THE FORECASTING PRODUCTIVITY MODEL USING A DECISION SUPPORT SYSTEM

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Abstract- Several years ago, many farmers lose of many products from their productivity of agriculture. Because of many problems have depended on both qualitative and quantitative factors. So many farmers want to select the best method that it is necessary to make a best way for their farm. In order to improve the performance of method to improve their farm, therefore this research used the concept of decision support system to solve many problems occur in agriculture problems. Then develop the forecasting productivity model based on DSS concept for many farmers to take decisions process and used a linear programming model for solving the method of planning. This research choose implement the case study of feeding shrimps for increase their productivity. A model is developed for the farmers to access online interactive and flexible information for their shrimps farm management.

Keywords- Decision Support System, Linear Programming Model, Knowleadge Base Management

I. INTRODUCTION

Today, Many people known that agriculture is one of the most important career for existence in the real world. In fact, many countries in the world have design agricultural zoning that is the area of maintaining the economic viability of their agricultural industry. Therefore they must to increased production of the agriculture products in order to maintain of the equal ratio between product of agriculture products and industry products. Now when the production has become essential so many farmers want to collect essential information about their agriculture products. They want some tool that can help them to collect and prepare information in day-to-day and want some equipment that can decision taking for the difference environment.

Decision support systems are a term of interactive between computer base and human. The system that contain of DSS area is design for help making decisions in each case and farmer can decision invest about their farms. For this system, present about the forecasting productivity of shrimps system. It design under DSS concept then it can helped many farmers to decision the season of invest their shrimps farms.

This paper describes necessary steps for design decisions process and implementing a linear programming model for solving planning problems for crop farms then create forecasting productivity of shrimps system that based on Decision support systems.

II. RELATE WORK

A. Decision Support System

Decision support systems are interactive, computer-based systems that aid users in judgment and choice activities. They provide data storage and retrieval but enhance the traditional information access and retrieval functions with support for model building and model-based reasoning. They support framing, modeling, and problem solving. Typical application areas of DSSs are management and planning in business, health care, the military, and any area in which management will encounter complex decision situations. Decision support systems are typically used for strategic and tactical decisions faced by upper-level management decisions with a reasonably low frequency and high potential consequences in which the time taken for thinking through and modeling the problem pay so generously in the long run.

There are three fundamental components of DSSs Database management system (DBMS). A DBMS serves as a data bank for the DSS. It stores large quantities of data that are relevant to the class of problems for which the DSS has been designed and provides logical data structures (as opposed to the physical data structures) with which the users interact. A DBMS separates the users from the physical aspects of the database structure and processing. It should also be capable of informing the user of the types of data that are available and how to gain access to them.

Model-base management system (MBMS). The role of MBMS is analogous to that of a DBMS. Its primary function is providing independence between specific models that are used in a DSS from the applications that use them. The purpose of an MBMS is to transform data from the DBMS into information that is useful in decision making. Since many problems that the user of a DSS will cope with may be unstructured, the MBMS should also be capable of assisting the user in model building.

Dialog generation and management system (DGMS). The main product of an interaction with a DSS is insight. As their users are often managers who are not computer-trained, DSSs need to be equipped with intuitive and easy-to-use interfaces. These interfaces aid in model building, but also in interaction with the model, such as gaining insight and recommendations from it. The primary responsibility of a DGMS is to enhance the ability of the system user to utilize and benefit from the DSS. In the remainder of this article, we will use the broader term user interface rather than DGMS.

These components of DSSs can shown in Figure 1.

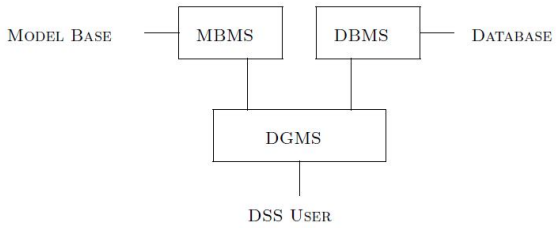


Figure 1: The architecture of a DSSs

B. The linear programming model

The general mathematical programming problem is stated as follows:

maximize (minimize) the function: $f(x) = f(x_1, x_2, ...x_n)$ where $x = (x_1, x_2, ...x_n)$ is subject to: $g_i x = g_i(x_1 x_2 ...x_n)$, i = 1, 2, ..., m. The variables $x = (x_1, x_2, ..., x_n)$ are known as decision variables, the function f is called objective function, and g_i (i = 1, 2, ..., m) are constraints. When the objective function and the constraints are linear, the problem becomes the linear programming. All of algorithm (see [4] and [5])

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C. Dss Application

In many researchers have used the concept of DSS to develop their agriculture. One concept of DSS that help user to manage their farm by internet technology to take farm management decisions. The farmers can access online interactive and flexible information for their farm management.

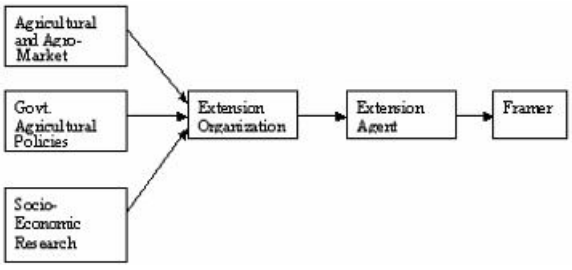


Figure 2: Proposed Flow System [4]

In Fig. 2 shown that, the proposed flow system for farm management. This propose explain about the method of access the necessary information. If the farmer have the various government policies for agriculture, the Farmers can acquire this information from the various resource when the necessary information process by DSS method

III. RESEARCH METHODOLOGY

In this section we demonstrated architecture of a forecasting productivity model. The design of forecasting system shown in 3, respectively.

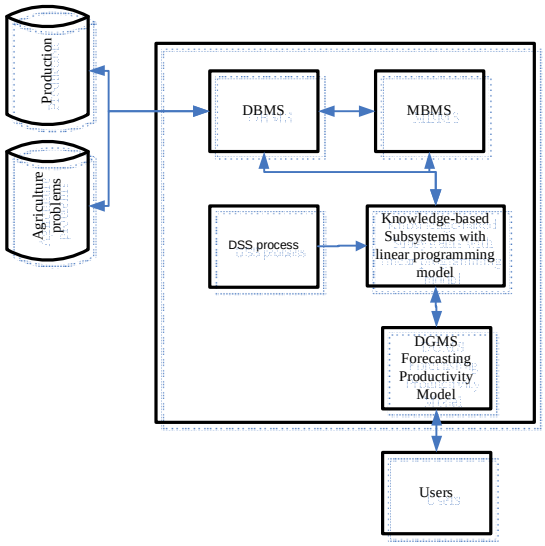


Figure 3: The architecture of a Forecasting Productivity Model

In fig.3 can describe the details in below:

A. The Data Management Subsystem (DMS)

This section we will describe about DMS that contains relevant data about shrimps farm management eg. agriculture , feeding shrimps. All of data in DMS will be managed by software called the Database Management System (DBMS) and we used structured query language to manage all of data and then generate data transfer to data warehouse in order to prepare data to DSS process. And we will stored all of data and accessed via a database Web server (see fig.4).

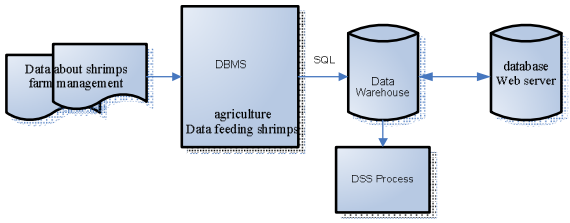


Figure 4: Data Management Subsystem

B. The Model Management Subsystem

This section describe about management subsystem area. This area is a software package that includes material statistical, farm management statistical or other quantitative models that used in the forecasting productivity of shrimps system requirement and appropriate software management. All of material statistical transfer from DMS section then we used model base management system for building models that helps system generate material statistical under the theory of linear programming model.

C. Dialog generation and management system (DGMS)

This section explain about process of DGMS. DGMS is a section of the area that allows user interact between the decision process. We create many pages in the system that use ability for many farmers. The forecasting productivity of shrimps system provides a familiar and consistent Graphical User Interface (GUI) structure for most DSS.(see fig.5 and fig.6)

D. The Knowledge-Based Management Subsystem (KBMS)

This system used theory of linear programming to making algorithm that integrate with DSS process. We can describe in section e.

E. forecasting productivity of shrimps system planning under DSS process

In this section, we use linear programming model to demonstrate the method of decision process. It can describe in below:

In this forecasting productivity model, decision process matching algorithm uses linear programming model. The key idea of the decision process matching algorithm is to find the maximize (minimize) the function specifications of the feeding shrimps farm planning to the DSS policy, $x = (x_1, x_{2,...}x_n)$ is subject to: $g_i\ x = g_i(x_1\ x_2\ ...x_n)$, i = 1, 2, ..., m. is a decision variables. Thus for a set of feeding shrimps FS that have the same functional properties, where FS = {fs1, fs2, ..., fsn},n is ordering of total feeding.

All of variables can denote as below:

FS: the number of feeding shrimps (six month/cycle);

i is the index (i = 1, 2, ..., n);

AFS : the number of annual feeding shrimps;

j is the index (j = 1, 2, ..., n);

T – the number of years feeding shrimps;

k is the index (k = 1, 2, ..., T);

q_{fs} : annual unit feeding shrimps (six month/cycle) per pond of feeding shrimps

i in the year j (i = 1, 2, ..., n);

q_{afs} : annual unit feeding shrimps per pond of feeding shrimps

i in the year j (j = 1, 2, ..., n);

P : total amount of pond available

W_{ij} : annual unit whether per annual feeding shrimps

d_{ij} : annual unit disease per annual feeding shrimps

PW : Probability of annual unit whether per annual feeding shrimps

Pd : Probability of annual unit disease per annual feeding shrimps

Then we can create relationship all of variables in below:

Maximize (minimize) the number of feeding shrimps (six month/cycle):

$f(T)_{FS} = f_{fs}(T_1, T_2, ...T_n)$ where $T = (T_1, T_2, ...T_n)$

is subject to: $P_i\ T = P_i(T_1\ T_2\ ...T_n)$, i = 1, 2, ..., m. (1)

Maximize (minimize) the number of annual feeding shrimps: $f(T)_{aFS} = f_{afs}(T_1, T_2, ...T_n)$ where $T = (T_1, T_2, ...T_n)$

is subject to: $P_i\ T = P_i(T_1\ T_2\ ...T_n)$, i = 1, 2, ..., m.(2)

Total annual unit feeding shrimps (six month/cycle) per pond of feeding shrimps :

$$q_{fs}P_n \cdot W_{ij}d_{ij} \le P_n \quad (3)$$

Total annual unit feeding shrimps per pond of feeding shrimps:

$$q_{afs}P_n \cdot W_{ij}d_{ij} \le P_n \quad (4)$$

Maximize the Probability of annual unit whether :

$$= PW \cdot W_{ij} \cdot P_i\ T \quad (5)$$

Maximize the Probability of annual unit disease per annual feeding shrimps:

$$= P_d \cdot W_{ij} \cdot P_{i\ T} \quad (6)$$

F. User Interface Features

The programs is using English language. All of the function in programs have common features with respect to the requirements of the user, as follows:

· The user can key the input data from keyboard and can be stored in a database, and can be reloaded later;

· When the user want to select the output to displayed it can show in a separate window and some window show in below this page, and can be saved for later use.

In this below, show about the page of the planning feeding shrimp. It used to key input all of data in order to generate the results in the next window.

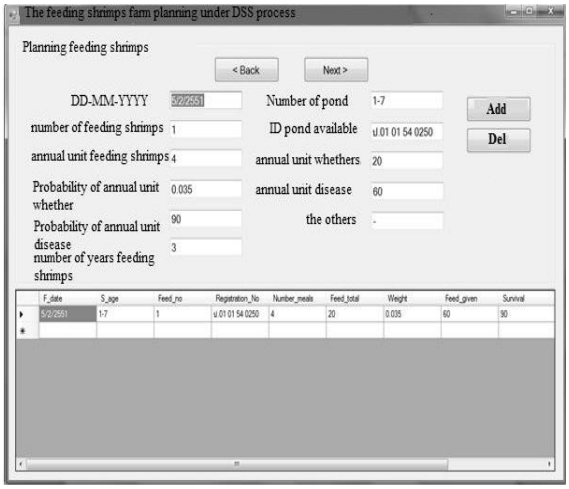


Figure 5: planning feeding shrimp window

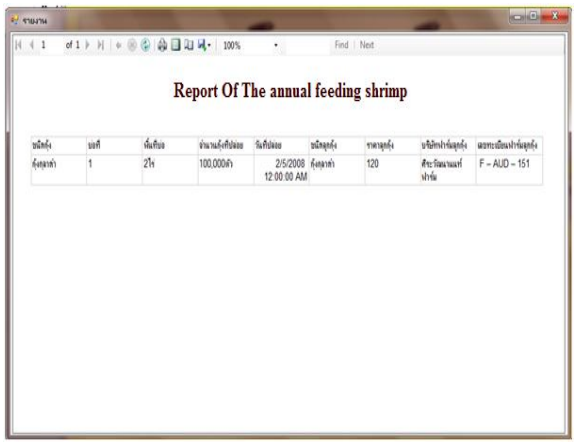


Figure 6: report of the annual feeding shrimp

IV. CONCLUSIONS AND FUTURE WORKS

The forecasting productivity of shrimps system is the cornerstone of the proposed Decision support system theory, and deals with specific forecasting all data that according to agriculture.

Thus far, forecasting productivity of shrimps system is an isolated specification, but will be complemented with several other specifications (especially according agriculture process) in the future.

In this paper, we presented a new model for forecasting the increase productivity of shrimps based on DSS process and showed how about creating model of forecasting by using linear programming and then verify the consistency of correctly policies in forecasting model and DSS, linear programming policies by abstracting them.

The forecasting model will help the farmers in increasing their productivity by raising the yield/pond in shrimps farms: thus, leading to their economic growth.

This system has been developed to keep track of farmers all type of information related to feeding. Certain applications that are successfully developed using this database are:

• Farmers can manage their cycle of feeding shrimps through the DSS system in a more predictable and efficient way.
• They can manage their any problems that occur when feeding shrimps.
• The administrator can add information to the database without stopping the application.

The possible abstraction method must be defined by the testing method. Defining an abstraction method about relation between forecasting model and linear programming is constrained based on the DSS process. In the part of testing method, We are applying approach for created forecasting model to two section.

First, we specified a forecasting method and all of feeding shrimps process in order to augment the agriculture information and present forecasting model for create method of feeding shrimps. forecasting model is represented new method and created new relationship by using relation between DSS process and linear programming into the new model.

Second, the validation method by used the method of system testing for verify forecasting model and tested correctly forecasting model based on DSS process and linear programming by trials in truly samples for experiment with all of function in system and then design and present system in use case diagram in order to used in existing organization.

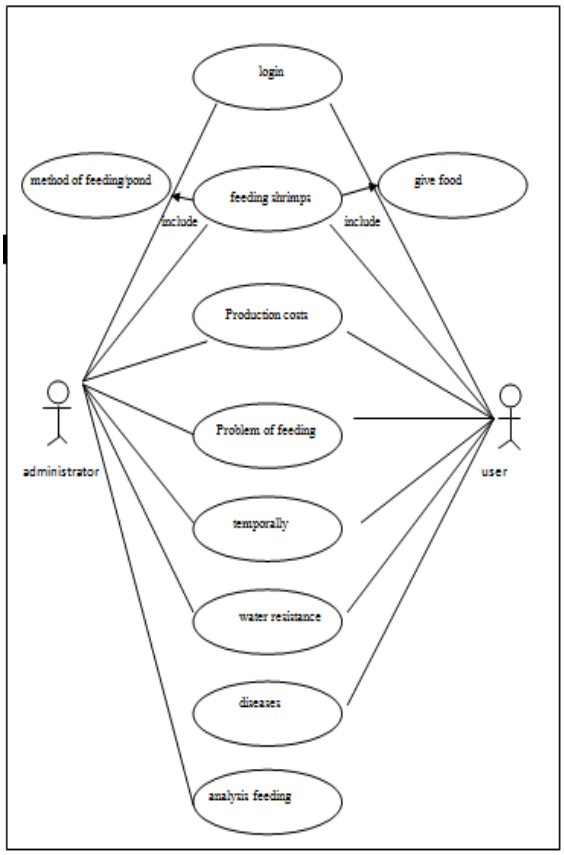


Figure 7: Use case diagram

V. FUTURE WORK

Although, several forecasting model have been developed, a model for automatically creating forecasting agricultural data incorporating their economic in rising today. Based on the DSS process and linear programming. We proposed a model for generating forecasting agricultural data based on two IT best practices and showed how the forecasting system can be used to generate substantial and agricultural organization specific knowledge of agricultural regarding existing control implementations. Further research will address the identified limitations and will create another forecasting area model. We plan to align our forecasting model in a differ theory. Furthermore, we will take the evaluation of our concepts from an expert to a real-world level by applying our concepts in real-world audit scenarios. The planned research activities will constitute our second step towards increasing the degree of automation in the field of DSS process.

We can conclusion of the scope for the future research is:

• This system must be converting the language of the system to the local language.
• Further development must develop the system relate to the economic system.

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