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# IMPORTANCE OF FARMER TRAINING FOR PRODUCING LOCAL FERMENTED FISH

*(Research article)*

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## Abstract

Fermented fish is a famous local food knowledge in northeast region of Thailand and now it is expanding to be national food branding. The purpose of this research is to present importance of farmer training in order to 1) study of type of raw fish for producing fermented fish, 2) develop database system on type of raw fish for producing local fermented fish and 3) encourage knowledge transfer activities, using a database system for people in the community. Fifty people voluntarily participated in this study as participants. The research instruments were an interview form, database system, the performance evaluation form and a satisfaction questionnaire. The statistics used for data analysis were percentage, mean and standard deviation. The results showed that 1) raw fish for producing fermented fish could be divided into 2 groups according to morphology; 28 types of scaled fishes, 13 types of leather fish, total 41 types 2) database system, there are 3 components: general user, member users and administrator, which has the ability to display, search, add, edit, delete information about fish and user information, the overall efficiency of the system was 97.92% and 3) the results of knowledge transfer on the use of a database system found satisfaction overall at high level.

*Keywords:* Farmer training, black box testing, database system, fermented fish

### 1. INTRODUCTION

The direction of the National Economic and Social Development Strategy focuses on the development of science, technology, research and innovation in line with the 20 years national research and innovation strategy 2; research and innovation for social and environmental development method research and development plan, policy or social innovation on key issues based on the country's strategy and knowledge management. Research strategy 5; Distribution of prosperity and livable cities and key research and innovation plans at 5.2 Provincial economic development and provincial groups (Office of the National Economic and Social Development Council, 2017). The communities surrounding Lampao Dam are employed by farmers. After farming, gardening, there was a fishing career because the area around Lampao Dam are numerous fish. Fish is used by the locals to make the two primary products: fermented fish and pickled fish. The local wisdom of dried fish is becoming more popular with consumers and provides employment for residents of the area.

The processed fish raw materials there is no published database of raw material fish species that combines raw academic materials, fish species and information on habitats, distribution and status of various raw materials. The adoption of Information and Communication Technologies (ICT) to support the operation of each system in various ways. The database systems are fundamental tools that play an important role for computer-based information systems because they are the input parts of all information systems. Therefore, the design of

information systems also requires a focus on the design of the database. There are many types of information systems, which vary according to the operational objectives, such as management information system (MIS), executive information system (EIS), geographic information system (GIS) (Al-Mamary et al., 2014). The basic elements of the development of all types of information systems are the development of the Database Management System (DBMS).

Therefore, the development of a database system for raw fish species for producing fermented fish around the Lampao Dam is a study, research and development of a resource capital database system. To systematically make fermented fish near Lampao Dam, this arranges the acquisition of raw fish. People in the community or the general public can use it to reference and research information about the types of raw material fish to produce fermented fish near Lampao Dam by storing it in a format that can be instantly run when searching, updating data and ensuring that the database system's process is always up to date. The natural resources become stable because of it. In terms of natural resource management and knowledge transmission, people in the villages near Lampao Dam can understand how to use fish resources in a balanced and sustainable way by using a database system of raw fish for producing fermented fish.

## 2. RESEARCH OBJECTIVES

In the light of training farmers;

2.1 To study the types of raw fish for producing fermented fish.

2.2 To develop a database system of raw fish for producing fermented fish.

2.3 To encourage knowledge transfer activities, the use of database systems of raw fish for producing fermented fish to the people of the community surrounding Lampao Dam.

## 3. RELATED WORKS

3.1 The database system's meaning is large amounts of data can be managed through database systems. Defining information storage architecture and creating tools for information manipulation are both components of data management. The database system must also guarantee the security of the data saved, even in the event of system failures or unwanted access attempts. If data are to be shared across several users, the system must avoid possible abnormal consequences. A database-management system (DBMS) is made up of a number of related programs and a group of interconnected data. Information pertinent to a company is contained in the data collection, which is commonly referred to as the database. An effective and convenient method of storing and retrieving database information is the main objective of a DBMS. It is a medium between users and programs related to the use of the database, which is responsible for helping users access information easily, conveniently and efficiently. User access to data can create a database, query data but users do not need to know about the details within the structure of the database. It is a medium between users and programs related to the use of databases (Korth & Silberschatz, 2010). The discussing on the development of an Object-Oriented DBMS, outline an extensible data model that captures behavioral semantics, no artificial restrictions on the quantity or size of database objects, database amenities (concurrency, transactions, recovery, associative access, authorization) and an interactive development environment (Maier et al., 1986). The most of discover everyday are activities related to interacting with the database, which discussed the basics of the database system as an element of life in modern society. (Elmasri & Navathe, 2010).

3.2 The Software Development Life Cycle (SDLC) is the process of creating or maintaining a software system, usually with various stages from analyzing preliminary developments to post-development software. Testing and evaluation also consists of models and methods used

by the development team to develop software systems, of which this method is a framework for planning and controlling the entire development process, software applications or information systems are designed to perform specific tasks. Currently, there are two SDLC methods that most developers use: traditional development and agile development (Leau et al., 2012). The highlight study of black box and white box testing techniques are to examine various test techniques in the field of software testing. Software testing is the process of running a program or system with the intent of finding software development errors. Software testing is an important activity of the software. The Software Development Life Cycle (SDLC) helps to improve the confidence of developers that the program does what it intends to do. In other words, we can say that it is also the process of implementing the program. Intend to find errors in the language of verification and confirmation. Black box testing is often used for validation (are we building the right software?) and white boxes, tests are often used to check (are we develop software?) (Nidhra & Dondeti, 2012).

## 4. RESEARCH METHODOLOGY

### 4.1 Participants

The participants of this research were 50 persons voluntarily, who live in the community surrounding the Lampao Dam, Kalasin Province, the location as shown in Figure 1.

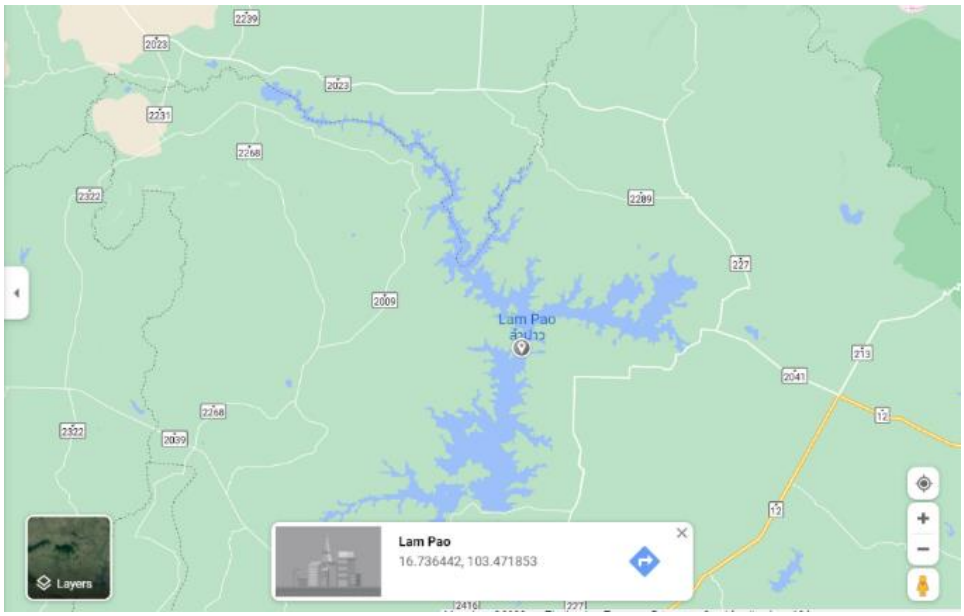


*Figure 1*. The Lampao Dam, Kalasin Province**;** 16.736442, 103.471853

### 4.2 Research tools

4.2.1 The interview form for raw fish types refer to a tool used for collecting data for use in research on the development of a database of raw fish types for producing fermented fish at Lampao dam by interviewing people who voluntarily participated in the research at Kalasin Province.

4.2.2 The database system of raw fish for producing fermented fish Lampao Dam to evaluate the performance of database system and reported the findings.

4.2.3 The assessment of the performance of database system on raw fish types for producing fermented fish at Lampao dam by using Black Box Testing Technique.

4.2.4 The satisfaction questionnaire of the users for database system of raw fish types.

### 4.3 Research process

4.3.1 The process of conducting research according to the System Development Life Cycle (SDLC) consists of 6 steps as follows:

This research presents the development of database system on type of raw fish for producing fermented fish at Lampao Dam. In the research, the operation is divided into 6 steps according to the System Development Life Cycle (SDLC) include; 1) data gathering 2) requirement and process analysis 3) system design 4) system development 5) system testing and 6) implement and evaluate, respectively. (Jirava, 2004; Iamsiriwong, 2012; Houston, 2017).

**Step 1** data gathering; 1) documentary research, such as data from studies related articles, 2) field study of information on types of raw fish for producing fermented fish. There are 2 steps for studying; collecting and analyzing the data as follows; 2.1) going to a storage area to collect data on types of raw fish for producing fermented fish at Lampao Dam and 2.2) conducting field studies by interviewing to obtain information on types of raw fish for producing fermented fish at Lampao Dam. The researcher interviewed agricultural fishermen and processed fish producers in communities surrounding the Lampao Dam using a semi-structured or guided interviews (Drever, 1995) compared data from interviews with various stakeholders.

**Step 2** requirement and process analysis (Saibaba & Vaidya, 2018; Rehman et al., 2013) 1) collect data and analyze the process of the database system of the types of raw fish for producing fermented fish at Lampao Dam and 2) analyze the data and processes of the work system according to the objectives set in the study issues as shown in Figure 2(a) and Figure 2(b).

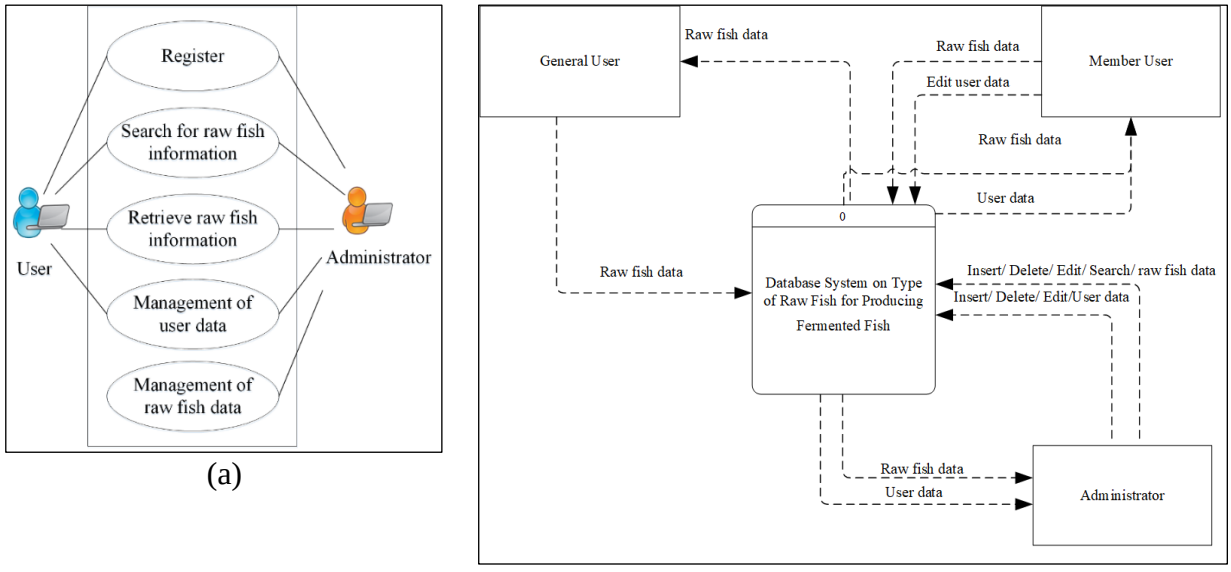


*Figure 2.* (a) Use case diagram, (b) Context Diagram of Database System on Type of Raw Fish for Producing Fermented Fish

**Step 3** system design; 1) design data scope in system development, 2) design presentation formats, photos and videos, 3) design system architecture and 4) database design, output data, input data and user interface design.

**Step 4** system development; to develop a database system of types of raw fish for producing fermented fish at Lampao Dam according to the designed process and the issues studied; insert, edit, delete, search data (Killoran, 2013).

**Step 5** system testing; to test the system for defects and then completely improve the system that has been developed; function test, usability test, application test (Scherr et al., 2018; Lewis, 2018; Ahmad & Hussaini, 2021).

**Step 6** implement and evaluate; to evaluate the performance of the system by experts, users and summarize the results of the assessment. 1) Evaluate the performance of the system by experts and related parties with the Black Box Testing Technique. 2) The user satisfaction test is conducted to determine how well users are satisfied.

### 4.4 Data Analysis

The basic statistics include percentage, mean and standard deviation. Statistics used to analyze activity performance test data include determining the developmental testing.

## 5. RESEARCH RESULTS

### 5.1 The results of the types of raw fish for producing fermented fish at Lampao Dam

The following results were discovered by two morphological categories, 28 scaled fishes, and 13 leather fish, total 41 types of fish as shown in Table 1.

Table 1. *The types of raw fish for producing fermented fish at Lam Pao Dam.*

| No. | Common name | Scientific name |
|---|---|---|
| 1 | Snake skin gourami | *Trichogaster pectoralis* (Regan, 1910) |
| 2 | Nile tilapia | *Oreochromis niloticus* (Linnaeus, 1758) |
| 3 | Striped tiger leaffish, Banded leaffish, Malayan leaffish | *Pristolepis fasciata* (Bleeker, 1851) |
| 4 | Common silver barb | *Barbodes gonionotus* (Bleeker,1850) |
| 5 | Bronze featherback | *Notopterus notopterus* (Pallas, 1769) |
| 6 | Eye-Spot barb, Spotted hampala barb | *Hampala dispar* (Smith, 1934) |
| 7 | Silver sharkminnow, Hard-lipped barb | *Osteochilus hasseltii* (Valenciennes, 1842) |
| 8 | Schwanenfeld’s tinfoil barb | *Barbodes schwanenfeldi* (Bleeker, 1854) |
| 9 | Julien's mud carp | *Henicorhynchus siamensis* (Sauvage, 1881) |
| 10 | - | *Puntioplites protozsron* (Bleeker, 1865) |
| 11 | Snakehead murrel, Striped snakehead | *Channa striata* (Bloch, 1793) |
| 12 | - | *Stolephorus indicus* (van Hasselt, 1823) |
| 13 | Moonlight gourami, Moonbeam gourami | *Trichopodus microlepis* (Günther, 1861) |
| 14 | - | *Puntius orphoides* (Valenciennes,1842) |
| 15 | - | *Paralaubuca typus (*Bleeker, 1864) |
| 16 | Sand goby, Marbled sleeper | *Oxyeleotris marmorata* (Bleeker, 1852) |
| 17 | - | *Osteochilus melanopleurus* (Bleeker, 1852) |
| 18 | Small scale mud carp | *Cirrhina microlepis* (Sauvage, 1878) |
| 19 | Blackline rasbora, Red-tailed rasbora | *Rasbora borapetensis Smith, 1934* |
| 20 | Common climbing perch | *Anabas testudineus* (Bloch 1792) |
| 21 | Clown feather back | *Chitala ornata* (Gray, 1831) |

| No. | Common name | Scientific name |
|---|---|---|
| 22 | Thai river sprat | *Clupeichthys aesarnensis* (Wongratana, 1983) |
| 23 | Pale rasbora | *Rasbora aurotaenia (*Tirant, 1885) |
| 24 | Giant snakehead | *Channa micropeltes* (Cuvier, 1831) |
| 25 | Black sharkminnow | *Labeo chrysophekadion* (Bleeker, 1850) |
| 26 | - | *Labiobarbus siamensis* (Sauvage, 1881) |
| 27 | Scissor-tail rasbora | *Rasbora trilineata (Steindachner, 1870)* |
| 28 | Yellowtail rasbora | *Rasbora daniconius (Hamilton, 1822)* |
| 29 | Butter catfish, One-spot glass catfish | *Ompok krattensis* (Fowler, 1934) |
| 30 | Common Sheatfish | *Micronema apogon* (Bleeker, 1851) |
| 31 | Peacock eel, Spot-finned spiny eel | *Macrognathus siamensis* (Günther, 1861) |
| 32 | Asian redtail catfish | *Hemibagrus nemurus* (Valenciennes, 1840) |
| 33 | Striped catfish, Irridescent shark catfish, Siamese shark, Sutchi catfish | *Pangasius hypopthalmus* (Sauvage, 1878) |
| 34 | Twospot catfish | *Mystus nigriceps* (Valenciennes, 1840) |
| 35 | Red-finned loach | *Botia lecontei* (Fowler, 1937) |
| 36 | Horseface loach | *Acantopsis choirorhynchos* (Bleeker, 1854) |
| 37 | Siames glassfish | *Parambassis siamensis* (Fowler, 1937) |
| 38 | Walking catfish | *Clarias batrachus* (Linnaeus, 1758) |
| 39 | Tire track eel | *Mastacembelus favus* (Hora, 1924) |
| 40 | Wrestling halfbeak, Halfbeak | *Dermogenys siamensis* (Fowler, 1934) |
| 41 | Asian red-tailed catfish | *Hemibagrus wyckioides* (Fang & Chaux, 1949) |

### 5.2 The results of the development of a database system of raw fish for producing fermented fish at Lampao Dam

The database system of raw fish for producing fermented fish at Lampao Dam. There are three elements: general users, member users and administrators, who have the ability to display, search, add, edit, and delete the type of fish raw material and user information. The database system of raw fish for producing fermented fish at Lampao Dam to evaluate the efficiency. The system works with the Black Box Testing Technique to test and measure valid cases of 3 users, general user, member user and administrator of all 21 topics and 48 items in the test and measure valid cases with an overall average accuracy of 97.92%.

### 5.3 The results of the transfer of knowledge using the database system of raw fish for producing fermented fish at Lampao Dam to people in the communities surrounding

The satisfaction of user for the database system of raw fish for producing fermented fish at Lampao Dam are included at a high level ($\overline{X}$= 4.32, S.D. = 0.73). Considering the three most valuable sequences, 1) after looking over the fish database system used to produce fermented fish at Lampao Dam, you learned more ($\overline{X}$ = 4.48, S.D. = 0.58), 2) you believe that you can use your understanding of the many types of raw fish to produce fermented fish at Lampao Dam in the field of sustainable natural resource management ($\overline{X}$=4.42, S.D. = 0.67) and 3) the suitability to interact with users ($\overline{X}$ = 4.40, S.D. = 0.70), respectively as shown in Figure 3.

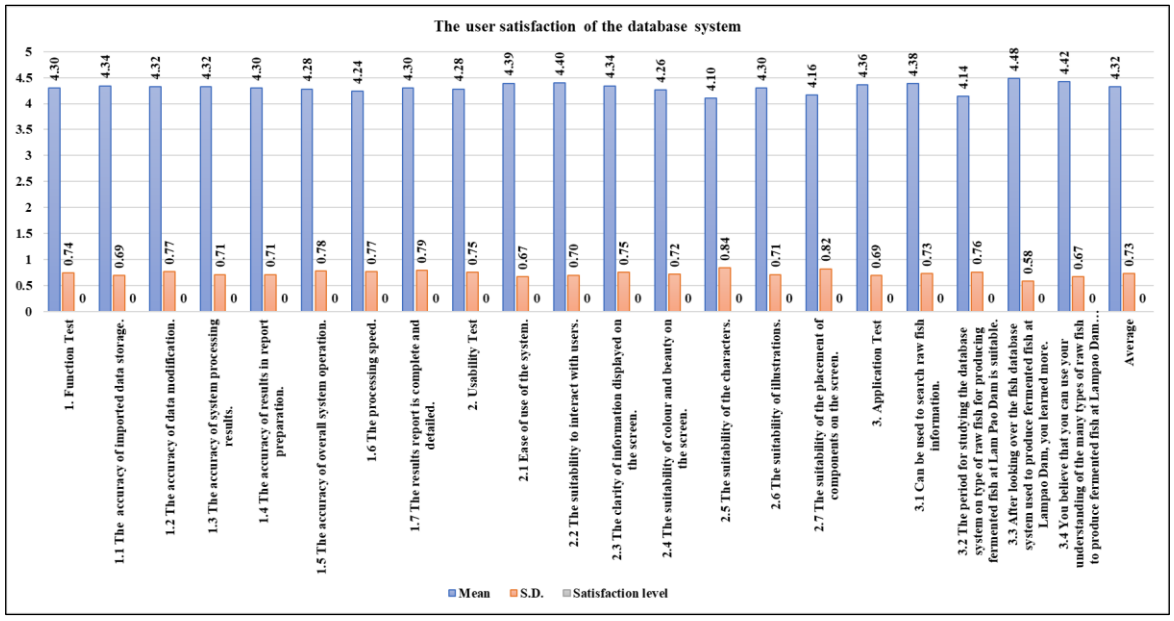


*Figure 3.* The user satisfaction of the database system.

## 6. CONCLUSION AND DISCUSSION

The types of raw fish for producing fermented fish at Lampao Dam classify species from the book fish of the world fifth edition (Joseph et al., 2016) and the book fishes of the Cambodian Mekong (Rainboth, 1996). There are 6 steps to study, collect and analyze the data as follows: 1) visit the area to collect information on types of fish, raw materials for producing fermented fish in the Lam Pao dam area. 2) Conduct field studies by interview; interviewed farmers with fishermen and processed fish producers in communities surrounding the Lampao Dam using a semi-structured interview. Compare data from interviews with several stakeholders, gather data, analyze data, and conclude that there are raw fish to produce fermented fish around Lampao Dam. To divide by morphology, there are two groups: 28 types of scaled fish and 13 types of leather fish, totaling 41 types of scaled and leather fish, which can be used to make fermented fish, include large, medium-sized and small fish. The most popular fish are used as the three most fermented fish production ingredients 1) *Henicorhynchus siamensis* (Sauvage, 1881) 2) *Osteochilus hasseltii* (Valenciennes , 1842) and 3) *Clupeichthys aesarnensis* (Wongratana, 1983) respectively.

The database system on types of raw fish for producing fermented fish at Lampao Dam consists of the database and three parts of user interface: general users, member users and administrators include: 1) home page 2) login page 3) project information page 4) leather fish page 5) leather fish information page 6) search for leather fish information page 7) scale fish page 8) scale fish information page 9) search for scale fish information page 10) edit raw material fish information page 11) delete raw material fish information page 12) contact us page 13) add fish information page 14) member information page 15) edit member information page 16) delete member information page and 17) add member information page. This is possibly because, in accordance with the System Development Life Cycle (SDLC), the researchers built a database system on types of raw fish for producing fermented fish at Lampao Dam. 1) data gathering 2) requirement and process analysis 3) system design, 4) system development 5) system testing 6) install and evaluate system performance (Iamsiriwong , 2012; Ragunath et al.,2010; Balaji & Murugaiyan, 2012). This is consistent with the conducted research on Application of the System Development Life Cycle Method for the South Jakarta Area Search System with User Acceptance Test, which has adopted the principles of SDLC

system (Aldisa, 2022). The results of the application's design are displayed in the implementation, where there is also an initial display menu or application start menu, main menu, campus list, campus routes, recommendation menu and how to use the system menu. By clicking start, the application will launch immediately and open the main menu display.

The performance of the database system on types of raw fish for producing fermented fish at Lampao Dam has been assessed using the Black Box Testing approach. On the part of general users have 4 topics, 12 items to test and measure the valid case, overall equal to 100.00%. The members of the user have 7 topics, 17 items in the test and measurement of the valid case, overall accurate as 94.12 % and the administrative user segment of 10 topics, 19 items in the test and measurement of the valid case, overall accuracy equal to 100.00 %. According to the evaluation of the performance of the raw material fish database system, 3 users, general users, member users and administrators total 21 topics 48 items in the test and measurement of valid cases, the overall average accuracy was 97.92 %. This may be because the development of a database system of raw material fish to produce fermented fish around Lampao Dam has been conducted in the study of relevant research papers, system analysis and design also to carry out procedure development and performance evaluation of the raw material fish type database system to produce fermented fish around Lampao Dam.

Through knowledge-transfer operations, residents in the communities near Lampao Dam by using a database system on types of raw fish for producing fermented asked for feedback on the satisfaction of 2 schools, 50 students. It was discovered that users' satisfaction with the raw fish database system used to create fermented fish around Lampao Dam was high level. This may be because the researchers have designed activities with clear procedures. Moreover, the principle of presenting content as text, images and other information. Therefore, once the user has participated in the database system to gain more knowledge after studying the system. The users believe they may apply their understanding of the different varieties of raw fish to manufacture fermented fish near Lampao Dam in the field of sustainable natural resource management (Ahmad et al., 2021; Parmin, et al., 2019, Khastini, et al., 2019; Sagala et al., 2019). The sustainable development can be appeared in the arena of science and education meet, people understand how to live nature in balance based on scientific knowledge in different contexts.

Farmer training makes it possible to enlighten producers about fact that the raw fish for producing fermented fish could be divided into 2 groups according to morphology. There are 28 types of scaled fishes and 13 types of leather fish. The database system consists of 3 components; general user, member users and administrator, which can display, search, add, edit, delete information about fish and user information. The overall efficiency of the system was 97.92% and the results of knowledge transfer on the use of a database system found satisfaction overall at high level ($\overline{X}$= 4.32, S.D. = 0.73). In short, it can be concluded that farmer training is an essential part of producing fermented fish.

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