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Decision Support System for Farm Management

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***Abstract*—**The emergence of information technology has resulted in an ever-increasing demand to use computers for the efficient management and dissemination of information. Keeping in view the strong need of farmers to collect important and updated information for interactive, flexible and quick decision-making, a model of Decision Support System for Farm Management is developed. The paper discusses the use of Internet technology for the farmers to take decisions. A model is developed for the farmers to access online interactive and flexible information for their farm management. The workflow of the model is presented highlighting the information transfer between different modules.

***Keywords*—**Decision Support System, dissemination.

I. Introduction

IT is known fact that agriculture is one of the most important sector for human beings all over the world. In India near about 70% of population depend upon agriculture. The credit of the increased production of the agriculture products in the past could be given to the efforts of farmers. Now when the production is stagnating it has become essential that the farmers collect important and updated information about any of the crop [5]. Keeping this in view, there is a need for development of dynamic website for farm entrepreneur which could help them in day-to-day decision taking. The business of farming has entered a new era – an age where key to success is perfect, timely information and careful decision-making. International competition has resulted in a continued pressure on profit margins. Moreover, the farmer has to decide about various production options utilizing the results of latest developments of research and technology. Informed and quick decision making is therefore required to ensure profitable performance of the farmers [1][2].

Decision support systems are a class of computer-based information systems including knowledge based systems that support decision making activities. DSS is a computerized system for helping make decisions. A decision is a choice between alternatives based on estimates of the values of those alternatives. Supporting a decision means helping people working alone or in a group gathers intelligence, generate alternatives and make choices. Supporting the choice making process involves supporting the estimation, the evaluation and/or the comparison of alternatives. In practice, references to DSS are usually references to computer applications that perform such a supporting role. DSS are "interactive computer-based systems that help decision makers utilize data and models to solve unstructured problems" [3].

The decision process may be divided into three phases: intelligence, choice and design as shown in Fig. 1.

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II. Problem Statement and Solution Methodology

The timely information to the farmers is closely linked to the Agricultural Development and well being of the rural communities. Quick information transfer between the researchers and the farmers has specific importance. Hence this research work is focused on the problem of developing a decision support system for farm entrepreneur. As the sharing of programme is beneficial, if used through Internet, hence the project is planned to be web based.

The additional advantages that will accrue are:

- Low cost of operation.
- Quick access to all relevant information.
- Direct and personalized.
- Integrated.

The present work will provide the platform for the farmers to make the use of internet technology to take farm management decisions. With the help of present model, the farmers can access online interactive and flexible information for their farm management.

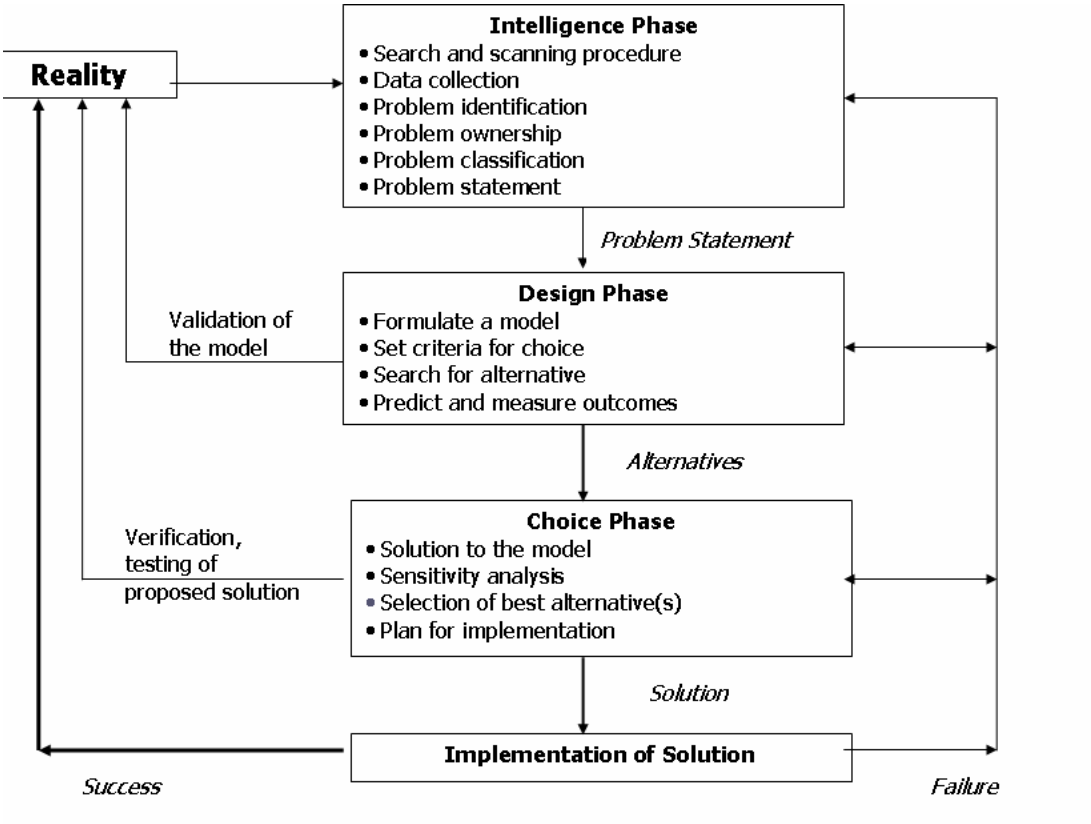

Fig. 1 Phases of decision support system

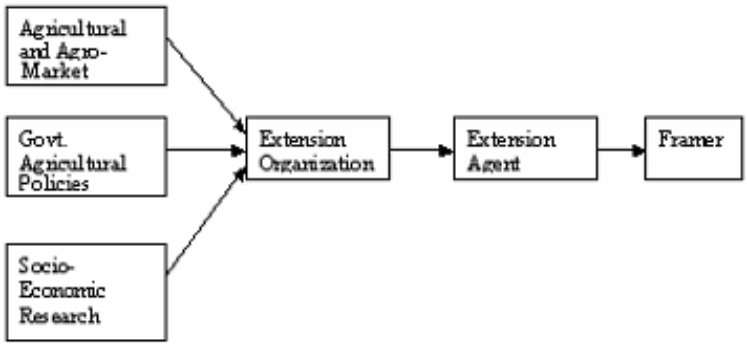

Fig. 2 Proposed Flow System

The proposed flow system for farm management is shown in Fig. 2. The farmers will be able to access the necessary information regarding the various government policies for agriculture, the ongoing socio-economic research and the different benefits for the entrepreneur for investing in particular area of farm management. The Farmers can acquire this information from:

- Farmer's organizations
- Researchers
- Other Farmers
- Farm journals, radio, television, Government Departments and agencies.

The primary and the basic fundamental of any project involving the database is the collection of data and information. This project also requires the collection of information from various sources. The main source of the data is the service published by the state or center Government. The present model will help the farmers to take interactive, flexible and quick decisions. This will also help them in increasing their productivity by raising yield per hectare in food grain, thus leading to their economic growth. It will keep track of farmer's all type of information related to crops.

The additional advantages that will accrue are:

- Low cost of operation.

- Quick access to all relevant information.
- Direct and personalized.
- Integrated.

DSS with all the ready information, help the farmers in a very useful manner. The farmers can get all the information at just at click of the mouse, and they need not to travel to Agricultural Universities for that.

A. Sitemap

Sitemap gives us the complete description of how the control flows through the site. The main page that links to all the pages is called the Home Page. This page shows the introduction about the Farm Entrepreneur System, the objective of the system and the principles of activity.

B. Information Retrieval System

The main advantage of this model to the farmer is that they can retrieve the dynamic information for their farm management decisions. DSS Framework being an agent for the driving force behind the changes in highland resource uses, the farm or household is considered to be the center of this analysis. The decisions on agricultural land and water uses are made in response to resource endowments, economic conditions and socio-cultural norms of the household or communities.

C. Resource Management Unit

Farms or households are classified into different types, called resource management units or RMU.

D. Modeling at the Node Level

The term node is defined, conceptually, as 'water balance unit'. Its implication depends much on the aspect from which a node is looked at. From hydrological view point, a node represents a village and a network of nodes. Hence each node has a physical domain, which has to conform to that of the village it represents. With in this physical domain exist other biophysical attributes such as soil type, climate type etc. These biophysical attributes constitute a process, which determines the amount of water that flows in and out of the node.

From a socio-economic viewpoint, the characteristics of farm households, alternative land use options and farmers' priorities and constraints characterized by RMU types may differ from node to node. The different set of socio-economic conditions would influence the decisions on how they should manage their available resources to their optimal level of production [4].

From a modelling viewpoint, a node plays a major role in the whole Decision Support System. A node is the level at which all modelling Engines are activated and linked together. The main outputs from modelling process, although initialized at farm or plot level, are reflecting interaction between human and resource availability at the node level.

E. Outputs and Implications

The simulation system provides the output on land and water allocation that can maximize gross margin to the communities and Farm Entrepreneur within the node by taking into account the biophysical and socio economic constraints specific to the area. The effects of a partial change in the land uses, prices, investment and other developments plans on farm gross margin, labor and capital requirements can be easily assessed and the results can be presented both at the non-aggregated RMU (household) level and the aggregated level (node or village).

The economic and environmental tradeoffs of various plans can be determined for improving welfare. Since water is basically a very important shared resource with lack of true ownership, the Decision Support System, can aid assessing management options to help resolving or avoiding land and water use conflicts. Although the output is quantitative in its nature, this DSS is aiming towards providing the trend of resource use options rather than quantifying the amount of resources being used. The workflow overview of the DSS is shown in Fig. 3.

III. Conclusion

The model will help the farmers in increasing their productivity by raising the yield/hectare in food grains: thus, leading to their economic growth. This system has been developed to keep track of farmers all type of information related to crops.

Certain applications that are successfully developed using this database are:

- Farmers can manage their cash flow through the DSS system in a more predictable and efficient way. It is a more common problem with the farmers to manage the cash received at time of harvesting the crop.
- They can avail full benefit of their cash management by co-relating it with the loans and advances.
- The administrator can add information to the database without stopping the application.
- If implemented at Village, District and State level, the model will provide valuable information to other agencies and panchayats in particular.

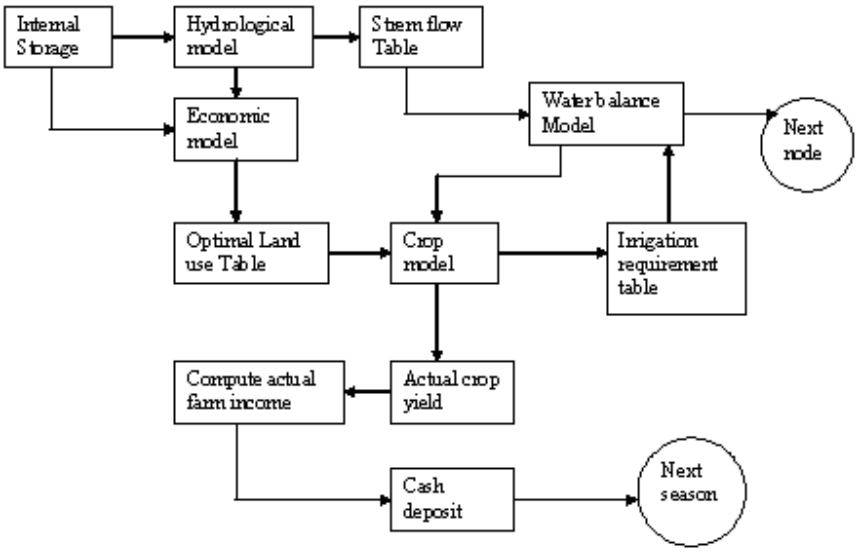

Fig. 3 Workflow of DSS

With growing population and demands for improved watershed management, there is an obvious need to implement sustainable resource use that best serves the communities and the nation. To satisfy this need, the DSS is developed to aid decision – makers and various stakeholders in identifying and assessing options for resource uses. The DSS applies an integrative approach, combining biophysical data, perceptions and socioeconomic conditions of the farmers in the given area. The DSS attempts to stimulate the farmer's behavior in selecting farming systems given relevant constraints and then aggregating up to the node.

A large number of database queries can be generated according to Crop, Water Availability and Requirement, Socio-economic constraints and so on. Design and Development of this database is purely based on Relation Database Management System Model, so the large volume of queries can be easily handled.

DSS with all the ready information help the farmers in a very useful manner. The farmers can get all the information at just at click of the mouse, and they need not to travel to Agricultural Universities for that.

IV. Future Scope

The Scope for the future research is:

- The Farm Entrepreneur System can be made more useful for the farmers by converting the language of the system to the local language
- Further development of the economic model is required in order to address more complicated resource management patterns effectively.
- Market information relating to prices of the crop, particularly if quoted higher than the maximum support price offered by the government.
- Information transfer to the farmers can be increased substantially by providing email, news groups, messenger services, online chatting, and discussion groups.
- Voice support in local language can be provided for illiterate or semi-literate farmers.
- Research on growing different crops in protected environments.

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