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A Developing Intelligent Expert Systems on Knowledge Management of Tilapia Disease for Fish Farmers'

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Abstract:- Tilapia can be raised in all conditions, both in the pond and in the floating cage, the main obstacle to culture is Tilapia disease. A main in objective aimed for developing the intelligent expert systems on knowledge management of Tilapia disease for fish farmers' in Chaiyaphum Province, Thailand. The collection came from documentary, interview, and assessment by questionnaire to the data. A "Key" intelligent expert systems including database system of farmers users, user interface via smart phone, database of diseases related to Tilapia, inference mechanisms, expert system, knowledge base system, and method base of the solution. Also, the intelligent expert systems have to suitable at a level of high levels.

Keywords:- *Intelligent expert systems, knowledge management, Tilapia disease for fish farmers'*

I. INTRODUCTION

The expert system it is a part of intelligent systems, that a meaning computer program to collects both knowledge about a problem to be solved and an inference process to lead to a conclusion or an answer to that problem. [1] Tilapia are freshwater animals, which are popular culture of fish farmers', and important economic fish of Thailand, with an economic value of 9,700 million baht / year. Although, the Tilapia can be raised in all conditions, both in the ground pond and in the floating cage. Also, the major obstacle to tilapia culture is tilapia disease because the farmers prefer to leave very dense and lack good management. Tilapia farmers' to often have an epidemic problem from moving the fish to the floating cage or pond. The ways to prevent and treat epidemic diseases, the farmers' must study each disease of the fish thoroughly, if fish are found to have problems, they must be brought up from the floating baskets to be treated before the germs spread to other fish. And the vaccination against many fish diseases has caused the fish raising costs to be much higher. Fish diseases can be divided into 2 main types were infectious diseases, and non-infectious diseases, also, caused by pathogens which are most common in the environment and attached to fish that are carriers of the disease to contagious diseases that a need to control the outbreak. [2] Therefore it is very important that the tilapia farmers need experts in the analysis of the disease occurring, and able to solve problems in a timely manner to prevent damage, reduce risk, using algorithm of deep learning into preliminary screening and expert systems. The research in objective aimed for developing the intelligent expert systems on knowledge management of Tilapia disease for fish farmers' in Chaiyaphum Province, Thailand. Also, the development of the expert system for Tilapia is an expert system that collects diseases and symptoms of Tilapia from the experts in agriculture and fisheries to create a database into images of mobile applications that can provide to agricultural information for fish growers immediately.

II. LITERATURE REVIEW

- *Intelligent Expert System*

Conati, C. [3] to discussed the expert system it is a part of intelligent systems, that a meaning computer program to collects both knowledge about a problem to be solved and an inference process to lead to a conclusion or an answer to that problem. The knowledge that has been collected is both true and true, which may be saved as a document and knowledge gained from experience. Johnson, W.L. [4] the developing intelligent expert system to consists of 6 steps, namely; 1) problem identification, 2) gathering basic knowledge related to system construction, 3) collecting knowledge to create a complete program, 4) testing the system, 5) training and creating manuals usage, and 6) maintenance. In order for developing the intelligent expert systems on knowledge management of Tilapia disease for fish farmers'.

- *Ontology Conceptual*

Feng-Jen Yang [5] to presented of the meaning in the ontology, which is to define the definitions of the terminology used to represent the concept of information, and shared knowledge of a variety of sources with the same content scope or subject to understand of the meaning that is consistent and same standard to so that both humans and computers can understand, and use together effectively. [6] MIT App Inventor is a tool used to create applications that run on the android operating system, using principles of component-based software development to make it easy for users to developed of applications without writing source code.

III. THE METHODOLOGY

This mixed method research on the qualitative research to created and developing the intelligent expert systems, the quantitative research to suitable assessment of the intelligent expert systems of data method.

➢ *Sample Methods*

The key informants of two groups study were group 1st; the experts in system development of 13 persons including farmers' raising fish in floating cages experts in Lam Pa Town dam of Chaiyaphum Province, Thailand, fisheries experts, technology experts. Group 2rd; the experts in system quality assessment of 15 persons were fisheries experts, technology. They all were purposive sampling and focus group.

➢ *Collection Methods*

Respondents were asked to respond into collection of the qualitative data employed a review of documentary in gathering a basic knowledge relevant for creating the system, by considering separating the data into a database format of "MySqL" for using suitable of according to the framework of the decision tree model theory and development with "MIT App Inventor", and "PHP" for creating a prototype program, and to interview with the key informants of the experts in system development were farmers' raising fish in floating cages experts, fisheries experts, technology experts by interview questionnaire of a structure into the instrument of identify tilapia problems data, the specific characteristics of the tilapia problem, include water quality, food, antibiotics, diseases of Tilapia, How to solve the problem? To gather data that has been analyzed and synthesized for creating and developing intelligent expert systems including database system of farmers users, user interface via smart phone, database of diseases related to Tilapia, inference mechanisms, expert system, knowledge base system, and method base of the solution. The quantitative research to assessment with the experts in system quality assessment by questionnaire of semi structure at 5 – ratting scales in 4 aspects which are utilization, feasibility, suitability, and accuracy in the data.

➢ *Inquiry Methods*

The purpose of data analysis in qualitative data for developing intelligent expert systems including database system of farmers users, user interface via smart phone, database of diseases related to Tilapia, inference mechanisms, expert system, knowledge base system, and method base of the solution, to analysis on data reduction, data organization, data interpretation to conclusion. In quantitative data for assessing a quality of intelligent expert systems of data analysis by descriptive strategically, percentage, mean, standard division.

IV. THE RESULTS

The results of developing the intelligent expert systems on knowledge management of Tilapia disease for fish farmers' in Chaiyaphum Province, Thailand were followed:

➢ An intelligent expert systems on knowledge management of Tilapia disease for fish farmers' in Chaiyaphum Province, Thailand.

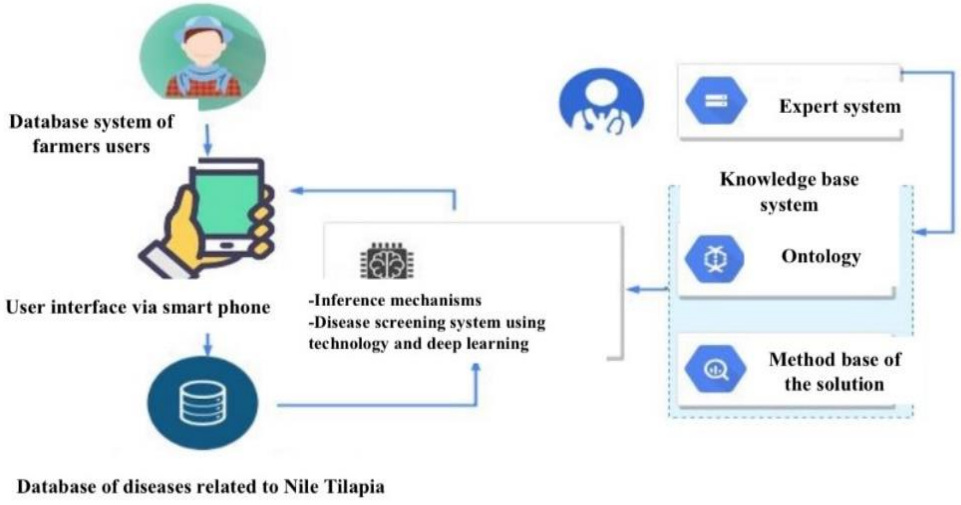

Fig 1:- A "Key" intelligent expert systems on knowledge management of Tilapia disease for fish farmers'

- **Database system of farmers users:** is the collection of farmers' data in a computer system that can be processed, easy to search and report results accurately and quickly. By collecting data, consisting of 2 parts; 1) basic information consisting of first name, surname, address, telephone number, 2) the information section for tilapia occupation consists of information on raising tilapia, the location of the farm and farmers' income.
- **User interface via smart phone:** the system can be accessed, by connecting to the network in the computer system of Internet and can be used on smart phone. Which farmers' have access to current technology And can register to use.

- **Database of diseases related to Tilapia:** fish diseases can be divided into 2 main types were infectious diseases, and non-infectious diseases, also, caused by pathogens which are most common in the environment and attached to fish that are carriers of the disease to contagious diseases that a need to control the outbreak. Which disease information such as Trichodina, Ichthyopthirius multifilis, Chilodonella, Scyphidia, Epistylis Disease, Costia, Monogene, Ergasilus, Lamproglena, Argulus, etc.
- **Inference mechanisms:** is a screening system with techniques **of** deep learning was algorithms to create models to represent the high level of meaning to effectively (e.g., a picture can be represented as a vector of brightness per pixel point, which can be applied to find the pattern and type of fish diseases in each type, by taking a picture from the farmer's phone).
- **Expert system:** is a system for diagnosing disease through experts and experienced in providing knowledge about tilapia disease.
- **Knowledge base system:** a management knowledge base to control disease outbreaks, inappropriate environmental conditions, malnutrition, genetic defects.
- **Method base of the solution:** is the method, procedure and process for solving Tilapia disease. Tilapia farmers need to have experts to analyze the disease and can solve problems in a timely manner, prevent damage, reduce risk.

➢ The quality levels in assessing suitability of intelligent expert systems on knowledge management of Tilapia disease for fish farmers' to shown on table 1.

Quality levels in assessing suitability	Mean	S.D.
1. Utilization	4.50	0.68
2. Feasibility	4.43	0.76
3. Suitability	4.32	0.78
4. Accuracy	4.28	0.83
Total	**4.38**	**0.76**

Table 1:- mean and standard deviation of quality levels in assessing suitability of intelligent expert systems (n=15)

The quality levels in assessing suitability of intelligent expert systems on knowledge management of Tilapia disease for fish farmers' in 4 aspects which are utilization, feasibility, suitability, and accuracy at a level of high levels (Mean=4.38, S.D.= 0.76). When considering each component separately, the composition with the highest mean of utilization (Mean=4.50, S.D.= 0.68), feasibility (Mean=4.43, S.D.= 0.76), and suitability (Mean=4.32, S.D.= 0.78), respectively.

V. DISCUSSION

"Key" intelligent expert systems including database system of farmers users, user interface via smart phone, database of diseases related to Tilapia, inference mechanisms, expert system, knowledge base system, and method base of the solution. Also, the intelligent expert systems have to suitable at a level of high levels. Also, the creating and developing intelligent expert systems were proceeding with the development based on in-depth interviews About expert opinion With documents and studies, analyzed the data from the interview and use the obtained data to analyze, summarize the content and categorize the data and then design the system for effective use into solutions of Tilapia diseases. The expert system it is a part of intelligent systems, that a meaning computer program to collects both knowledge about a problem to be solved and an inference process to lead to a conclusion or an answer to that problem. [1] The knowledge that has been collected is both true and true, which may be saved as a document and knowledge gained from experience. However, A health management of Tilapia is a method used for a planning prevent of fish disease. It is very necessary because if Tilapia to infected, the chances of it being difficult to treat and increasing costs are higher, causing the party to not be able to bear the burden and not be accepted by consumers. [2] First, thing that farmers should consider is the rapid diagnosis of the disease, accurately and precisely that the said disease is caused by the water quality in the fish pond, changes in the environment and food quality will help to find a solution and prevent the spread of the disease in time. An intelligent expert systems, that a meaning computer program to collects both knowledge about a problem to be solved and an inference process to lead to a conclusion that problem. [5] The ontology which is to define the definitions of the terminology used to represent the concept of information, and shared knowledge of a variety of sources with the same content scope. A important that the tilapia farmers need experts in the analysis of the disease occurring, and able to solve problems in a timely manner to prevent damage, reduce risk, using algorithm of deep learning into preliminary screening and expert systems.

VI. CONCLUSION

Intelligent expert systems on knowledge management of Tilapia disease for fish farmers' were as; 1) database system of farmers users is the collection of farmers' data in a computer system that can be processed, easy to search and report results accurately and quickly, 2) user interface via smart phone is the system can be accessed, by connecting to the network in the computer system of Internet and can be used on smart phone, 3) database of diseases related to Tilapia is fish diseases, 4) inference mechanisms is a screening system with techniques **of** deep learning was algorithms to create models to represent the high level of meaning to effectively, 5) expert system is a

system for diagnosing disease through experts and experienced in providing knowledge about tilapia disease, 6) Knowledge base system is a management knowledge base to control disease outbreaks, 7) method base of the solution is the method, procedure and process for solving Tilapia disease.

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