

Design of an Intelligent Tobacco Farmer Scoring Management System

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Abstract: This paper presents a comprehensive study of tobacco farmers in Lijiang, Yunnan Province. The design of the intelligent score system for tobacco farmers focuses on evaluating factors such as basic farmer information, purchasing data, and tobacco planting management levels. By analyzing and assessing these data, the system generates a comprehensive score for each farmer. The system employs multiple integrated technologies and includes features like system administrator permissions, WeChat mini-program geographic positioning for survey forms, and basic farmer data collection. It imports and processes field planting and purchasing data and offers automatic scoring capabilities. This scientific evaluation system allows for a more rational allocation of tobacco planting areas, regulates farming practices, prevents adverse effects of large-scale planting, promotes effective land use, and ensures stable farmer incomes as well as the quality and yield of tobacco leaves.

Keywords: Tobacco Farmer Scoring; Management System; SpringBoot; Vue; Uniapp

1. Introduction

Since 2020, tobacco farmers in Lijiang, Yunnan Province, have faced economic challenges. Rising planting costs and stagnant purchase prices have squeezed farmers' profit margins. To address these issues, the Yunnan Tobacco Company in Lijiang proposed assessing each farmer based on their basic conditions and production practices, aiming to evaluate their planting level and conditions.

The literature review reveals sparse research on tobacco farmer evaluation. MM Hassan, MM Parvin, and SI Resmi analyzed the profitability of tobacco planting in Rangpur, Bangladesh within a socio-economic context

[1]. In 2024, A. Srinivas and colleagues assessed FCV tobacco farmers in Andhra Pradesh regarding their understanding of and response to Orobanche management practices. Most were familiar with infestation symptoms, yet had limited implementation of strategies like crop rotation and resistant varieties adoption. [2] Dai En and Wang Baowen introduced a comprehensive evaluation system for farmers, applying lean management to enhance efficiency and satisfaction. This approach promises to stabilize farmer communities and improve overall tobacco production [3]. Luo Kaijun focused on high-quality and efficient planting techniques to boost yield in his Research on the Application of High Quality and Efficient Planting Technology of Tobacco, advocating management improvements based on the biological needs of tobacco plants. Thus, the purpose of high-quality and high-yield tobacco leaves is achieved, and the purpose of improving the planting efficiency of tobacco farmers is really helped [4]. Tan Fangli et al. analyzed and identified the primary social factors influencing tobacco farmers' income from numerous complex and ambiguous factors. They applied the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method to examine the interactions among various social factors impacting income. By constructing a direct influence matrix through analyzing the interconnections among these factors, they derived a comprehensive influence matrix, the degree of influence for each factor, its affected degree, centrality, and causal degree. The DEMATEL analysis determined that the main factors affecting tobacco farmers' income include planting area, among six other factors, and these key factors were further analyzed in the study [5]. Yi Zhongting proposed an evaluation system for constructing tobacco industry complexes based on the construction model and content of the

Shaanxi tobacco industry complex, emphasizing the collaborative development theme of "tobacco leaf + diversified industries". This system considers six dimensions, including land transfer and preservation, and employs the Analytic Hierarchy Process (AHP) to assign weights [6].

In both China and internationally, research primarily focuses on tobacco leaf quality, planting, and management methods, comparing leaf quality across different regions. There is extensive study on new tobacco varieties, quality, and planting management. However, there is a lack of a systematic and complete scoring system for farmers. This paper aims to specially design a scoring system for tobacco production in Lijiang, Yunnan Province, based on comprehensive indicators. The system evaluates farmers through their basic information, field management skills, and purchasing data to create an overall score.

2. System Analysis

The current scoring system for tobacco planting in Lijiang has certain limitations. While previous research has made progress, a complete and systematic evaluation is still lacking in practical application. Most studies focus on leaf quality, but they do not sufficiently account for Lijiang's unique environment and industrial background.

This system will first analyze the tobacco planting situation in Lijiang, aiming to develop a scoring system that closely reflects local conditions and considers the specific needs of the region and its farmers [7]. It will deeply analyze farmer information, planting conditions, field management, and purchase data, incorporating the economic, social, and cultural context to create a more comprehensive evaluation system. Such analysis will enhance understanding of Lijiang's tobacco production characteristics and issues, leading to more effective improvement strategies.

3. Requirements Analysis

Tobacco farming in Yunnan mainly occurs in mountainous areas, making planting regions scattered and management and guidance challenging for tobacco stations. The current scoring system is not well-suited for this situation. Without a complete and systematic evaluation system, it's difficult for tobacco

stations to allocate farming areas fairly based on farmers' experience. Experienced farmers may not get enough land, reducing their income, while inexperienced ones might waste land due to lack of guidance. This system uses farmer information, purchase data, and field management skills to score farmers. In this way, higher-scoring farmers can receive more land, while those with lower scores get necessary farming guidance to help increase their income.

For tobacco station administrators, the system needs role-based access control. It uses users, roles, and permissions to ensure security, allowing only authorized access to certain functions.

3.1 Functional Requirements Analysis

The Intelligent Tobacco Farmer Scoring Management System is designed to help tobacco station administrators better understand farmers' planting levels, and create planting targets based on scoring results. Therefore, the system needs the following features:

The system should permit the administrator to add new tobacco farmer data, including basic details, planting, and purchase information. It must support bulk data import to ensure timely updates of system information. Additionally, it should offer functionality to modify farmer information, including basic, planting, and purchase details. The capability to export system data in Excel format for backup and further analysis should also be provided.

The system serves two types of users, administrator and tobacco farmer respectively. For Administrators: System manages departments based on the tobacco station's organizational structure. Different stations may have different departments, each with administrators who have the authority to manage farmer data.

Permissions can be configured via role assignments, allowing operations like adding, modifying, and deleting farmer data. Administrators can control permissions down to individual operation buttons.

Tobacco farmers have relatively limited permissions. Upon logging in, they can mainly view and fill out surveys and modify their basic information.

The system automatically calculates scores based on farmers' planting practices, basic, and

purchase information, and sets different planting targets based on the scores.

The user interface is designed to be simple and clear, with intuitive function buttons and operation processes, enabling users to operate the system swiftly without professional training.

With these features, the system will effectively manage tobacco planting, promote efficient tobacco production, and offer convenience and support for farmers and tobacco station administrators.

3.2 Analysis on Main Functional Requirements of Administrators

The administrator's requirements focus on several areas: tobacco station management, department management, user management, farmer information management, role management, and permission management. Each area must implement basic functions such as create, delete, update, and view.

Through these features, administrators can efficiently manage stations, departments, user information, and farmer data. They can also flexibly control roles and permissions, ensuring the system's security and stability. An administrator use case diagram is shown in Figure 1

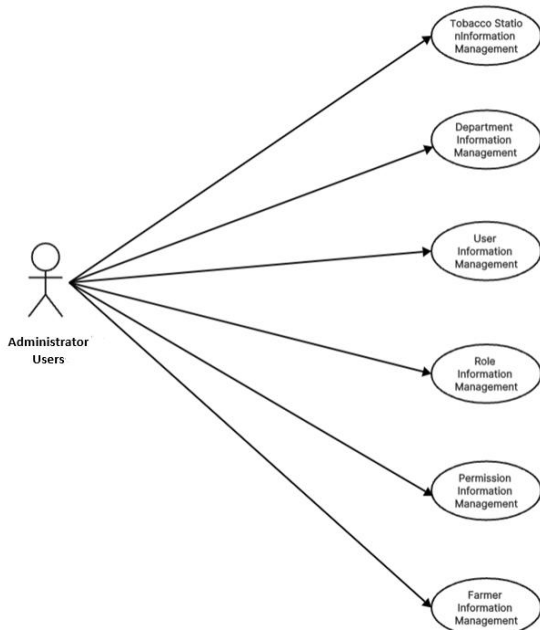


Figure 1. Administrator Use Case Diagram

3.3 Analysis on Main Functional Requirements of Tobacco Farmers

The primary functional requirements for tobacco farmers focus on tasks such as filling

out planting surveys online, viewing historical surveys, checking scoring results, and updating personal information. A tobacco farmer use case diagram is shown in Figure 2.

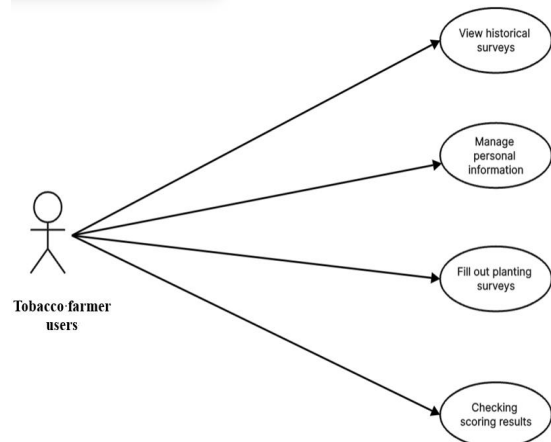


Figure 2. Use Case Diagram of Tobacco Farmers

4. System Design

System design includes planning the architecture, dividing into modules, and designing data structures, all of which are important for quality and ease of maintenance [8]. It's crucial to keep the system simple and easy to use for administrators and tobacco farmers. A clear interface and logical layout are essential. The system must be practical and reliable, providing accurate scores from farmer information, planting data, and purchase details. It must operate stably with complete data to enhance its usability and dependability [9].

4.1 Overall Design

The primary aim of this system is to offer administrators and tobacco farmers a comprehensive and efficient platform for management and communication. To ensure security, administrators are granted specific access according to their departmental permissions before accessing system data. Tobacco farmers can log in to manage planting surveys, view past planting records, and check their scores, helping them understand and improve their planting practices based on feedback. The functional structure of the system is illustrated in Figure 3.

4.2 Functional Module Design

The system provides an easy login for users, ensuring security through correct username

and password verification [10]. Once logged in, both administrators and tobacco farmers can access system features. The system also has an automatic scoring feature that uses farmer information, purchasing data, and planting details to calculate scores.

Drawing from in-depth research and analysis of Lijiang's existing tobacco farmer evaluation system, three scoring modules were devised: one for basic information, another for planting management level, and a third for purchasing data, resulting in a comprehensive score. Basic information scoring is assessed based on

planting years, contributing 5% to the total score. Planting management level considers multiple indicators such as field quality, soil conservation, and fertilization, accounting for 35% of the score, using a percentage-based system. Purchasing data score is adjusted based on the progress of farmer deliveries, comprising 60% of the total score. The process for calculating the basic information score is depicted in Figure 4, the comprehensive score in Figure 5, and the activity diagram for the scoring module in Figure 6.

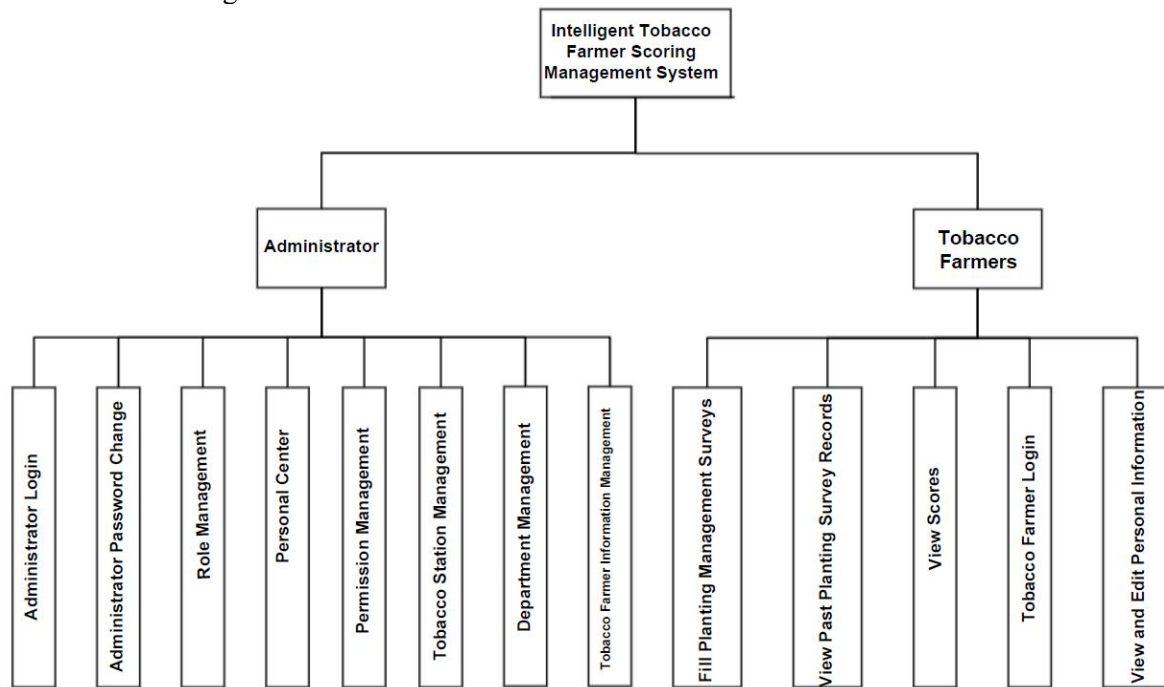


Figure 3. System Functional Structure Diagram

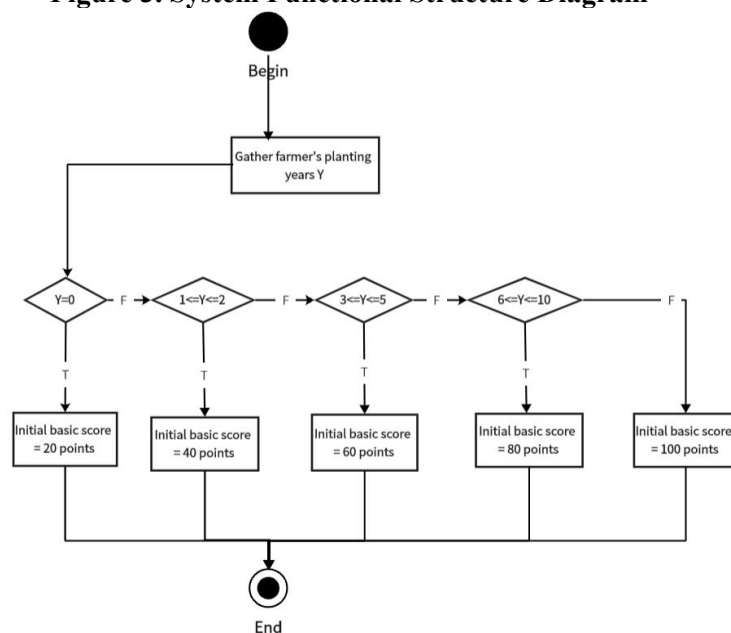


Figure 4. Tobacco Farmers Basic Information Scoring Procedure Flow Chart

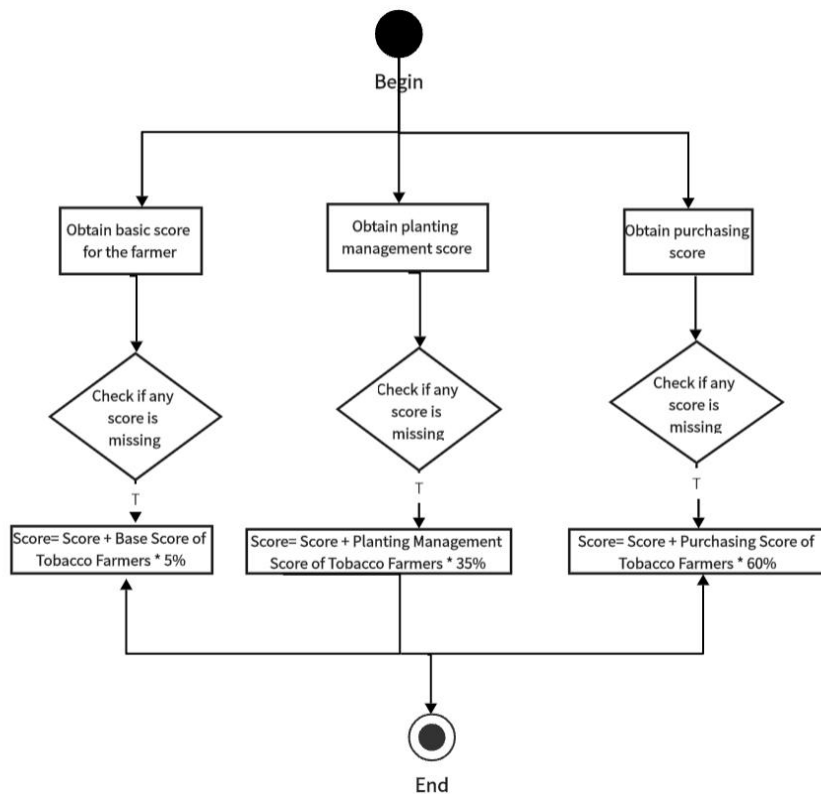


Figure 5. Flowchart of Tobacco Farmer Scoring Procedure

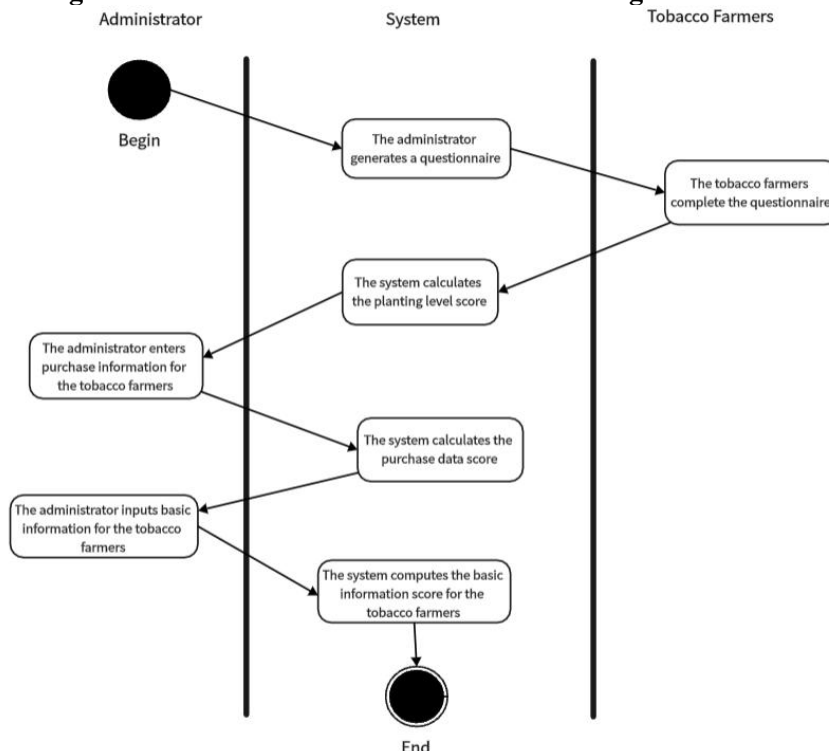


Figure 6. Scoring Module Activity Diagram

5. Conclusion

Through the design and implementation of the system, a comprehensive intelligent tobacco farmer scoring management system has been successfully created. This system includes

crucial functional modules such as planting management, purchasing information management, farmer information management, departments, tobacco stations, and roles and permissions. It greatly facilitates and supports tobacco production, ensuring that the

evaluation of farmers is more scientific, objective, and fair. During system development, a combination of white-box and black-box testing was used to fully verify the internal logic and functionality, thereby enhancing the system's quality and stability.

Acknowledgments

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