMP by the

regulators was very rigid. These caused to the problems in application of GMP guideline in community food production practices.

The GMP indicates that “location and surrounding of food manufacturing buildings shall locate in area which may not cause the food easily to be contaminated.

There must be effective measures in protection and elimination of insects and infection carriers, dust and other causes of contaminations” (The Ministry of Public Health, 2012a).

In implementation, the production room was a closed room which separated outside and inside environment definitely and must be in alignment of food processing. However, in some type of food processing such as frying Khao Tan and steaming sticky rice, there were hot climate from oil vapor and hot steam which caused to suffering workers. The community producers have applied this concept to create desirable knowledge of food production in many ways.

To this concept, Common community 3 (C3_L) that produced frying products, Khao Tan and Khao Kriab (fried rice cracker), told that to reduce hot steam from sticky-rice steaming and hot vapor from frying oil (PG3), they designed their production building and processes as follow:

- 1) Built up the packing room with the mosquito-net windows and a plastic curtain door for packing of finished products (KG1)
- 2) Framing and frying processes were carefully done outside the room but under the eaves of the building, and stop processing if in bad climate such as raining or heavy wind (KG2).
- 3) In-process materials were kept in protective containers and cover with mosquito-net or lids such as keeping the steamed sticky rice in an ice pot (KG2).

Moreover, the GMP also indicates that “equipments, which contact to food, shall be made of non react-to-food materials and cause no hazard to consumers. Contact surface of tables used in production shall be made of non rusting materials,

easy to clean, non react-to-food and cause no hazard to consumer's health. Furthermore, it has to have enough tables with suitable height" (The Ministry of Public Health, 2012a). However, since the guidelines did not indicate specifically what material to use, and what suitable size of table was, the Food Sanitation standard were used to indicate the table surface as well as other instruments should be stainless steel and height from the ground at least 60 cm.(Bereau of Food Control, 2012).

Common community 3 (C3_L), the elderly community, has applied this concept. They designed a small wooden seat with 20 cms. height and covered with 20x20 cm² of stainless steel plate for Khao Tan framing process(KG4). These seats were used while they were sitting on the short leg table in comfortable position. They were sitting while framing Khao Tan at the height from the ground enough to prevent contaminants.

These cases present the community knowledge creation in applying the GMP concepts. The products of these processes are both valuable knowledge and inventions which are tailor-made for different production processes. Therefore, it also prevents ruining community producers' health while working. For example, the elderly producers need not to stand in work for a long time as well as they do not work in hot environments.

2.2.2 Control of Total Polar Compound (TPC) in repeated frying oil

Since the GMP guideline determines "selection of production ingredients and raw materials shall be clean, good quality suitable for production to consume" (The Ministry of Public Health, 2012a) and food standard of repeated fried oil indicates "the total amount of polar compound in frying oil should not more than 25 percent"(The Ministry of Public Health, 2004, 2012b). This guideline was broad and did not give how to measure total polar compound as well as how to use repeated frying oil appropriately. Then, the community producers who produce frying products need the knowledge about how-to measure the total amount of polar compound in frying oil (PG5), and how-to use repeated frying oil in food production (PG6). They have produced their knowledge to cope with these problems.

First, they used the total polar compound test kit (KG5), product of the department of medical science, to measure TPC in frying oil. Learning center 2 (L2_N) applied this test kit to measure TPC in fried oil after frying process, and re-measured before start frying in new batches. They repeated these steps in several production cycles and recorded the volume of peanuts they cooked. Then, they found that the repeated frying oil could be used for 4 cycles of processing or the cumulative weight of peanuts about 200 kg with less TPC than limit(KG6). However, after 4 cycles of processing, they found some sediments and dark color of frying oil. Then, they changed frying oil for new production.

“In initiate of frying measure, we must frequently test the polar compound both before and after frying...until the results are précised, we stop testing...we test until we know that the fried oil can be repeatedly use for 3-4 times by mixing with new frying oil... after daily use, we must filter the cracked peanut off and keep it for reuse...however, we only use not more than 4 times because it always found the sediment that will be caused to rancidity... the oil was kept for sale for biodiesel making”

Another solution, Learning center 3 (L3_L) , Common community 3 (C3_L), and Common community 2 (C2_L) have used the proper amount of frying oil for use sufficiently in each production (KG7). They told that the frying oil would be absorbed by frying products in processing, then it could be calculated the proportion between frying oil and the amount of products in each production.

2.2.3 Determination of products' shelf life

Previously, products' shelf life has been indicated by expectation or imitate from other products in the markets. The community producers found the shelf life they label was not conformed to the real ages of products. Then, they investigated what the appropriate shelf life was (PG7).

Common community 1(C1_N) kept their chili paste at room temperature and used some packs of product in daily cooking to observe their product properties (KG8). They also found those properties were not changed within 1 month. Moreover, at 500 gram packing size or common packing, the chili paste was totally

used in daily cooking before 30 days. They explained that in community daily life, this kind of chili paste was used in various type of cooking. Then, they indicated their product shelf life at 15 day and they also recommended to customer for keeping this product in refrigerator to keep product's quality.

“ our chili paste can be kept for long time if keeping in refrigerator because we did not put the preservatives...but less than one month, it will be used out...lay peoples use our product in every day cooking...it can be used in many types of food such as common curry, fried fish, Kanom Jene (Thai vermicelli eaten with curry), Hor Mok (steamed fish with curry paste)...half kilograms of chili paste was used out readily...when we label the expiring date, we always indicate about 15 days and tell our customer to keep in refrigerator”

Another measure to identify shelf life, Learning center 1 (L1_N) community enterprise found that the dried banana sheet products were rapidly changed their color when they kept in common plastic container. Later, they developed new package which is separately metalite bag. They needed to identify expiring date (PG7). Then, they kept their new products in number of shelf-life months they expected and sampled to test the product properties every month (KG9). Finally, they found the proper shelf life was 8 months at room condition and 12 months at keeping in refrigerator.

These cases reveal the knowledge creation in applying GMP and related food standards. The community producers have ability to generate their procedural knowledge or how-to apply GMP standard.

Learning in creating knowledge

Since community producers needed to generate new knowledge to cope with production problems, formulation and GMP knowledge were learned through application of existing background knowledge to create new contextualized knowledge.

In food formulation, basic knowledge in food preparing and producing was learned through past experiences in household cooking. The community producers told that they applied local wisdom to produce food product such as chili paste, Khao

Tan, Khao Kriab, fried potato chips, and dried banana. Moreover, they also learned from interaction by customers or consumers that reflected about the taste of products and allowed them to adjust their formulation to meet market satisfaction. For example, the chili paste formula of common community 1 (C1_N) was developed by suggestion from regular customers in Bang Yai district.

In GMP knowledge, it was related to concept of preventing contamination and food safety. Most of background knowledge was from in-class training by the provincial health office/FDA. This learning environment, the common community 2 (C2_L) producer told that they were not fully got concepts since it mostly used technical terms, lack of practices and explanation about why to do. However, (1) the community producers have still *acquired the core concepts* of GMP, safety and sanitation in food production. Then, (2) they *adopted these concepts* and articulated with their basic concepts in daily household food cooking. Since I describes about collective identity in community context, that identity was root of basic concepts in daily household cooking. For example, the common community 2 (C2_L) have attended to keep food sanitation in potato chips and other frying products since they concerned the major customers which were the students in provincial school. They have produced their product as making for their child. Likewise, other community producers have produce their products as the same concept of cooking for consume by themselves which must be cleaned and safety. Later, (3) these community producers were *applying food production concepts* which learned from training and rooted in daily food cooking to produce food products for commercials.

Since GMP guideline always caused to constrain for community production. Some guideline was broad and no direction to apply such as the guideline for use repeated frying oil. The producers had to create their measures to use repeated frying oil to keep both food safety concepts and to save cost of changing new frying oil. Likewise, some GMP guideline was implemented by regulators with rigid application such as allowance only closed system production room with stainless steel equipments and height from the ground at least 60 cm. This rigid application caused to constrain in elderly people and workers in tolerating with long time standing with hot climates. Then, they had to apply GMP concept to their contextualized food

production. For instance, they attended to keep sanitation carefully in packing room since it related to finished products which needed protection from contamination. The Learning center 3 (L3_L) told that *the major step of sanitation was to frying Khao Tan because any microbes were kill in this process, then the product must be kept in protecting containers*. These cases revealed the application of GMP concept from food production learning.

Key factors to enhance creating knowledge in community food production

Collective identity

Since most community producers set their goal to keep their collective identity which was the representative of their community image and reputation, then they always to achieve this goal by doing good products to those customers both good taste/formulation and safety/clean food products. For instance, they always produced their food in the same quality of doing for self consuming as well as doing for their neighbors/children.

Organizational Goal

Moreover, another organization goal was focused among business benefit and well being of workers. Most community producers did not highly focus to business income but they mostly concerned for the benefit and well-being of their community members. For example, the learning center 2 (L2_N) told that they proud that their business could provide occupation and income to their community members. Moreover, common community 3 (C3_L) told that anything they did in their community food production, it must be from agreement of their members and must not ruin their members health and being. Then, this goal led to creating knowledge in order to keep any constrain in food production. The clear picture from the cases was the creating knowledge in coping with hot climate in food production as well as keeping clean/safety food production in the same time.

3. CAPTURING AND SHARING VALUABLE KNOWLEDGE INSIDE THE COMMUNITY

Since food production knowledge has been acquired from the outside sources and also accumulated through past experiences of production, the knowledge was embedded as the expertise of individuals responsible for the process. This knowledge should be captured in order to transform individual knowledge within the organization into organizational knowledge (Dalkir, 2005).

The tacit knowledge capture is the process of eliciting and transforming, tacit knowledge, the experiences and expertise of the individual in the organization into more explicit form of corporate memory such as a concept of food production. In addition, knowledge capture is used interchangeably with knowledge acquisition which is articulation and amplification of individual knowledge to internalize into organizational knowledge base. There are some approaches to capture knowledge from individuals, for examples, learning by observation, learning by being told, and learning histories (Dalkir, 2005).

Learning by observation of demonstration is the way people learn from demonstration of expert in application of knowledge with a case study or sample problem that the expert then solves.

Learning by being told or probing is learning from the clarifying and validating the knowledge artifacts which expert performs in term of prerequisite skill required, consequences of mistakes, and interrelationship with other task.

Learning histories is a review of successes and failures in order to capture best practices and lessons learned. This approach would be to analyze and discuss what would have done differently and why. (Dalkir, 2005).

In community food productions, knowledge would be captured to be available knowledge for organizational sharing and use. This part, I explore how community food producers capture their individual tacit knowledge to community knowledge, what knowledge they captured and how valuable knowledge is.

3.1 Capturing knowledge in community food production

In community food production, the past experiences and expertise as well as the successes and failures of the community food production are the valuable sources for capturing knowledge in food production. In community contexts, capture tacit knowledge is mostly occurred as a linkage between knowledge creation and sharing. Many cases from the fields reveal.

3.1.1 Capturing knowledge in food formulation

The knowledge in food formulation is mostly created by doing and practicing in production processes. The techniques and know-how as well as know-why are collected in the expert workers. The ways to capture this expertise to be an organization asset were explored.

3.1.1.1 The learning by observation and by being told approaches

When the community productions recruited some new members to the organization, the expertise of old timers were captured by learning of these new comers.

Common community 3 (C3_L) community members told when they were new members of this community enterprise; they have been learned by training with the old members. In Khao Tan making, the know-how in framing, drying and frying (KF_f1-8) were told by the expert members. Moreover, in making Khao Tan, they had to observe the way to frame Khao Tan with a proper force (KF_f1), how dryness of framed Khao Tan was (KF_f8), how suitable temperature and time of frying was (KF_f4-5), as well as the characteristics of good Khao Tan was (K_LF_f1). Then, they tried to do as they learned with the former members.

Likewise, Learning center 2 (L2_N) community members also told that at the beginning of new members, they started working in frying peanuts. They have observed how the old workers screened the quality of raw peanuts (KF_f6), how to set up the oil temperature (KF_f4), how long frying periods was (KF_f5). Moreover, the expert workers told them the techniques to see what thoroughly fried peanuts were

(K_LF_f1) and how to do when the peanuts were partially cooked (KF_f4-6). Later, they have started practicing their captured knowledge with the expert workers.

Another community, Common community 1 (C_{1N}) community member told when she started making chili paste; she has help other members to do simple works such as cleaning herbal ingredients as well as observed former members to do more complicated processes. In mixing and grinding of ingredients, while the expert members demonstrated, she has been told how to do (KF_g1-3) and notice the smooth texture of chili paste (K_LF_g1).

“the characteristic of good texture, we have to notice at the crushed chili meat ... at start grinding, the texture are crudely, we can see the chili meat and chili seed suspended over the product...if the chili paste are well grinding, the texture will definitely fined”

Through this approach, the new members have learned from observation of expert demonstration of food production and solve problem that occurred in food processes, as well as they ask questions to get more detail about techniques in notice what good properties of products are, how to do when some difficulties happened. By this way, the tacit knowledge inside the experts are described, illustrated and transformed in to new members. This knowledge are clarified and validated through the real situation of food production that the expert demonstrated and explained. It emphasizes that this knowledge is usability and beneficial to learn and internalized this knowledge.

3.1.1.2 The learning histories approach

Learning histories is a review of successes and failures in order to capture best practices and lessons learned (Dalkir, 2005). Most community producers have their past experiences about successes and errors in food production. These experiences allow them to learn and adapt to eradicate any errors.

Khao Kriab is another product of Common community 3 (C_{3L}) community producer. To produce this product, there are 5 main steps:

- 1) Flour mixing and threshing are the processes to mix ingredients and flour together and then thresh them to be smooth paste.
- 2) Steaming Khao Kriab paste is to steam the pieces of Khao Kriab pastes for several hours until thoroughly cooked.
- 3) Cutting is to cool the steamed paste in cooling box and cut it into rounded pieces
- 4) Drying is to dry the pieces of Khao Kriab in the sunlight
- 5) Frying is the last process to fry dried Khao Kriab

In Khao Kriab production, there has been past experience about an error of mixing process that becomes the lesson learned to community members.

The leader of Common community 3 (C3_L) told that she got the feedback from the regular customer that her Khao Kriab's taste was not the same as before (PF_f6). It was no salt in formulation. Then, she considered the process of mixing and setting up the control process. Thence, after finished mixing, she always tasted the flour before threshing (K_LF_f2). This method could be controlled of other ingredients as well such as sugar, pepper, and other herbal tastes.

Another lesson learned Learning center 2 (L2_N) who produces the fried peanuts found that there were some partial-cooked peanuts mixed up in the same batch of frying product (PF_f1). This problem happened after use new batches of raw peanuts from regular supplier. The knowledge they captured was to control of raw materials' quality such as consistency of peanuts ages (KF_f6). Each batch of raw peanuts would be sampling to be cooked (K_LF_f3). If they found any problems, it would be reclaimed to the supplier (K_LF_f4). They also apply this way to the other materials.

In capturing knowledge through lessons learned, the cases indicated there are few lessons learned about food production from community producers. It may be from whether they have carefully done in their production or they could not remember their past failure. However, from the cases showed that some knowledge that generated after error detected was tacit knowledge such as tasting the flour before threshing. This type of knowledge needs specific individual skill to detect and prevent

recurrent of mistakes, however, to capture this knowledge to new members may not enough to prevent error efficiently. The way to better prevent this mistake should be codified this lessons learned to explicit knowledge such as the direction document or process control documents.

3.1.2 Capturing knowledge in food GMP

3.1.2.1 The learning by observation and by being told approach

Since knowledge about GMP was frequently trained by the provincial health officers, the community leader as well as the production staffs have been trained and got more knowledge than others. To leverage this knowledge to organizational level, there have been some approaches to capture this knowledge.

The leader of Learning center 3 (L3_L) told that when she went to her production plant, she always demonstrated how to correctly wear the cooking dress and hair cover (K_LG1), as well as to washing hand (K_LG2) before working according to GMP standard. Moreover, she always cleaned the floor and production equipments as well as explained the reasons why she had to do in order to encourage their members to know how to conform to GMP and to emphasize members to know how important it is. She told *“these are belong to us, to our community...we have to help each other...to clean and keep our disciplines...when we do cooking, it must be cleaned...we make it for sale, if the customers seen we were untidy...it might not be fascinating”*. This case reveals the approaches of learning by observation and being told of their members.

Similar to Learning center 3 community producer, the leader of Learning center 2 (L2_L), Common community 2 (C2_L), and Common community 3 (C3_L) community producers told that they have frequently emphasized about GMP practices and sanitation of food production in their periodically meeting. They always demonstrated how to correctly wear the cooking dress and hair cover (K_LG1), as well as to washing hand (K_LG2). They also told the community members to check their dressing as well as to check their colleagues' dressing.

The leader of Common community 2 (C2_L) said *“we have a monthly meeting and always emphasize about sanitation, cleaning, and dressing in food production...our members are elderly, they may forgot so it should be prevented...we have trained a lot...when we come back, we have to explain to our members...”*

The leader of Learning center 2 (L2_N) said *“we almost have a meeting weekly; we have to repeatedly tell our members about dressing...embedding for over 10 years so they know their duties...”*

In addition, not only know-what and know-how do the members need to know about GMP practices, but also know-why is important to enhance their members understood why to conform to GMP practices. These producers told that they have explained the consequences from ignorance of GMP practices to them.

The community members were told about the negative outcomes from contaminated food production including the stories about the mistake from other communities' food production. For example, the contaminated found in the products would caused to stop purchasing from customers as well as to be cancelled of food manufacturing licenses.

“Khao Tan from community T was found a few hairs...the large container of their product was rejected totally...only one (contaminated) package...they could not sell any products...then we aware to wear a cap regularly...” Learning center 3 (L3_L)'s staff explained.

“We must have a reason to explain what should be done...such as if hair were found in our products, our customers will stop buying...we will be unemployed” Learning center 2 (L2_N)'s staff said.

“Our customers were students...If we do unclean products; the children will get a stomachache...the officers will find the causes...then they will revoke our food license” Common community 2 (C2_L)'s leader explained.

In capturing knowledge through observation and being told, there are some different between formulation knowledge and GMP knowledge. Since GMP

knowledge is mostly to control and change behaviors of production members, this knowledge is unfamiliar with local community lifestyle which based on household food production. Learning by observation and being told may not enough to enhance those community members to get total concepts of GMP.

However, the leader and head of production, which have been trained and get more GMP knowledge than other members, have to demonstrated, explained, encouraged, and facilitated all production members to understand how and why to learn this knowledge. They always managed their leadership to convince and enhance their members to get GMP concepts. Moreover, the sharing these knowledge through community of practice may be more efficiently as well.

3.1.2.2 The learning histories approach

In capturing tacit knowledge about GMP, the community producers have learned from some past mistakes as well as the reflection from other social networks.

Learning center 3 (L_{3L}) community producers told they had experience about the feedback from regular customer at Chiangrai province. These customers brought Khao Tan to their home. Later, they called back directly to the community leader and told they have found the production date indicated it produced since last year. It should be already expired but its quality looked freshly. They thought it would be a wrong date-stamp (P_LG3). Therefore, this community producer has learned to strictly recheck their production date before stamp on product label (K_LG3).

Likewise, Learning center 2 (C_{2N}) had been informed by, 7Eleven, their distributor to be careful about production date labeling. Since 7Eleven sampled and found some packages were not labeled the date-stamp (P_LG3). The auditor from 7Eleven told them to plan how to prevent this mistake happened again. Then, they had to set another worker who sealed packages, to recheck the production date before packing (K_LG3).

I have summarized the capturing knowledge of community food production as showed in Table 4.14.

Table 4.14 The summary of capturing knowledge in food production

Type of knowledge **	
Formulation	
KF _f 1= Control force for framing	K _L F _f 3= Sampling of raw peanut
KF _f 2= Control content of liquid seasoning	K _L F _f 4= Sign contract with supplier to claim low quality raw material
KF _f 3= Providing Method and formula in frying production	K _L F _f 5= The noticeable appearance of steamed Khao Kriab
KF _f 4= Control temperature of frying	K _L F _f 6= The noticeable appearance of well dried Khao Kriab
KF _f 5= Control time of frying	KF _g 1= Adjusted formula to customer feedback
KF _f 6= Control ages of peanuts	KF _g 2= Separate grinding of different ingredients' texture
KF _f 7= Drying with sunlight	KF _g 3= Use of grinding machine
KF _f 8= Control dryness of Khao Tan	K _L F _g 1= The noticeable appearance of good product
K _L F _f 1= The noticeable appearance of good product	
K _L F _f 2= Test the taste of mixing flour	
GMP	
K _L G1=Correct dressing	
K _L G2= Correct washing hand	
K _L G3= Rechecking of production date labeling	
<p>** K=Knowledge, F=Formulation, G= GMP, Subscript = type of production process: f= frying, d= drying, g= grinding = way to gain knowledge: L= learn Example: KF_f1= Knowledge related to formulation of frying product KG1= Knowledge related to GMP K_LF_d1= Knowledge from learning which related to formulation of drying product</p>	

Since lessons learned about GMP knowledge related to quality and safety of food products, it should be kept in mind to prevent the error occurrences. Only capture tacit knowledge from persons to persons is not efficient to assure food safety. The codifying tacit knowledge to explicit forms is the couple measure to ensure product safety as well.

3.2 Knowledge sharing of community food production

Knowledge management orientation were divided into 2 approaches; the information-based approach focused emphasizing on knowledge capture and codification, while the interaction-based approach tended to emphasis on knowledge sharing interaction (Demarest, 1997). The knowledge sharing refers to the process of distributing and transferring what knowledge peoples have created and learned to the communal knowledge based (Dalkir, 2005). Although, there have been interchangeably use of knowledge sharing and knowledge transfer (Argote, et al., 2000; Patriotta, et al.); in this study, I use “*knowledge sharing*” as to transfer the knowledge inside the organization, and “*knowledge transfer*” as to transfer the knowledge across the different organization.

Since the knowledge was created through the interaction between tacit and explicit knowledge, Takeuchi and Nonaka proposed 4 ways of knowledge sharing through this types of knowledge. These were socialization, externalization, combination and internalization processes (Takeuchi & Nonaka, 2004).

Socialisation is the process in which individual tacit knowledge is transferred to other individual tacit knowledge through imitated, observed and shared experiences.

Externalisation is the way to transform and transfer individual tacit knowledge to explicit knowledge. This process allows the explicit knowledge to be disseminated to others, and it then becomes the basis of new knowledge in group level.

Combination is the process in which explicit knowledge is managed to be more complex and systematic sets of knowledge. It is collected and then combined, edited or processed to form new knowledge, which is then shared among the members of the enterprise.

Internalization is the process to convert explicit knowledge to tacit knowledge by individuals. It is closely related to learning by doing and then knowledge is embedded (Esterhuizen, Schutte, & du Toit, 2012; I. Nonaka, 2000).

These 4 modes of knowledge transformation were moved through community of interaction from individual to individual (socialization), from individual to group (externalization), from group to organization (combination) and from organization to individual (internalization). The knowledge was transferred throughout the organization and amplified knowledge as the knowledge spiral (Takeuchi & Nonaka, 2004).

Likewise, the social constructivist perspective viewed knowledge was produced through the shared understanding from social interaction. The individuals and groups have mutually influenced each other's views and generate shared construction of reality. The knowledge was context dependent and could not be separated from knower (Lave & Wenger, 1991). With this perspective, the community of practice was much better suited to apply to knowledge sharing of community food producers.

Community of practice (CoP) was defined as a social process of collaborative learning among people who have common interests. Tacit and explicit knowledge were learned by interacting with other community members. Community of practice had 3 basic characteristics: joint enterprise, mutual engagement, and shared repertoire. Joint enterprise meant the reason for interacting that bind members together. Mutual engagement referred to the membership role and responsibility to achieve the goal of CoP that allowed member became a part of community. Shared repertoire was the shared workspace in which members could communicate and shared knowledge. After the community was formed, the community members had cooperative functioned to prolong the community with learning and their common interests. Then, community members developed the shared repertoire through their mutual engagement(Wenger, et al., 2002).

Through the CoP, knowledge was most transferred through the situated learning that happened in legitimate peripheral participation or apprenticeship learning. The apprentices learned from master by participation in certain tasks of community. Over time, the apprentices moved from peripheral to full participation in the community. They also learn a common understanding about what it was and what

it meant for their lives and their community (Lave & Wenger, 1991; Ribeiro, et al., 2010).

The way in which people shared knowledge was raised from their knowledge vision or the goal of managing knowledge. It was based on the community aesthetic value of truth, and goodness, which defined the ideal image of how organization want to be. It determined the collective ideal missions that give the direction of the organization (I. Nonaka, et al., 2008). This concept was articulated to the collective identity of community enterprises.

Since, in community food enterprise, there were no obviously separated groups, sections, or departments, the community food production was mutual participated by everyone in their community. Moreover, in community involvement, all knowledge types were integrated together. In this part, I focused on knowledge sharing inside the organization. Then, the follow part I explore how these community producers share their knowledge through the community of practice, what knowledge they share, and how valuable created knowledge is.

Sharing knowledge through CoP/Situated learning

I pick up a case of knowledge sharing in food formulation to describe how community producers shared their formulation knowledge through the community of practice.

Common community 3 (C3_L) told that the concept of their community learning was “everyone has to know and do in place of other”. So, when there have been new members, the apprentice was treated in the way they can do everything as other members do.

In case of Khao Kriab making, there were complicated processes such as flour mixing and threshing, steaming Khao Kriab paste, cutting the steamed paste into rounded pieces, drying and frying. The new members have started by helping the old-timers to do the simple tasks such as preparing raw materials and packing. However, they also observed the old member doing other complex processes. Since, it was small

community; the members who were free from their responsible tasks would help others in various tasks.

“I am a member...I have to do like others do...when I was new member; I must learn from observation...learn by myself...it does not have a theory, it must be practice...” the new member told.

They told, at the beginning of making Khao Kriab, there have been partial-cooked of steamed Khao Kriab paste. The members who were responsible to this task called other members including new members to see the problem (PF_f6). The solution was mutual suggested. In this situation, the techniques to see how to identify well-steamed Khao Kriab (K_LF_f5) were explained from the member who has the expertise. Then, after the re-process of steaming was done for 4 hours, every member met again to see the results of problem solving. The well-steamed paste was translucent and thick throughout a piece (K_LF_f5). This was good properties of well-steamed Khao Kraib paste. The knowledge has been shared through this participation of whole members. Then, when they rotated to do this task the mistake would not recurrent.

“When we start making Khao Kriab, we mostly found partially-steamed Khao Kriab...most members have found this problem...it must be re-steaming...when we see a problem...we will talk together to know how to do, how to solve it...”

Moreover, to learn how to fry dried Khao Kriab (KF_f4-5), to notice how well-cooked Khao Kriab was (K_LF_f1), the new members had to participate in frying process with the old-timers. They have been trained on the job with advice of the master. They have noticed what appearance of well-dried Khao Kriab was (K_LF_f6), when to put dried Khao Kriab to frying oil (KF_f4), how long to pick frying Khao Kriab up (K_LF_f1) through direct experience of frying. They also have been tasted their products and learned that if it was over heated, the taste would be bitter.

“Members who have much experience on frying will know...it must be practiced...must be trained...our members have ability to do...they will observe...they will practice...”

Moreover, the members were also learned more than the formulation. They have learn the concept of good hygienic practice through observation of the practice of leader and old timer members such as how to wear the cooking dress (K_LG1), how to clean hands before working (K_LG2).

They also discussed and talked about why their communities had to frame Khao Tan on the small seat covered with stainless steel (KG4), why they must carefully protect in-process food with the lid and net (KG2) while they were frying and steaming outside the room. They also learn how other members feel when working together within community context.

They have seen the role of community leader to perform with carefully and perseverance in food production as well as in other role in their district such as the local district treasurer. In religious ceremony, they have participated with the leader and other members in the cooking food to offer to the monks at local temple. At night, all members have been at temple to meditate and observe religious rites.

“In religious ceremony, our members are going to the temple...daytime, we work together...nighttime, we are praying and meditating at the temple...to make our mind relax and calm...not be serious...we live together; we must understand each other...”

When there was donation for helping victims in flooding crisis, the leader and other members had attended to donate their Khao Tan to other sufferers. Moreover, the leader also gave the cotton blanket which she has got the offering in Songkran day to help those victims. This event revealed the unegoistic of the leader that reflected to the responsibility to their society as well.

They have embedded the faithful in the way of the leader and community living. The new member told:

“We live together until now because we live with brotherhood...everyone is equally...leader or members were equal...there will be anything, we talk together here ... while working, we have all known each other...”

They also absorbed the concept of working in food production from interaction with leader and other members.

“Khao Krib is easy to eat but hard to make...for 4 days to be finished making ...we must be patient...must love it...”

That means they are doing things, especially food production, with carefully and perseverance. The new members were moved to participate in each process of Khao Kriab and Khao Tan production until they fully acquired the whole techniques, ability to make products and the concept of do the good thing as the old-timers done. Within this kind of learning, the relationships between the new and old members were developed through working, participating, and overcoming the difficulties together. Not only the production techniques have they learned but also acquired the concepts of production and living in the community as well.

This concept of community of practice in food production is beneficial to share both the formulation knowledge and GMP knowledge in the same time. Moreover, it also enhances the concept of carefully food production for food safety as well as for preserving morality with responsibility to others and society.

To provide effective knowledge sharing, learning through master-novice relationship or situated learning is recommended to promote the sustainable food production. Since the newcomers are not only carried the production techniques but also embedded the corporate social responsibility (CSR) through their social interaction which become the quality assurance of food production.

Table 4.15 The summary of knowledge in food production

Type of knowledge **	
Formulation	GMP
KF _d 1= Drying with hot air oven KF _d 2= Press raw banana to be a sheet KF _d 3= Turn drying plate and banana sheet KF _d 4= Control drying time KF _f 1= Control force for framing KF _f 2= Control content of liquid seasoning KF _f 3= Method and formula in frying production KF _f 4= Control temperature of frying KF _f 5= Control time of frying KF _f 6= Control ages of peanuts KF _f 7= Drying with sunlight KF _f 8= Control dryness of Khao Tan KF _f 9= Slice thin piece of fruit KF _g 1= Adjusted formula to customer feedback KF _g 2= Separate grinding of different ingredients' texture KF _g 3= Use of grinding machine K _L F _g 1= The noticeable appearance of good product K _L F _f 1= The noticeable appearance of good product K _L F _f 2= Test the taste of mixing flour K _L F _f 3= Sampling of raw peanut K _L F _f 4= Sign contract with supplier to claim low quality raw material K _L F _f 5= The noticeable appearance of steamed Khao Kriab K _L F _f 6= The noticeable appearance of well dried Khao Kriab	KG1=Set up mosquito-net windows KG2= Carefully processing with protection tools KG3= Use alcohol and Dettol for insect repellent KG4= Create small seat cover with stainless steel KG5= Use Total Polar Compound test kit KG6=Set up measure to use repeated frying oil KG7=Use appropriate proportion of oil and product KG8=Observe shelf life through every day use of product KG9= Observe shelf life through planning period K _L G1=Correct dressing K _L G2= Correct washing hand K _L G3= Rechecking of production date labeling
** K=Knowledge, F=Formulation, G= GMP, Subscript= type of production process: f= frying, d= drying, g= grinding = way to gain knowledge: L= learn Example: KF _f 1= Knowledge related to formulation of frying product KG1= Knowledge related to GMP K _L F _d 1= Knowledge from learning which related to formulation of drying product	

Learning in capturing and sharing knowledge

Most processes in capturing and sharing knowledge were learning process itself which expressed the knowledge acquisition of new comers. Previous part I expressed on content of knowledge and how to acquire individuals' tacit knowledge to organizational knowledge. In this part, I emphasized on learning processes and linking between learning in capturing and learning in sharing together.

Learning process in capturing

The learning process in capturing was to learn by (1) observing expert demonstration in food production (2) probing/being told about how to/techniques and application in production practices (3) learning from lessons learned and best practices in past experiences of the expert or old-timers.

The tacit knowledge-capture techniques in (1) and (2) were mostly utilized together while the technique (3) was mostly found from errors in food production which was reflected by other social networks such as regular customers, neighbors, and distributors.

Through the capture processes, the knowledge which was internalized to old-timers by knowledge creation process (created knowledge) and learned from past experience (learned knowledge) was acquired by new members.

Most process of learning in capturing knowledge was learning without practicing or direct experience. To transfer experiential knowledge to newcomers, it needed learning through direct experience of newcomers as well.

Learning process in sharing

The learning in sharing knowledge was the CoP/situated learning that allowed newcomers to acquire tacit knowledge by learning in doing with master. The cases revealed that in situated learning, the newcomers have learned techniques/formulation and application of GMP concept. Moreover, they also learned the concept of food production such as sanitation/safety in food production and the senses of

community responsibility through fully participated in formal and informal community situation with their master. The socialization in Nonaka's knowledge creation model was utilized here to emphasize the interaction among individual and their social surrounding which allowed the creating and sharing knowledge to newcomers.

The key learning process was to get the concept of food production from the master. Then, to enhance learning food production concept effectively, it needed the explanation of what important concepts were, how important to get this concepts, and what the consequence of ignorance these concepts.

Key factor to enhance capturing and sharing knowledge

Leadership

Since this attribute related to acquiring knowledge from master to newcomers, the role of leader was used through leadership which rooted by the expert power and referent power. Many cases revealed that the leaders expressed their power to facilitate, convince, and encourage their members to learn the concept in food production as well as adopt and implement this concept into practices. They always performed good production practice to be the role model for their members. They also explained the reasons why to conform to GMP guideline and gave the consequence of ignorance this concept.

4. CODIFYING KNOWLEDGE IN FOOD PRODUCTION

The explicit knowledge codification is the stage of leveraging intangible knowledge by transforming knowledge into explicit form so that knowledge can be distributed much more widely and cost-effective. The knowledge codification is beneficial to enhance corporate accuracy, understandability, accessibility, currency, and credibility (Dalkir, 2005).

Codification is a people-to-document based approach, and it uses information systems to codify knowledge and keep as organization repository (Román-Velázquez, 2005). Codification is involved to a commodity view of knowledge, where tacit knowledge are collected, stored and explicitly represented (García-Muiña, et al., 2009)

There are 4 community producers who codified the tacit knowledge related to food formulation to be explicit knowledge as showed in Table 4.16 while there were 2 community producers who codified GMP knowledge as indicated in Table4.17. The reasons and application of this codified knowledge were different in each community producer.

This part, I divided the codifying knowledge into 2 separate subtopics. These were (1) Codifying of formulation knowledge and (2) Codifying of GMP knowledge.

4.1 Codifying knowledge in food formulation

Common community 2 (C_{2_i}) has codified their formulation of fried banana, fried potato, and fried jack fruit (KF_d1-4). The leader told that she recorded the formula and method to make frying products while she was creating the new products. After she already got the appropriate formula, it was recorded in the book as a reference formulation. This book was used to train new members and also to be direction for the community members' use in food production. She told when she went upcountry trade fair; her community members could furthered production and supplied products for sale. However, some knowledge was not codified such as the

techniques to enhance totally cooked, and crispy (KF_{f4}, 5, 9) since it was the special technique to produce their own product.

Table 4.16 The codified formulation knowledge of community food production

The community food producers					
The learning centers of food production			The common community of food production		
Learning center 1 (L1 _N)*	Learning center 2 (L2 _N)	Learning center 3 (L3 _L)	Common community 1 (C1 _N)	Common community 2 (C2 _L)	Common community 3 (C3 _L)
<ul style="list-style-type: none"> • Drying with hot air oven (KF_{d1}) • Press raw banana to be a sheet (KF_{d2}) • Turn drying plate and banana sheet (KF_{d3}) • Control drying time (KF_{d4}) 	<ul style="list-style-type: none"> • Control temperature of frying (KF_{f4}) • Control time of frying (KF_{f5}) • Control ages of peanuts (KF_{f6}) 	<ul style="list-style-type: none"> • Provide method and formula in frying production (KF_{f3}) • Drying with sunlight (KF_{f7}) 	<ul style="list-style-type: none"> • Adjusted formula to customer feedback (KF_{g1}) • Separate grinding of different ingredients' texture (KF_{g2}) • Use of grinding machine (PF_{g3}) 	<ul style="list-style-type: none"> • Provide method and formula in frying production (KF_{f3}) 	<ul style="list-style-type: none"> • Control dryness of Khao Tan (KF_{f3}) • Control temperature of frying (KF_{f4}) • Control time of frying (KF_{f5}) • Drying with sunlight (KF_{f7})
<p>* L=learning center, C=common community, Subscript=province</p> <p>** P=Problem, F=Formulation</p> <p>Subscript= type of production process: f= frying, d= drying, g= grinding</p> <p>Example: PF_{f1}= Problem related to formulation of frying product</p> <p>Gray highlight = uncoded knowledge</p>					

Learning center 3 (L3_L) revealed they have made the poster illustrated Khao Tan production method (KF_F3, 7). This poster shown the photos of each process and also described how to do in every steps. This form of explicit knowledge was used to explain Khao Tan making for other community producers and customers who visited their community. However, some knowledge was not codified such as the techniques to prevent partially cook, non-crispy, and cracking (KF_F4, 5, 8) because it was the valuable technique to generate the specific characteristic of their product.

Learning center 1 (L1_N) has depicted their processes of dried banana sheet production on the future boards. There were the pictures of each process with describing of production details (KF_d1-4). This codified knowledge was mostly used to explain the production processes of dried banana sheet to the visitors from other communities and customers.

Another community was Learning center 2 (L2_N). This community has generated the production documents in order to keep for inspection of 7Eleven auditors which are the main distributor. These documents were written about ingredients list and order of production to control the consistency of product's quality.

In contrast, there were 2 communities who did not codify their tacit knowledge. These are Common community 1 (C1_N) and Common community 3 (C3_L). These communities were the elderly communities and their major customers were in local community members, neighbors, and regular customers in their district. Then, they may have difficulty in writing or codifying their tacit knowledge.

Most community producers who codified formulation knowledge were the learning center producers. Most explicit knowledge of food formulation was codified only the main steps of production such as list of ingredients and steps of processing in order to showed method of production. However, the techniques for specific tastes or identity of each product were not codified. It would be not easy to codify in community contexts such as how to notice the appearances of well-cooked peanuts, how to define the dryness of dried Khao-Tan, how to identify the appropriate texture

of chili paste. Moreover, it would be kept inside community in order to keep their product identity.

4.2 Codifying knowledge in food GMP practices

There have been 2 community producers who codified GMP related tacit knowledge to explicit knowledge for their applications. Those were Learning center 1 (L1_N) and Learning center 2 (L2_N) community enterprises.

Learning center 1 (L1_N) community enterprise has codified their tacit knowledge about how to identify shelf-life of dried banana sheet role. In their product development process to prolong shelf-life with appropriate packaging, they have been supported by Sukhothai Thammathiraj Open University. The teacher has supported them the metalite packaging and guides them about how to observe their product shelf-life (KG9). Then, they had to record the study and also kept it to be a reference. Then, the knowledge was codified from direct experience to be a direction for reuse later.

Another community was Learning center 2 (L2_N). They expressed each process of frying peanuts according to GMP standard. The production control documents were written as a direction for quality assurance including raw material specification, cleaning process of equipments and production room, weighing record of raw material and finished products, the insect repellent (KG3), how to identify shelf life (KG9) and others. In addition, the knowledge about checking the total polar compound in frying oil (KG5-6) was written to be the step of changing frying oil in the production procedure. Then, these documents were kept to be traced back or inspected by 7Eleven auditors.

Table 4.17 The codified GMP knowledge of community food production

The community food producers					
The learning centers of food production			The common community of food production		
Learning center 1 (L1 _N)*	Learning center 2 (L2 _N)	Learning center 3 (L3 _L)	Bang Yai (C1 _N)	Common community 2 (C2 _L)	Common community 3 (C3 _L)
<ul style="list-style-type: none"> • Observe shelf life through planning period (KG9) 	<ul style="list-style-type: none"> • Use alcohol and Dettol for insect repellent (KG3) • Use Total Polar Compound test kit (KG5) • Set up measure to use repeated frying oil (KG6) • Observe shelf life through planning period (KG9) 	<ul style="list-style-type: none"> • Use appropriate proportion of oil and product (KG7) 	<ul style="list-style-type: none"> • Observe shelf life through every day use of product (KG8) 	<ul style="list-style-type: none"> • Use appropriate proportion of oil and product (KG7) • Observe shelf life through planning period (KG9) 	<ul style="list-style-type: none"> • Set up mosquito-net windows (KG1) • Carefully processing with protection tools (KG2) • Create small seat cover with stainless steel (KG4) • Use appropriate proportion of oil and product (KG7)
<p>* L=learning center, C=common community, Subscript=province</p> <p>** K=Knowledge, G= GMP,</p> <p>Subscript= type of production process: f= frying, d= drying, g= grinding</p> <p>Example: KG1= Knowledge related to GMP</p> <p>Gray highlight = uncoded knowledge</p>					

However, other communities were not codified their tacit GMP knowledge. It would be from 2 reasons. First, the uncoded knowledge was the specifically use innovation which designed for solving specific problem about applying GMP such as creating small seat cover with stainless steel (KG4) or carefully processing with protection tools (KG2). Second, some knowledge was based on dynamics condition which could not define definite method such as use appropriate proportion of oil and product in frying (KG7). This process depended on type of frying product, type or source of oil (saturated/unsaturated oil, animal/plant oil), the temperature of frying, characters of raw material, amount of drying product in each batch, time of frying and others. It may need the skill of expert workers and continuously record in experimental in each condition of frying to codify, but nowadays it was not codify by community producers. It will be better if the public sectors or academia could be support them to codify these skill and knowledge systematically.

Learning in codifying knowledge

Since codifying was to transform tacit knowledge to explicit knowledge in order to share and use to be references/directions/manuals of food production inside organization. Moreover, some codified knowledge was used to transfer to other community producers or visitors.

The community producers have learned to (1) *define their aims* of use the codified knowledge such as to control the production process or keep for the auditor in inspection. (2) *Identify what knowledge appropriate to codified* to be explicit knowledge since some tacit knowledge needed to be kept for internal sharing and use such as secret recipe. (3) They *selected the appropriate way to codify* such as most learning center (L1-3) did the poster and picture to illustrate their production processes. (4) *Using and evaluating of codified knowledge* such as the learning center 3 (L3_L) changed the way of using poster of their production process from sticking on the wall in the production room to use for teaching the student in the class. Because it caused to contamination in production room, it was not allowed any material stick on the wall.

Key factors to enhance codifying knowledge

Organization goal

The goal of the organization was key factor to guide codification. Since the evidences revealed that most community who codified both formulation and GMP knowledge was the learning center communities, while only one common community has codified the formulation knowledge in order to record the method and formula for all members could repeat production with the same quality of product when the leader was absented.

The reasons why only the learning centers was codified both GMP and formulation knowledge because these learning centers were committed by the provincial health offices/FDA as the place for study visit by other communities. They were recognized as the expertise community with reputation from others. The finding showed that most codified knowledge such as posters of production processes and related records were use to teach and train or explain their production practice to the visitors and students. Moreover, one learning center, they were not only codified knowledge for internal used but also to be inspected by their distributor e.g. 7Eleven auditors.

The organization goal was encouraged the community producers to utilize codifying knowledge. Most of evidences showed that the role of learning center which was committed to be their goal was the major factor to drive knowledge codification.

Codification support from public/private sectors

In addition, since the community producer was rarely codified their knowledge since they were not familiar with codification and always shared knowledge through daily working. Then, the public/private sectors should support the codifying process to those community producers.

5. TRANSFERRING KNOWLEDGE TO OUTSIDE ORGANIZATION

Since community enterprises have established with different aim to other business organizations. They founded with the concept of doing by community involvement and for their members and communities (Mannarini, et al., 2006). Then, based on this concept, the valuable knowledge in food production has been shared to other communities in order to support each other as community production networks.

In this study, I defined “knowledge transfer” as a process of transferring knowledge to outside the organization. Since each community producer has been the source of knowledge for other newcomer community producers. Table 4.18 and Table 4.19 indicate what knowledge and expertise these communities shared to other new community producers.

This part, I divided the transferring knowledge into 2 separate subtopics. These were (1) Transferring of formulation knowledge and (2) Transferring of GMP knowledge

5.1 Transferring formulation knowledge

In Thai contexts, whether the community producers are the government established learning center or not, they are open for other communities accessing to their expertise knowledge. All community producers I observed told that they have willing to transfer and have been transferred how to formulate their own products to other new producers.

The ways they transferred were:

- 1) To be the learning place for learning of other peoples
- 2) To be the trainer in academic settings

5.1.1 To be the learning place for newcomers

Both the learning center producers and the common producers have been the learning places for newcomers. Most tacit knowledge in food production was transferred in this way. They allowed other communities and students to visit, observe, consult, and try to participate in producing. Their everyday food productions were ready for visiting and learning. Since the production knowledge was their expertise, they performed food production step by step and described how-to and why-to to the visitors. In demonstration with allowance of other communities to practice, they also advised some production techniques when the outside participants needed some helps.

Learning center 1 (L1_N) community producer, one of the learning centers, told that they transferred how to produce dried banana sheet roll (KF_d1-4) to Moo 5 community producer. They allowed them to observe, and try to practice until they have already done their similar products. Nowadays, Moo 5 community producer have produced the same product and sold inside their community. They also told:

“...I help them to get occupation... they sell only inside their community, I have my own customer... I dare not competition”

Table 4.18 The transferring formulation knowledge of community food production

The community food producers					
Learning center 1 (L1 _N)*	Learning center 2 (L2 _N)	Learning center 3 (L3 _L)	Common community 1 (C1 _N)	Common community 2 (C2 _L)	Common community 3 (C3 _L)
How to produce dried banana sheet roll <ul style="list-style-type: none"> • Drying with hot air oven (KF_d1) • Press raw banana to be a sheet (KF_d2) • Turn drying plate and banana sheet (KF_d3) • Control drying time (KF_d4) 	How to produce fried-peanuts <ul style="list-style-type: none"> • Control temperature of frying (KF_f4) • Control time of frying (KF_f5) • Control ages of peanuts (KF_f6) 	How to produce Khao Tan <ul style="list-style-type: none"> • Control force for framing (KF_f1) • Control content of liquid seasoning (KF_f2) • Control temperature of frying (KF_f4) • Control time of frying (KF_f5) • Drying with sunlight (KF_f7) • Control dryness of Khao Tan (KF_f8) 	How to produce chili paste <ul style="list-style-type: none"> • Adjusted formula to customer feedback (KF_g1) • Separate grinding of different ingredients' texture (KF_g2) Use of grinding machine (KF_g3) 	How to produce potato chips, fried-banana and jack fruit <ul style="list-style-type: none"> • Method and formula in frying production (KF_f3) • Control temperature of frying (KF_f4) • Control time of frying (KF_f5) Slice thin piece of fruit (KF_f9) 	How to produce Khao Tan and Khao Kriab <ul style="list-style-type: none"> • Control force for framing (KF_f1) • Control content of liquid seasoning (KF_f2) • Method and formula in frying production (KF_f3) • Control temperature of frying (KF_f4) • Control time of frying (KF_f5) • Drying with sunlight (KF_f7) • Control dryness of Khao Tan (KF_f8)
* L=learning center, C=common community, Subscript=province ** P=Problem, F=Formulation Subscript= type of production process: f= frying, d= drying, g= grinding Example: PF _f 1= Problem related to formulation of frying product					

A common producer group, Common community 1(C1_N) allowed other communities to observe their chili paste production. Since they have been informed about visiting, they prepared more ingredients for demonstration and for practice by the community visitors. They told the formula and method, and demonstrate with explanation about chili paste production (KF_g1-3). Later, they have been the consultant for this visiting community. When these visitors had some problems in their production practices, they considered these visitors as their networks and always gave recommendation to solve problems.

“...I explain what I do in daily chili paste production, and let them try to do...I do believe that my formula is delicious...I already have regular customer in my community, so I do not nervous about sharing my knowledge”

5.1.2 To be the trainer in academic settings

Since Non-Formal Education Centre has a course about food production, the community producers who were expert in food production was invited to be the trainer. In this way, the tacit knowledge as well as explicit knowledge in food production were used and shared.

Learning center 3 (L3_L) community enterprises told that they have been a trainer on Khao Tan making to the academic students. They had to do an instruction and poster about processing steps of Khao Tan making. These tools were used in illustrate how to make Khao Tan (KF_r1, 2, 4, 5, 7, 8). In addition, in some practicing classes, they have demonstrated making Khao Tan and also explained method and techniques. Later, the students were practiced under their advice.

By this transferring method, major process was teaching by explaining food production method in the class. The explicit knowledge was beneficial to share in cognitive learning. Moreover, the demonstration was setting up as a small scale or lab scale production which is different from real situation.

5.2 Transferring GMP knowledge

Most of community producers who shared GMP knowledge were the learning center community producers. These learning center producers were Learning center 2 (L_{2N}), Learning center 1 (L_{1N}) and Learning center 3 (L_{3L}). They told that they have been the learning places for study visiting by other communities. The main GMP knowledge that these 3 learning centers have transferred to other communities was related to sanitation in food production such as how to wear cooking dress correctly (K_LG1), how to washing hand effectively before working(K_LG2). This knowledge was embedded through every day production. Besides, they also described what GMP guideline definitely expressed such as alignment of food processing, building and equipment construction, quality control, and personal hygiene since they have been trained by the provincial health offices regularly. They always allowed the visitors to observe their production as well as infrastructure and equipments which were designed as GMP recommended. They also explained how to apply GMP concepts in daily community production.

However, some GMP knowledge that they have created through their direct experiences were not transferred to other community producers as same as those 3 common community producers, Common community 1(C_{1N}), Common community 2 (C_{2L}), Common community 3 (C_{3L}). For example, the knowledge about how to identify product shelf-life (KG8-9), how to use Total Polar Compound test kit in defining repeated frying oil use (KG5-6), how to use appropriate proportion of oil and product (KG7) and how to create small seat cover with stainless steel (KG4).

The underlying that this knowledge was not transferred to other communities was related to 3 reasons.

First, since most knowledge was uncodified tacit knowledge which needed knowledge capture and person-to-person transferring approach, it should have the involvement of the visitors and community context to absorb this knowledge as well as the concept of social responsibility in food production.

Table 4.19 The transferring GMP knowledge of community food production

The community food producers					
Learning center 1 (L1 _N)*	Learning center 2 (L2 _N)	Learning center 3 (L3 _L)	Bang Yai (C1 _N)	Common community 2 (C2 _L)	Common community 3 (C3 _L)
Hygienic food production • Correct dressing (K _L G1) • Correct washing hand (K _L G2)	Hygienic food production • Correct dressing (K _L G1) • Correct washing hand (K _L G2)	Hygienic food production • Correct dressing (K _L G1) • Correct washing hand (K _L G2)	• Observe shelf life through every day use of product (KG8)	• Use appropriate proportion of oil and product (KG7) • Observe shelf life through planning period (KG9)	• Set up mosquito-net windows (KG1) • Carefully processing with protection tools (KG2) • Create small seat cover with stainless steel (KG4) • Use appropriate proportion of oil and product (KG7)
• Observe shelf life through planning period (KG9)	• Use alcohol and Dettol for insect repellent (KG3) • Use Total Polar Compound test kit (KG5) • Set up measure to use repeated frying oil (KG6) • Observe shelf life through planning period (KG9)	• Use appropriate proportion of oil and product (KG7)			
<p>* L=learning center, C=common community, Subscript=province</p> <p>** K=Knowledge, G= GMP,</p> <p>Subscript= type of production process: f= frying, d= drying, g= grinding</p> <p>Example: KG1= Knowledge related to GMP</p> <p>Gray highlight = non-transferred knowledge</p>					

Second, the approaches of the visitors to capture and learning from these expert communities should be considered. Since most expert community enterprises were familiar with the everyday production practices, they always explained only keys practices of GMP that they hold in food production. Then, if the visitors were not asked the specific questions direct to their past experiences or tacit GMP knowledge, they could not transfer those knowledge to others.

Third, the events that allowed the expert community producers to transfer their knowledge were also limit the transferring. The visitors were mostly visited to learned formulation knowledge than GMP knowledge. Moreover, the events that allowed the common community to transfer their knowledge were also less than the learning center communities.

In addition, since these learning center producers have been specially trained and supported by Food and Drug Administration and the provincial health office about GMP concepts, they were collected expertise in GMP knowledge until they have been established to be the learning center of community food production by FDA and/or the provincial health office. Indirectly, this establishment has verified that the GMP practices of these community producers were corrected and would be the model for other communities. Then, they have confidently shared their knowledge to other communities.

In contrary, the common community producers were rarely found the transferring of GMP knowledge. I notice that they could be generated their GMP knowledge, but those knowledge were not verified by the government sectors such as the academia and Food and Drug administration. Then, their knowledge related applying GMP concepts was used only inside their communities and did not widely share to other communities.

Hence, the knowledge transfer was depended on both the transferor and receiver. To enhance GMP knowledge transfer to promote food product safety widely, it should be supported by public sectors in order to promote the community producers to transfer their knowledge and best practices in several situations. Moreover, their

tacit GMP knowledge should be codified to explicitly form which easy to access and use by other communities. Lastly, those tacit and innovation knowledge should be verified and validate by academia and food standard related organizations to leverage the knowledge value and was ready to transfer to other communities.

Learning in transferring knowledge

Since transferring was to transfer both tacit and explicit knowledge to other community producers and visitors, the community producers have learned about how to transfer their knowledge as followed.

(1) They *identified their target of transfer* and evaluate the ability to learn of learners such as to the community producer who had past direct experience or to the students/newcomers without any basic knowledge in food production. (2) They *selected the appropriate knowledge contents to transfer* such as the common community 1 (C1_N) explained the major step of processing to community visitors because most visitors wanted to learn about chili paste formulation and they had some basic background in food production. (3) They used *appropriate transferring method* in teaching such as they use codified knowledge to teach the student in class since they want to overviewed all food processing before explaining in details. (4) Some community producers had *evaluated the learning results of learners* in order to assist them to learn effectively. For example, the learning center 1 (L1_N) followed up the Moo 5 community who have learned the making banana sheet role from them and told them some specific techniques to enhance good quality of products.

Key factors to enhance transferring knowledge

Organization goal and support from public/private sectors

Similar to key factor of codifying knowledge, the organization goal was the major factor that guides the community producers to transfer knowledge. Each community producers had willing to help other communities since they empathized in the sense of community. Then, they set a goal to help other community to get occupation and self reliance by transfer their production knowledge to those

communities. However, in transferring GMP knowledge, it was limited in learning center communities. Then, it would be supported from public/private sectors to promote GMP transferring by validating GMP knowledge and promoting CoP and food production knowledge networks.

SUMMARY

This chapter addresses knowledge management and learning process of community food product production. The results show that in community food production contexts, there were some attributes of knowledge management process which differ from other business/organization knowledge management. Since, in community environments, there were social relations among the community food producers as the social network. Then, the flow of knowledge was from outside-in to inside-out. This means that the community food producers have acquired the external knowledge from outside their community and then the knowledge were referred from inside community to other communities in food production network.

The finding showed the attributes of knowledge management of community food production were composed of 5 major attributes. These were (1) accessing and capturing valuable knowledge from outside sources (2) knowledge creation of community food production (3) capturing and sharing valuable knowledge inside the community (4) codifying knowledge of community food production and (5) transferring knowledge to outside community.

The main issues of knowledge management and learning of community food production were related to food formulation knowledge and GMP knowledge. Most community producers have identified knowledge need according to their organization goal. They managed the knowledge in order to produce good products which were tasty, good appearance, good quality and no harmful to their consumers.

In order to reach their goal, they have acquired knowledge from their social network. In this process, they had to prepare themselves in order to access to the right knowledge source. The appropriate approaching was a strategy for effective capturing the valuable knowledge from outside sources.

When some knowledge could not capture from outside source, each community producers both learning center and common community were created their own knowledge through direct experiences in every day food production in order to apply with their specific problems under their community contexts. The constraint from applying GMP concepts caused to create specific knowledge to cope with these problems. These were some guideline was very rigid such as the specification of building and equipments that ruined people's health from hot climate, while some guideline was very broad such as the regulation of using frying oil without any direction of use. The organization goal was mainly directed to create their knowledge.

After knowledge was collected and embedded into individual practitioner, it was to be capture to organization knowledge. The community producers have captured both formulation and GMP knowledge by learning through observing, probing, and lessons learned/best practices from expert people. This knowledge was also shared to all over organization members by community of practice or learning in practice (situated learning). The major driver was the leadership of community leader to convince and facilitate learning to their members.

Then, knowledge codification was to transform tacit knowledge to explicit knowledge. The community producers were less codified their knowledge. The learning center communities have more codified knowledge than common communities. The commitment of learning centers which became their organization goal was the major factor to enhance knowledge codification of community producers.

Lastly, knowledge transferring was widely adopted and performed by each community producers especially in food formulation knowledge, while it was limited transferring of GMP knowledge by learning center communities only. The organization goal, especially in learning center role, was guided the transferring knowledge in community food producers.

In each attributes of knowledge management, learning was situated together with each stage of knowledge flow in order to increase effectiveness of knowledge management.

CHAPTER V

CONCLUSION AND RECOMMENDATION

Through this study was concerned about knowledge management and learning process of community food production which composed of what knowledge were valuable in community food production, how they managed and learned valuable knowledge, what knowledge management process was, and what possible factors to formulate strategy for improving of knowledge management and learning of community food product production. The finding of this study reinforce the important of understanding managing knowledge and learning of community food production that could be applied to propose the KM improvement strategy for community producers.

This study was based on a qualitative approach since it was appropriate way to explore managing knowledge in natural community circumstances. I conducted this study in 6 community food producers. Those were 3 learning center of food production and 3 common community producers which located in Nontaburi province and Lampang province. The data was collected between June 2011-May 2012 with in-depth interview, observation, and informal focus group method. The data analysis was done in concurrent processing with data collecting period.

The process of knowledge management in community contexts was extended the other knowledge management models of common business organizations. The community knowledge management has interconnected with the outside of community. Since the nature of community contexts, community producers were not situated separately from other parts of society, they were help each other by the sense of community and had willing to support other communities to get occupation and better beings. The interaction among community food producers and other community/networks allowed the flow of knowledge from outside expertise sources to inside their community, and then it flowed to outside community again. The finding illustrated knowledge management attribute into 5 attributes. Those were:

1. Accessing and capturing valuable knowledge from outside sources
2. Knowledge creation of community food production
3. Capturing and sharing valuable knowledge inside the community
4. Codifying knowledge of community food production
5. Transferring knowledge to outside community

Community knowledge management

In order to answer the specific objective 1: To explore the knowledge management process on food production of community producers, I expressed what the community producer knowledge management was, how they manage their knowledge, how well knowledge management was, and what knowledge they managed.

The finding showed in community knowledge management, there was 2 types of knowledge management. Those were (1) tacit knowledge management and (2) explicit knowledge management.

Community tacit knowledge management composed of accessing and capturing knowledge from outside source, knowledge creation, knowledge capturing and sharing inside community

The community producers have managed both formulation knowledge and GMP knowledge in order to respond to knowledge need of food production. These knowledge was valuable knowledge to achieve the organization goal in each stage of community food production development.

Both learning center communities and common community producers have managed the tacit knowledge similarly through direct experiences and learning from interaction among their social network such as create their contextualized knowledge by reflection from customers and capture knowledge from external expert community.

The relationship among social networks was important to tacit knowledge, especially in accessing and capturing tacit knowledge from external sources. The community producers have built and prolonged this social tie in order to share the past experience, lessons learned, best practices together. However, the source of knowledge in local area was not widely established, especially to GMP knowledge source. Then, the knowledge creation was generated to cope with the gap of knowledge access.

The knowledge creation was driven by the organization goal. Most community producers have created their knowledge in order to achieve their goal. The evidences revealed each community producer found the constrain while adopted GMP knowledge such as the rigidity and/or no direction of GMP guideline and related food standard. They had to design and apply GMP concept to keep both the good production practice and no ruin community members' health in such case of hot climate in frying process as well as to formulate method of using repeated frying oil by themselves in order to cope with no direction of controlling polar compound in frying oil.

The leaders of community food enterprises were key persons to enhance tacit knowledge management since they were facilitators in knowledge capturing as well as the master in knowledge sharing. They also applied their referent and expert power in order to drive knowledge management. The techniques and concepts of food production, especially in corporate social responsibility and good production practice, were socialized to their community members through situated learning in community of practice by influencing of their leadership.

Another type of knowledge management, *the explicit knowledge management* was focused on codifying knowledge and transferring knowledge. Most knowledge content that has been codified was the GMP knowledge while the secret recipe or food formulation were less codified.

Most GMP codification and transferring were done by learning centers than common communities. It was from the influencing of organization goal which

allowed the learning center who established by FDA/the provincial health office to perform a role of distributing GMP knowledge than common community.

In formulation knowledge, since it was related to secret recipe, this type of knowledge was kept tacitly than codified to explicit knowledge. It needed people-to-people based in eliciting and transferring this knowledge.

Most explicit knowledge management was done under the organization goal of transferring knowledge, especially GMP knowledge, to other communities while managing explicit knowledge to apply for internal use was rarely found. Since the nature of community production which was highly involved in any activities of food processing, then they were familiar with tacit knowledge management which enough for basic need of food production management. However, they were not considered to improve of food production by applying explicit knowledge management.

This finding suggested the public sectors to support them the technology of knowledge codifying and transferring in order to make this explicit knowledge management easily. The public sectors would facilitate them to understand the benefit from explicit knowledge management in improvement of quality assurance system of their food production and also enhance their knowledge transferring to food production network effectively .

Community learning of food production knowledge

In order to answer the specific objective 2: To analyse the learning constituents of community food producers through the stage of knowledge management cycle, I explored what learning constituents of community food producers were, how they learned their knowledge, how well their learning was, and what knowledge they learned.

The finding revealed most community producers, both learning center and common community, had similar learning in each type of knowledge management.

In tacit knowledge management, the community producers have defined their need of knowledge and they had learning method in acquiring external knowledge.

They had an effective approaching to capture the knowledge from outside expert community. They used the directed past experiences to make assumption of what possible causes of problem and solutions in order to direct asking and observing to gain the right knowledge . They also learned what the right knowledge source was and how to keep relation with that knowledge source in order to further learning more knowledge. Moreover, in creating knowledge, the community producers learned to adopt concepted of food production and apply in their specific community context to cope with some difficulty in food production. They also learned to leverage knowledge to organization level by learning in practice or in CoP/situated learning. The learning in CoP allowed the community members learned both techniques and concepts of food production with the responsibility to society.

In explicit knowledge management, the community producers have learned how to transform tacit knowledge to explicit knowledge in order to use inside organization and transfer to other communities. They also identify the target of using explicit knowledge and select the way of transforming and representing knowledge according to the organization goal. In this type of knowledge management, the learning center communities were more implemented learning to practice than the common communities. The finding suggested that learning in explicit knowledge management would be supported by the public sectors in order to improve the knowledge management effectively, especially to utilized the learning in enhancing the GMP knowledge management of community food producers.

Key factors in policy formulation of KM and learning improvement

In order to answer the specific objective 3: To propose key factors for formulating strategy in order to improve knowledge management and learning process on local production of food product, I expressed what key factors for facilitating KM and learning were, how these key factors influence to KM and learning.

The finding indicated that there were 6 key factors which influence to KM and learning of community food producers. These were (1) Approaching in accessing and capturing knowledge from outside source (2) Close network relationship among social

networks to enhance accessing, capturing, sharing, and transferring knowledge of community producers (3) Collective identity of community producers that governed the community producers to attend KM and learning process carefully to keep and sustain their identity (4) Organizational goal to guide the target of knowledge management to those community producers (5) Leadership in influencing to the community members to learn and share the food production knowledge with the concept of good production practice and responsibility to society and (6) Supporting from public/private sector in facilitating KM and learning process especially to explicit knowledge management.

The finding revealed that the learning centers had better KM and learning in GMP practice since they had the clear organization goal to promote the good production practice to other communities. Moreover, they also received supports from FDA/the provincial health office as well as other related sectors/departments such as the local administration, 7Eleven, and others. Then, they had both social capital and knowledge capital in order to share and transfer the GMP knowledge both inside and outside organization.

In addition, the key factors that influenced to most community producers to keep effective knowledge management and learning were the *collective identity and social relation* among food production networks. Since these factors were rooted in nature of community life, the community producers were concerned and socialized about the social relation and their identity. Then, it influenced to all activities that these community done that must be good and no harmful to their images and reputation. If the public sectors could link this concept to the reasons of managing knowledge and learning, it would be governed their self discipline in KM and learning, especially to keep concept of GMP and the responsibility to society. Moreover, the leadership of community leaders were also highly influenced to those community members, since the power that supported leadership was not based on legitimate power but based on expert and referent power. This leadership allowed leaders convince and facilitate the KM and learning effectively.

Limitation

There were some limitations in this study. First, the study was conducted in 6 community food producers. This may not be representative to all community producers nationwide since it was the common limiting of qualitative design. Second, the type of food product and processing were limited to generalize only in similar product, processing, and context of community. Third, there were no representatives from Northeast, South, and West regions which have different cooking culture.

Recommendation

Some recommendations were already made in chapter IV and conclusion. This part I emphasize the major recommendation for the related sectors: the policy makers and the community producers and the research recommendation for further study.

1. Recommendation for related sectors

Government sector

- 1) The application of GMP and food standards should be designed in contextualized to different community food production circumstances. Those are allowance of community producers to design their own applications of GMP and food standards based on the same major concept to ensure food safety such as prevention of contamination, and risk reduction instead of the rigidity of judgment in GMP regulation.
- 2) The created GMP knowledge should be verified and validated to ensure food product safety and leverage them to be best practice for transferring to other communities within similar content and context of food production.
- 3) The establishment of learning centers should be continued to increase the knowledge sources in local areas that allow the community producers to learn and utilize local knowledge effectively.

- 4) The promotion of sharing and transferring events among food production networks should be encouraged and supported in order to facilitate knowledge sharing in food production networks.

Community producer sector

- 1) The community producers should build and sustain the social relation and networking among their food production communities in order to facilitate and maintain the knowledge sharing and transferring in community networks.
- 2) The leaders should perform their role in facilitating, and encouraging knowledge management to their community members in food production as well as in promoting of GMP and social responsibility concept.

2. Research recommendation

The further study will be conducted in codifying and transferring technology development and transfer in order to enhance explicit knowledge management of community producers. Further, the research in effective knowledge management in food production network should be conducted to provide the appropriate knowledge network forming and sustaining, type of relationship, and how to facilitate knowledge flow of each KM attribute in the community food production network.

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