MARUMEGH
Kisaan E- Patrika
Available online at www.marumegh.com

ISSN : 2456-2904

Received: 05-09-2022
Accepted: 16-09-2022

ROLE OF DECISION SUPPORT SYSTEM IN INDIAN AGRICULTURE

*** Priya Pallavi[1] and Rohini Anand[2]**

[1] PhD scholar, Department of Agricultural Extension & Communication, Birsa Agricultural University, Ranchi, Jharkhand-834006
[2] Former MSc scholar, Department of Agricultural Extension & Communication, Bihar Agricultural University, Sabour, Bihar-813210
***Corresponding email:** priya.11.d@gmail.com

Abstract:

Research and advances in agriculture have made available vast amounts of data in different areas of agriculture. It is very challenging to extract knowledge from data and this has led to methods and techniques like decision support system that can bridge the knowledge gap. The effectiveness of decision-making in agriculture can be improved through the integration of geospatial information and advanced information technology techniques. Information systems, particularly decision support systems, are becoming increasingly important in the agricultural sector. Access to vital and timely information can help stakeholders involved in agriculture and agribusiness, such as farmers, traders, and government personnel, make better decisions about crop production and trade.

Introduction:

Decision Supports Systems (DSS) are interactive computer-based information systems designed in such a way that help managers to select one of the many alternative solutions to a problem. It is possible to automate some of the decision making processes in a large, computer-based DSS which is sophisticated and analyse huge amount of information fast. It helps Indian corporate to increase market share, reduce costs, increase profitability and enhance quality. The nature of problem itself plays the main role in a process of decision making. A DSS is an information system with an organized collection of models, people, procedures, software, databases, telecommunication, and devices, which helps decision makers to solve unstructured or Semi-structured business problems.

Components of a Decision Support System

A decision support systems consists of three main components, namely database, software system and user interface.

1) DSS Database: It contains data from various sources, including internal data from the organization, the info generated by different applications, and therefore the external data mined form the Internet, etc.

2) DSS Software System: It consists of varied mathematical and analytical models that are used to analyse the complex data, thereby producing the specified information. A model predicts the output within the basis of different inputs or different conditions, or finds out the mixture of conditions and input that is required to produce the desired output.

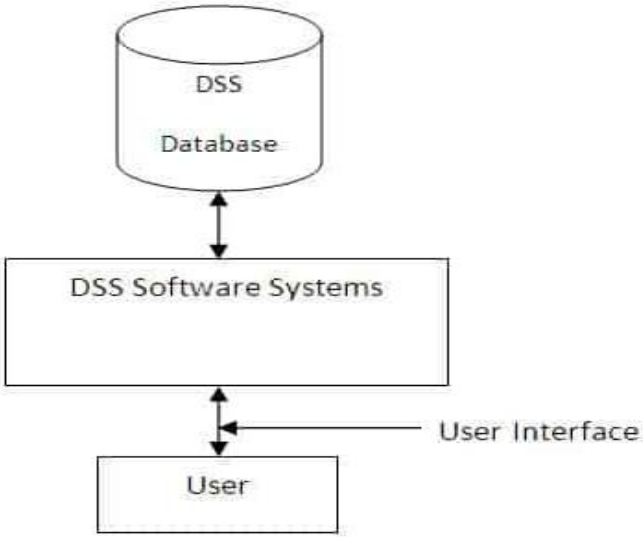

Figure: Components of DSS

3) DSS User Interface: it's an interactive graphical interface which makes the interaction easier between the DSS and its users. It displays the results (output) of charts or graphics. The user can select the acceptable option to view the output according to his requirement.

Need for decision support in agriculture

Sustainable agriculture production and processing systems have become more complex involving biological, chemical and physical processes such as soil, water, climate scenarios and crop management practices, respectively. The Decision Support System (DSS) provides a framework within which complex systems can be represented in a structured way, allowing them to be understood more easily and helping to extract additional information and new insights. It is an interactive computer-based expert system that helps decision makers use data and models to solve unstructured problems. The applicable use of successful decision support can help in the sustainability of agricultural resources

Who needs them?

- Farmers
- Extension advisers
- Govt. Departments
- Scientists
- Planners
- Consultants
- Insurance companies
- Industry/agribusiness

What types of decisions?

What kind of decisions?

- Selection of crops and farming systems
- Crop management:
  - Land use planning
  - Selection of varieties
  - Input management
  - Agricultural Management
- Management of natural resources
- Marketing and distribution

Different DSS Models in Agriculture Management

Sl.no	Name of DSSAT	Application
1.	CROPWAT	DSS tool for land and water management
2.	SWASALT	DSS tool for Soil and Water Resource Management
3.	CROPMAN	DSS tool Crop Production and Management
4.	DSS-ET	DSS tool for soil evapo-transpiration estimation
5.	DSS-FS	DSS tool with Fertigation Simulator for application of fertilizers.
6.	IPM	DSS for Integrated Pest Management.

DSS IN AGRICULTURE IN AN INDIAN CONTEXT

DSS in crop productivity improvement

DSS is widely applied in various parts of India for different farm management activities. Crop productivity being one of those activities, it has given considerably good results with the use of DSS. The DSS named "Crop Environmental Resource Synthesis (CERES) - Wheat", is a part of DSSAT that was successfully applied to simulate the growth and development of wheat crops under varying levels of climate, water and nitrogen in semi-arid and semi-arid regions. Punjab subtropics for five growing seasons from 2000-2001 to 2004-2005. The model results concluded that grain yield and water productivity are affected by the water-holding capacity of soils.

The Crop System Simulation Model (CropSyst) is another simulation-based DSS model linked with Geographic Information System (GIS). It uses the same approach to simulate the growth and development of all arable crops using periodic biomass and leaf area index (LAI). Helped decide water saving and water productivity policy for rice cultivation in Punjab by integrating crop management practices such as transplant date, seed type and irrigation.

DSS in crop water requirements management

DSS is also applies to the management of water resources, the water requirements of crops. Crop water requirements depend on factors such as evaporation, evapotranspiration, meteorological factors such as solar radiation, air temperature, humidity, wind speed, etc. CROPWAT DSS helped decide irrigation schedule for different cropping patterns and calculate crop water requirements in eastern Godavari delta, Andra Pradesh. Together with climatic data, it assisted in the evaluation of baseline evapotranspiration under the Kashmir Valley temperature conditions. It also gave good results when applied to simulate different crop water requirements based on crop need at different planting dates and likely canal water supplies.

DSS in irrigation scheduling

Irrigation scheduling is one of the important activities in agriculture. A DSS tool for water and salt simulation (SWASALT) was calibrated and validated for irrigated areas in the

semi-arid region of Haryana. It helped prevent waterlogging on the farm and soil salinization due to canal irrigation. This model was also used to calculate water management response indicators (WMRIs) that helped optimize the on-farm irrigation schedule by minimizing percolation losses to groundwater for different soil types. Integrated GIS-based model of rainfall, soil, water use and canal flow. Soil water balance model and groundwater flow model are used as an effective DSS tool.

DSS based on climate data

Climatic parameters such as temperature, rainfall and hours of sunshine play a very important role in crop production. DSSAT-Cropping System Model (DSSAT-CSM) was also applied to study the impact of climatic parameters on the productivity of the rice-wheat system in the Indo-Gangetic plains of India. Comparison of observed and simulated rice and wheat yields showed that, along with climatic parameters, crop productivity can be improved by integrating biotechnological advances and precision agriculture.

In Punjab, a multi-year, multi-crop, daily staggered cropping-based simulation model called the "Crop Production and Management (CROPMAN)" model was used to study the effects of different transplanting dates and meteorological parameters on yield, evapotranspiration, and humidity water productivity. The analysis showed that the rice yield in Punjab can be increased by shifting the transplant from mid-May to June onwards. It also successfully concluded that the irrigation water requirement is higher in low-rainfall environments and coarse-textured soils compared to medium-textured soils and high-rainfall areas.

DSS in the advisory system

The advisory DSS is playing an extremely important role in Indian agriculture. e-Sagu, farm-specific DSS developed by IIIT, Hyderabad and Media Lab Asia under the aegis of Media Lab Asia, which helped improve farm productivity by providing high-quality farm-specific expert decisions in a timely manner for each farm at the farmers gate. Advice was provided at all stages of crop cultivation, from planting to harvest, reducing the cost of cultivation and increasing agricultural productivity as well as the quality of agricultural products.

DSS tool "MKRISHITM" developed by Tata Consultancy Services and implemented in Borgaon village, Maharashtra to provide proper pest and nutrient management advice for grape farms via mobile phones. Integrated Pest Management is an important parameter in agriculture. An Integrated Pest Management (IPM) DSS called "Cell Phone" was developed for sustainable plant protection of South 24 Paraganas, West Bengal. The DSS aided sustainable IPM by creating on-going awareness among farmers and in turn improving crop productivity.

Conclusion

Decision support system (DSS) is a tool which serves in various field in agriculture and help in improving the decisions that are made. However, DSS have a sense within the global decision-making system only, which also comprises of the decision maker who uses the DSS to make a decision in a structural environment. At the centre of the system

are the decision maker and the information enabling them to understand the decision, and the organization, which constitutes the purpose of the system? Decision support systems provide the basis on how the systems functions in the company and how the worth decisions for managers can be upgraded. DSS can be very helpful for the overall performance of any organization. However, DSS could also cause a great deal of confusion, misunderstanding, and even inaccurate analysis.

References

Ganeshan, V. 2006. Decision support system 'Crop-9-DSS' for identified crops. In: 12thInternational Conference on Computer Sciences, ICCS, Vienna, Austria, 29-31st March, 2006, pp. 263-265.

Kumbhar, V., Singh, T.P. 2013. A Comprehensive Study of Application of Decision Support System in Agriculture in Indian Context. International Journal of Computer Applications (0975 – 8887) 63(14),

Mir, S. A., *et al*. 2015. Decision Support Systems in a Global Agricultural Perspective - A Comprehensive Review. International Journal of Agriculture Sciences, 7(1):403-415.

Neville ,C., *et al.* (2017). Evaluation of new farming technologies in Ethiopia using the Integrated Decision Support System (IDSS). https://doi.org/10.1016/j.agwat.2016.07.023.

Rupnik, R. (2018) . AgroDSS: A decision support system for agriculture and farming. https://doi.org/10.1016/j.compag.2018.04.001

Stancalie, G., Marica, A., Toulios, L. 2010.Using earth observation data and CROPWAT model to estimate the actual crop evapotranspiration. Physics and Chemistry of the Earth, Parts A/B/C, 35:1–2

UNESCO, 2004. ICT in education, definition of Information and Communication Technology (ICT). http://www.unescobkk.org/index.php?id=999.

****