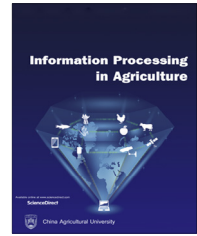




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Agricultural information dissemination using ICTs: A review and analysis of information dissemination models in China

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ABSTRACT

Over the last three decades, China's agriculture sector has been transformed from the traditional to modern practice through the effective deployment of Information and Communication Technologies (ICTs). Information processing and dissemination have played a critical role in this transformation process. Many studies in relation to agriculture information services have been conducted in China, but few of them have attempted to provide a comprehensive review and analysis of different information dissemination models and their applications. This paper aims to review and identify the ICT based information dissemination models in China and to share the knowledge and experience in applying emerging ICTs in disseminating agriculture information to farmers and farm communities to improve productivity and economic, social and environmental sustainability. The paper reviews and analyzes the development stages of China's agricultural information dissemination systems and different mechanisms for agricultural information service development and operations. Seven ICT-based information dissemination models are identified and discussed. Success cases are presented. The findings provide a useful direction for researchers and practitioners in developing future ICT based information dissemination systems. It is hoped that this paper will also help other developing countries to learn from China's experience and best practice in their endeavor of applying emerging ICTs in agriculture information dissemination and knowledge transfer.

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1. Introduction

Agriculture plays a significant role for economic and social development in most undeveloped countries. Information of

adequate quality is a necessary condition for improvement of all areas of agriculture [17]. With the rapid development of Information and Communication Technologies (ICTs), data and information can be effectively generated, stored,

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analyzed, disseminated and used to support farmers and farming communities to improve agricultural productivity and sustainability. Information services for farmers at the national and regional level are a promising new field of research and application in the emerging field of e-agriculture [5]. Informatization refers to the transformation of an economy and society through the effective deployment of Information and Communication Technologies in business, social, and public functions [6,22]. It has been a significant phenomenon in China [6,22]. Agricultural Informatization, which is a specific term used in China, has no official definition [13]. Based on Li et al. [8,9], it can be defined as the degree and process of transforming Agriculture sector through the effective use of ICTs in agricultural production, operation, and management. Li [7–9] has published a series of reports on rural informatization in China and provided a useful overview on informatization progress, achievements and policy implications at the national and local levels. However, Liu [13] argues that existing research on China's agricultural informatization is still fragmented and exploratory.

With the introduction of agricultural informatization, the traditional agriculture has been reformed by advanced ICTs, eventually contributing to the significant improvements in agricultural productivity and sustainability. Agricultural informatization is a long-term stimulus for agricultural development and also an important indicator of agricultural modernization. The agricultural information dissemination service is one of the critical missions in implementing agricultural informatization [9,2]. China is seeing a rapid growth in its economy, and farmers are achieving a dominating role in the economic development. To improve agriculture productivity, farmers have an ever increasing demand for information because accessing information and knowledge is essential for improving their productivity and income. In particular, since China became a member of World Trade Organization (WTO), its agricultural industry has been strongly affected by markets, resources, and environments. Facing the fierce competition both in the domestic and international markets, Chinese farmers and agri-business managers must be fully aware of the available emerging technologies as well as markets and sales information to maximize economic benefits. Therefore, over the last three decades, Chinese government has invested substantial amount of effort and money to develop and deploy ICT-based agriculture information dissemination systems nationwide [9]. As a result, many innovative and effective information dissemination models have been emerged and widely used. Farmers have gained enormous benefits from the information dissemination services provided. A few studies in relation to agriculture information service models have been conducted in China [e.g. 26], but none of them have attempted to provide a focused and comprehensive review and analysis of different information dissemination models and their applications. This paper aims to review and identify ICT based information dissemination models in China, and most importantly, to share the China's experience and best practice in applying emerging ICTs in disseminating agriculture information to farmers and farming communities.

2. Agricultural information service development history

Driving by the emerging trend of market-based reform and informatization, Chinese agricultural information dissemination service systems were transformed from traditional pattern to market and economy based framework. From the perspective of agricultural information development and applications, the Chinese agricultural information dissemination services experienced a three-stage development process as below [19]:

- Initial developing stage (1970–1990).
- Establishing stage (1990–2000).
- Consolidating and rapid expanding stage (2000–present).

2.1. Initial developing stage

Before year 1990, the initial concept of agricultural informatization emerged from the planned economy's requirements for agricultural statistics [22]. In year 1979, China imported its very first mainframe computer for agricultural scientific computing, mathematical planning, statistics analyzing, etc. China set up the first computer application research institute in agriculture in 1981, which was the computer center in the Academy of Agricultural Sciences. The center began the applied research on scientific computing, mathematical planning and statistics analyzing. Chinese Ministry of Agriculture (MOA) equipped every agricultural department with computers in every province in China in 1984 and held three computer knowledge training seminars in order to push the development and application of computer-based information processing in agriculture. In 1987, the Information Center was founded in MOA, to promote applications of computer-based information processing in rural areas.

2.2. Establishing stage

From early 1990 to 2000, the central government pushed the informatization strategy in agriculture with strengthened guidance, and information systems. In 1992, MOA conducted 'Rural economic information construction plan' and set up rural economic information system liaison offices to strengthen and coordinate informatization development activities. These measures marked an important point in history. In 1994, MOA set up the Department of Market and Economic Information, accordingly. Liaison offices for informatization was formed in provincial and municipal agriculture departments. In December 1994, during the 3rd conference of 'National Economic Information Joint Meeting', the 'Golden Farming Project (JinNong)' was launched. In 1995, MOA formulated 'The 9th 5-year-plan for Rural Informatization Construction and the Plan for 2010'. The first national agricultural informatization conference was held in 1996. At the end of 1998, the Ministry of Science and Technology (MOST) started 'The national intelligent agricultural informatization technology applications program', and the program won widely supports. Pilot zones were set up in twenty-two provinces. As a result, national networks were developed

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