1226 → 25 x 40% = 5

MAKALAH PENELITIAN

AN INFORMATION SUPPORT SYSTEM FOR IDENTIFYING FARMING SYSTEM PART I : DEVELOPMENT OF A COMPUTER PROGRAM PACKAGE

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ABSTRACT

This study was undertaken to develop a computer program package for identifying a farming system that was focused in the water availability analysis, the optimizing of agricultural power and selected equipment and the sensitivity analysis. The computer programs for all models were developed and written in FoxBASE command language. Three databases were obtained from the farm survey i.e.; climate, crop and power. All these databases can be appended, edited, deleted or displayed by the users through a menu of database management system (DBMS). They were used to evaluate the utility of the computer programs as input data. The information system calculates the amount of monthly water surplus and deficit, the optimum number of agricultural power (animal or power tiller) and its matching implement required and also change in the net return of crop production system due to the change of input variables such as crop price, yield, and production material cost. The system output for each analysis can be presented in three options by screen, printer and file that can be accessed to another language.

Keywords: Information support system, farming system, database management system

INTRODUCTION

Agricultural sector still have a dominating role in the [illegible] highest priority to agricultural development. Now, development of agricultural sector has the general objectives of increased food production, land productivity, farmer's income, rural employment and support regional development. It also aims at supplying more raw materials for industrial sector.

In facts, there are many differents and interrelated problems when trying to develop agricultural sectors, especially in rural areas. High population growth, unequal distribution of land, soil degradation, lack of capital and educated or trained personnel, farmers with limited resources often do not adopt new technologies.

These problems are complex and need a systematic analysis and proper management approach based on a scientific decision support system. Obviously, there is need for an integrated agricultural information system which is able to collect relevant data, process it, and disseminate it to as many needy users as possible. Furthermore, the most important thing is how to process an agricultural database for providing information that can be used efficiently by the users.

The use of electronics and computers in agriculture and in farm management is attracting more and more interest and imagination of the agricultural community (Kok and Gauthier, 1986). The utilization of computers in 'information systems' is considered to be the key to any further increase in farm productivity. Dent and Scanlan (1987) stated that information systems are increasingly used in the context of agricultural system, they are concerned with varied applications, such as; research, farm management, decision support, etc. Also, Sonka (1983) explained that to be useful for agricultural purposes, information systems must be provided to the users who need it, at the time they need it, and in a form they can use it. Information systems can provide four types of reports i.e.; (a) exception reports, (b) demand reports, (c) predictive reports and (d) scheduled listings.

The study is proposed to provide the necessary information system to support decision-makers (government officials), administrative organizations, research institutions, extension agencies, farmer's organizations, agribusiness and farmers (group) in agricultural sector development. Moreover, the specific objectives are to develop and implement a computer-based information support system (collecting, storing, analyzing of database and then displaying of information) to identify the farming system.

DEVELOPMENT

Information is as data that has been processed into a form that is meaningful to the recipient and is of real perceived value in current or prospective decisions. In other words, information is used to make decisions, whereas data are just raw facts, figures, objects and opinions. Data must be processed into information before using for decision making. Meanwhile, an information system is a set of organized procedures that, when executed provides information to support decision-making and control in the organization (Lucas Jr., 1986).

Selection of Appropriate Software

Major considerations for designing the proposed information system will be as follows; (a) simplicity and ease of use, (b) ease of modification, (c) fast response and (d) flexibility and applicability to a desired activity. To construct the computer program of the information system, properly specified application software related to database management system (DBMS) was selected. FoxBASE (Fox Software Inc.) as the programming language was used in the designing of the information system.

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Design Considerations for the Information System Development

Kroeber and Watson (1987) explained that there are many stages to develop an information system. The following figure gives a general description of designing stage of the information system (**Figure 1**).

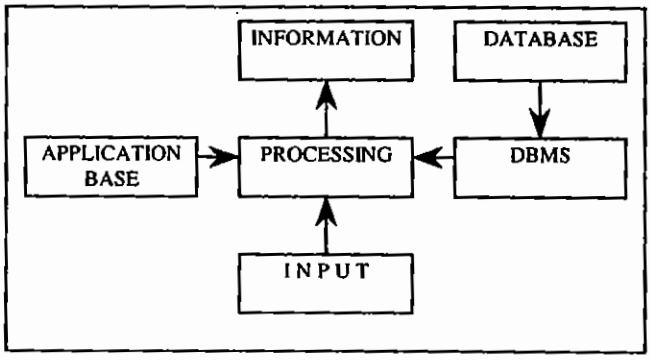

Fig. 1. The processing development of an information system

Referring to Fig. 1, the processing development of an information system could be described as the follows.

1. The application base

The application base is the repository of information system application programs. The most common applications of information systems involve the generation of reports, data analysis that draw it from the database and the support of structured decisions.

2. The information system processing

The modes of information system processing are storing, retrieving, classifying, sorting, and updating. The additional processes may consist of calculation, summarization and communications.

3. The database and database management system (DBMS)

The database is one of the important components in designing of information systems. Database is a collection of data on a computer used by several people. While the database management system, it refers to a primarily of a software component or a set of computer programs that manages data such as; defining, creating, retrieving, updating, revising, protecting, and maintaining the database.

4. Input and output design

The input design considerations in the study are (a) determine what data must be recorded from the output required, (b) subdivide each group of data into suitable format, (c) estimate the length of each field of existing data and decide its type and (d) input code may be used as necessary.

The output is the information to be delivered from the system after processing. The quality of the output and its usefulness determine the quality of an information system.

RESULTS AND DISCUSSION

Structure of the Developed Information System

The computer program structure of the information system can be divided into four sections were (a) main menu, (b) menu of database management system (DBMS) (c) menu of analysis and (d) menu of output. Details of each section and their relations with each other are described below.

1. The main menu

The main menu is a central part of interaction between users and system. It means that before and after the users used the system, they always drive this menu. In this study, it has already designed the main menu with six (6) options and each option was provided a menu popup of sub menu. The following is a structure of the main menu (**Figure 2**):

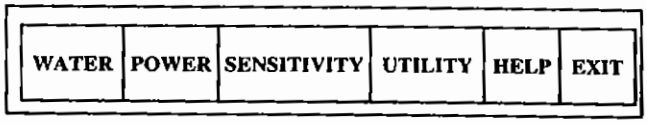

Fig. 2. The structure of the main menu

To select the required option can be used by moving the highlighted prompt with ARROW key (← or →). The menu popup in WATER, POWER and SENSITIVITY options generally provide three types of sub menu i.e.; (a) database management system and (b) analysis, (c) output of system. To select it, used ARROW key (↑ or ↓) on the keyboard and then press ENTER key (↵).

The UTILITY option includes the database management system that was focused in the database maintenance i.e.; copying, resetting, closing and indexing. This option covered all databases that available both in WATER, POWER and SENSITIVITY option. HELP option was software manuals for users that content the information about how to access the three analyses above and to know an area coding system. EXIT option can be selected when the user wants to exit or finish with this system.

2. The database management system (DBMS) menu

Structure of the developed database management system program consists of two items i.e.; (a) database and (b) database management program. There were three databases available in this system suitable with kinds of analysis; those were climate, crop and power database. The monthly rainfall, rain-days, max-min temperature, relative humidity, wind velocity and air pressure are stored in the climate database as FoxBASE database file (dbf).

There were two types of crop database, firstly it was determined for required power that consists of area under crop, crop price (district level), number of passes for land preparation. Secondly, it was arranged to analyze the sensitivity model, they consist of yield rate, crop price (regency level), cost of production materials, labor and power for rice, maize, soybean and peanuts. Meanwhile, the power database was used to support crop database for

determining of the required power. It consists of purchase price of power, salvage value factor, economical life, interest rate, factor of tax, insurance and shelter and cost of care, maintenance and food for animal only.

3. The analysis menu

In the developed system, there were three analysis for identifying of farming system, i.e.; (a) water balance analysis, (b) agricultural power and its equipment analysis and (c) sensitivity analysis.

The water balance analysis menu was divided into seven steps of sub analysis i.e.; (a) average of monthly rainfall and temperature, (b) potential evapotranspiration, (c) accumulation of water losses, (d) water storage, (e) changing of storage, (f) actual evapotranspiration and (g) water deficit/surplus (**Figure 3**).

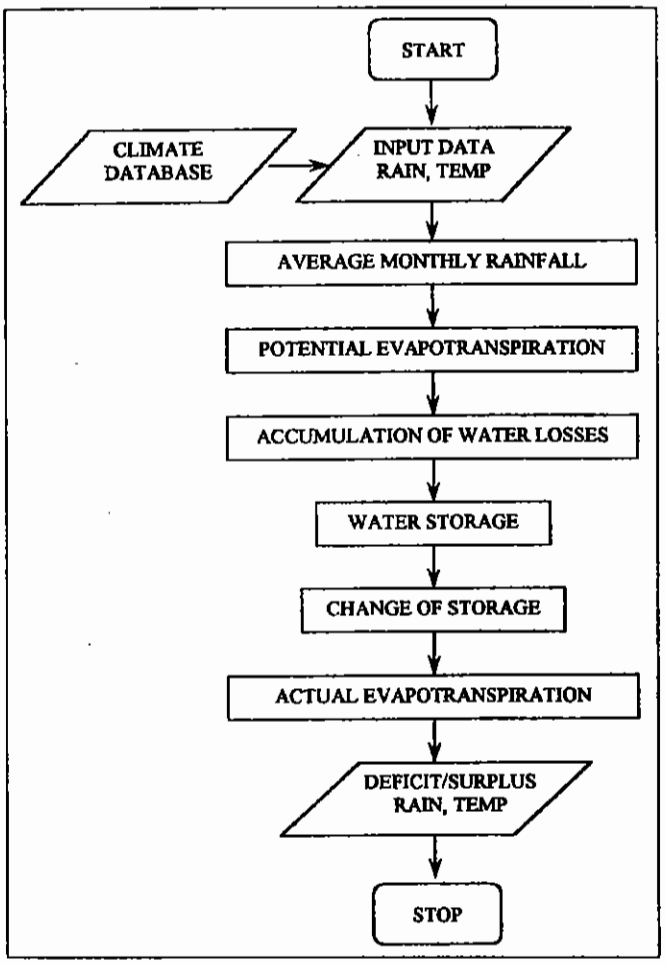

Fig. 3. Flow chart of water balance analysis

The second analysis menu was to optimize the agricultural power and its equipment, either animal or power tiller analysis. The menu consists of (a) labor and timeliness cost, (b) fixed cost of power, (c) optimum power, (d) required total power and (e) required number of implement (**Figure 4**).

Thirdly, the menu was named the sensitivity analysis menu, which contains simple programs that determined the change of net return due to the change of input parameters. In this program, the change of input and output were expressed in percentage dimension (**Figure 5**).

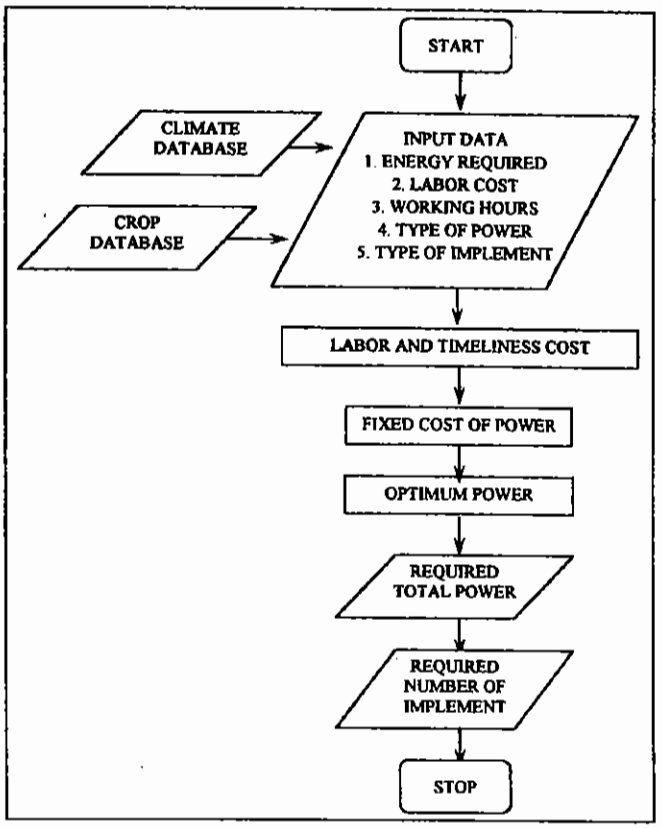

Fig. 4. Flow chart of agricultural power and its equipment analysis

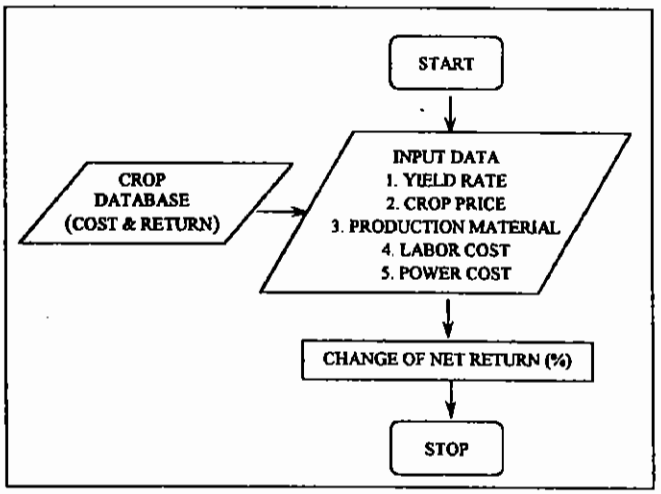

Fig. 5. Flow chart of sensitivity analysis

4. The output menu

With output menu user can obtain the report of the analysis in three options i.e.; monitor (screen), printer and file.

Looking the output through by monitor, user can view the result only from computer screen, while when they want to get the result in paper print-out, user should select the printer option. When the user wants to compile

the result with other language or combine with the other document file, they should select the file option.

The whole structure of the developed information system, from the main menu to the output menu can be seen in **Figure 6**, and sample of the developed main menu display can be illustrated in **Figure 7**. Also, example of the running program can be displayed in **Figure 8**.

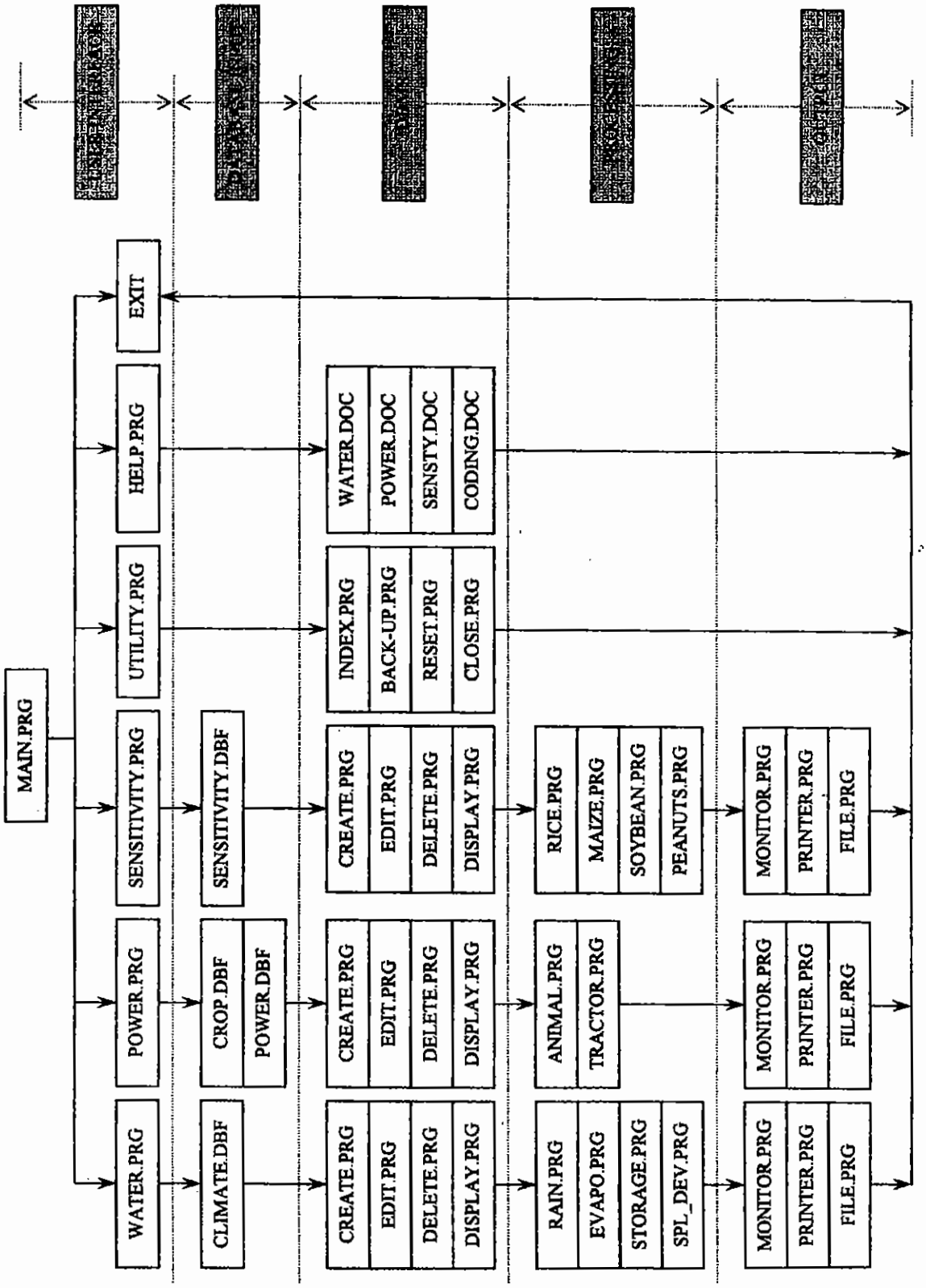

Fig. 6. Structure of the developed information system

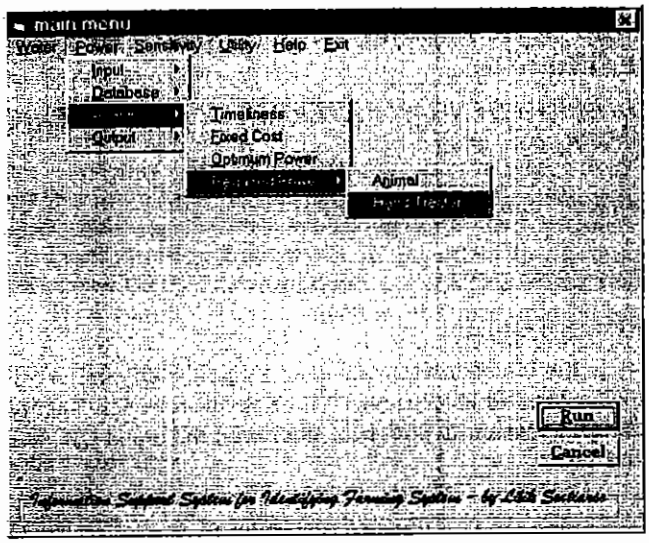

Fig. 7. Display of the developed main menu

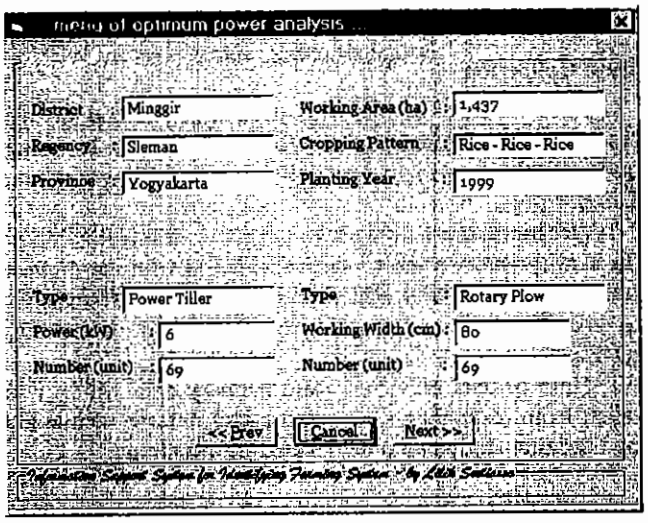

Fig. 8. Example of the displayed running program

CONCLUSIONS

Based on development process of the information support system in the first part of the study, the following conclusions can be made:

1. The "user-friendly" type information support system is developed that mainly consist of three analysis menus i.e.; water balance, optimum required agricultural power and its implement and sensitivity analysis in term of economical considerations, in order to identify a local farming system.
2. Due to some limitations, the developed system was only generally designed for situation of farming system in Indonesia.
3. The next study is to validate the developed system through field testing in a selected area.

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