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Role of Management Information Systems in Agriculture

(*Paluru Pavani)
Department Of Plant Pathology, College Of Agriculture, CAU, Imphal – 795004
*Corresponding Author's email: pavani09021999@gmail.com

Precision agriculture is a contemporary approach to farming that involves maximising output by combining established mechanised farming practises with cutting-edge technologies including monitoring systems, command and control systems, geographic information systems, and support information systems. In accordance with numerous criteria, these optimizations attempt to select the ideal time and location for culture seeding and to keep track of the culture throughout the growth phase. The Information Technologies are the methods by which people and organisations access and use information and technology as a whole, and they serve as the primary tenets of what is today referred to as the Information Society. Castells draws attention to the fact that our society's economy is governed by a technological paradigm that uses information as its primary input. In other words, the information is essential to the regular management of all the various jobs that make up their work operations. It is expected that how an organisation treats and manages information will have an impact on how well it is managed (FAO. 2005).

Research organisations, academic institutions, for-profit businesses, and farmers themselves are responsible for developing new agricultural technologies. Extension, consultation, business development, and agricultural information services are only a few examples of the agricultural information and knowledge delivery services that are intended to spread new technologies among their clientele (people who are involving in agriculture). The purpose of research and advisory services is to provide their clients with highly accurate, detailed, and objective technical and managerial information and advice. The adoption of new agricultural technologies by farmers is frequently very sluggish due to insufficient linkages between research and advisory services, and research frequently does not concentrate on the actual needs of farmers (Demiryurek *et al.*, 2008).

Low agricultural production in many nations has been linked, among other things, to weak links between researchers, extension agents, and farmers as well as to inefficient technology transfer methods, such as information packing, communication channels, and techniques. Therefore, the agricultural sector should establish information systems that integrate farmers, agricultural educators, researchers, extensionists, and farmers. They serve as facilitators and communicators, assisting farmers in decision-making and making sure that the right information is applied to achieve the best results in terms of sustainable production and overall rural development. They also work with the private sector (support and input services, traders) to glean knowledge and information from various sources for better farming and improved livelihoods.

Agriculture Information System Model

An agricultural information system is a system where agricultural information is produced, transformed, transported, consolidated, received, and given back in such a way that these activities work together to support agricultural producers' use of knowledge (Roling, 1988).

An agricultural information system, thus, comprises of subsystems, interfaces, networks, information-related processes (creation, transformation, storage, retrieval, integration, diffusion, and usage), and system operations (control and management). For agricultural education, research and development, and extension activities, agricultural knowledge is regarded as a crucial input. Different types of consumers need various types of information for various objectives. Government decision-makers, policy-makers, planners, researchers, educators, and students, as well as programme managers, field staff, and farmers, are possible users of agricultural information (Zaman, 2002).

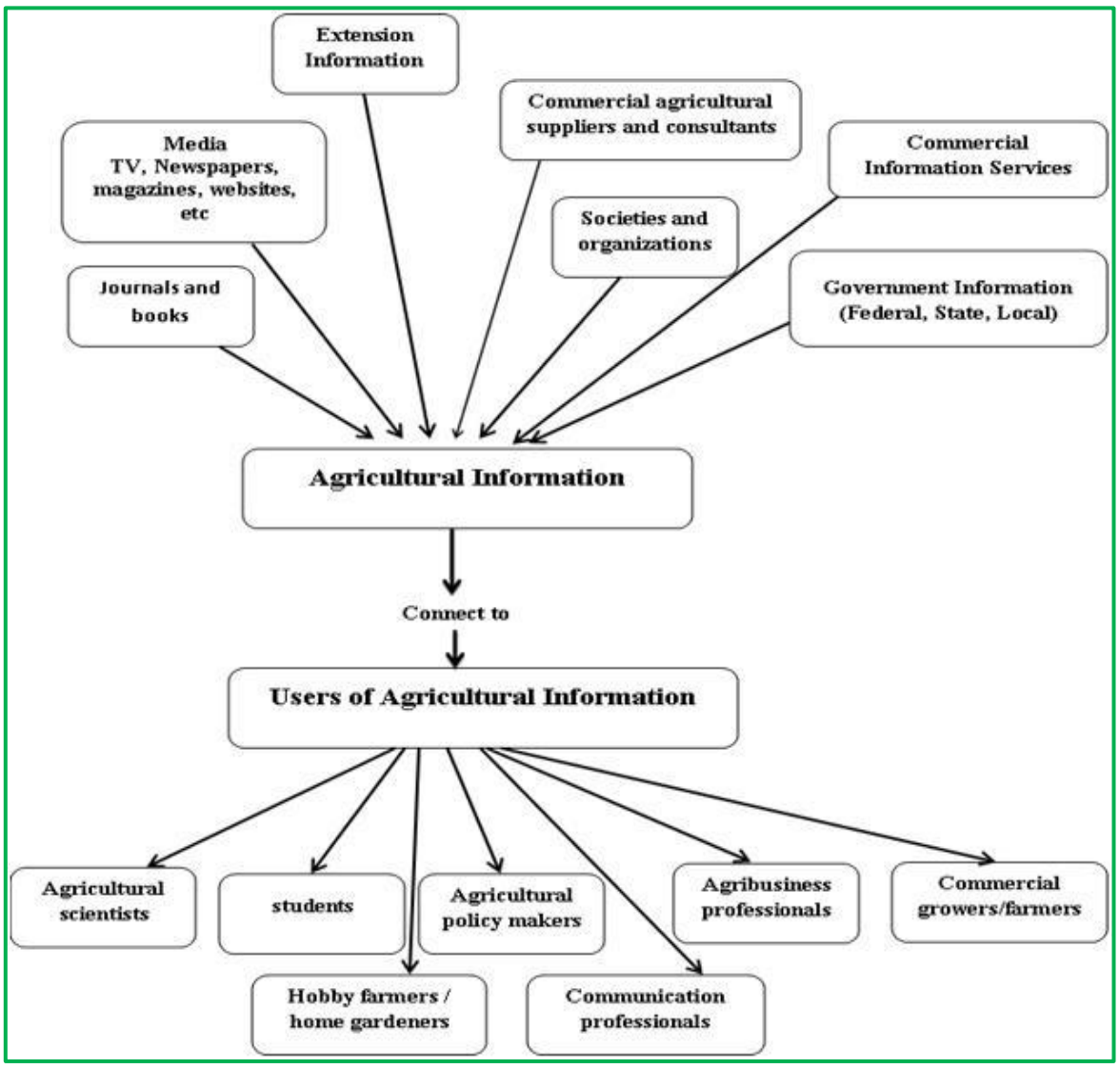

Figure 1: Concept map for agricultural information (Source: McCue *et al.*, 2005)

The identification of the fundamental elements and structure of the agricultural information system in a particular farming system, the understanding of how the system functions successfully, and how to enhance system performance (system management) are all possible outcomes of the analysis of the system (Demiryurek,2000). This strategy is also helpful for locating potential defaults and enhancing component cooperation (i.e., information management). According to Rogers (1995), information is exchanged (or communicated) and disseminated within a social system. The structure of the social system and the roles played by its players, or members, such as people, informal groups, organisations, and subsystems, have an impact on the diffusion process.

Analysis techniques for agricultural information systems

The Total Information Score (TIS), which combines the frequency of contact with information sources and their usefulness, was utilised by Demiyürek *et al.* (2008) and Demiyürek (2010). As a result, the TIS reflects both the amount and the calibre of the information contact. The number of information contacts (weight) and the degree of information usefulness can be multiplied to determine the information scores for each component of the information systems (TIS = number of contacts utility of information). Each component's weight can be assigned based on the depth of the information interaction. A weight of 0 indicates no contact, 1 indicates once a year, 2 indicates twice a year, and so on. The usefulness of information sources can also be weighted in a similar manner. Given a weight of 0, usefulness is defined as not at all useful, 0.25 means slightly useful, 0.50 means moderately useful, 0.75 means useful, and 1.00 means highly valuable. The percentages of farmers reporting each level of usefulness for each source can be used to determine the scores.

According to TIS, the respondents might be requested to list each source of information and the frequency of interaction for a certain year in order to define the idea of information contact. They could also be asked to rank the usefulness of each information source. These ratings offered a range of options, from not useful to a little useful, somewhat useful, and so on, rather than asking them to choose whether these sources were good or terrible. As a result, a frequent communication without pertinent or useful information might be cut out. Additionally, the degree of usefulness and contact frequency can be connected to determine how well these two factors agree with one another. According to the information scores of each information source, the degree of information interaction may also be divided into various groups. These things fall into three categories: mild, moderate, and powerful information contact. The classification might be based on the information scores' mean and standard deviation (Demiryürek, 2010).

These results can also be contrasted among other producers and/or production methods. The results can also be compared or corroborated with the socioeconomic traits of various groups of farmers and farms. Since the information systems are a construct of the farmers' personal characteristics (Rolls *et al.* 1999), and since these characteristics, along with the farming practises, have a significant impact on how they manage their information (Naidoo and Rolls 2000), it is crucial to compare the socioeconomic characteristics of farmers and their farms.

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