

# A Segmentation Transmission Approach and Information System for Agriculture Information Based on Mobile Communication

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**Abstract.** Considering the information transmission system of agriculture M-informatization, pertinence and practicability are critical factors, but the current system lack these factors in China. Based on the case study of Agriculture Space Time of China Unicom and Agricultural ICT of China Mobile, the segmentation transmission approach is presented in this paper. To make the current information transmission system more pertinent and practical, we adopt segmentation transmission approach in the critical nodes of the closed loop information transmission system, which includes produce, gathering, analysis & process, supplying, sending, distribution, receiving, application and feedback. According to the key attribute dimensionality of users, this approach employs intelligent IMS (Information Matching System) to match the content of data dictionary with the individual needs of users, and analyze the static and dynamic attributes of users' datum and the content of service by using the high-powered rule-engine. This data dictionary is based on the scientific multilayer-integrated data dictionary concerning farm products. Adopting the approach presented in this paper in current agriculture M-informationization system can successfully transmit all kinds of segmentation agriculture information to the right agriculture users.

**Keywords:** *Industrial applications, Enterprise information systems, Electronic business, Agriculture M-informationization, Informationization, Segmentation transmission, Information transmitting system, Information matching system*

## 1. INTRODUCTION

The key point of agriculture M-informationization is to build perfect information system using to deal and send information to users. But the current agriculture information system is a mass transmission system, which lacks of pertinence and practicability. For the sake of solving the problem, this paper addresses the segmentation transmission and IMS (Information Matching System) based on the case study of two mobile operators' agriculture information system in China.

## 2. AGRICULTURE INFORMATION SYSTEM

### 2.1 Case Study

Both China Mobile and China Unicom have developed their agriculture M-informationization projects—Agricultural ICT and Agriculture Space Time. These projects aim to provide more outstanding service to users based on perfect agriculture information system. But when transmitting information to users, both of them can not solve the problem of poor pertinence and practicability. Their information systems are showed in Figure.1 and Figure.2 below.

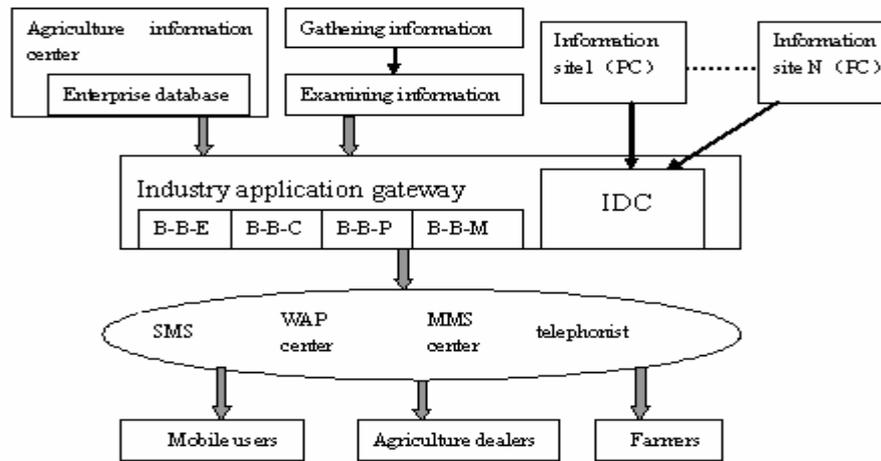


Figure 1. China Mobile's Agriculture Information System [1]

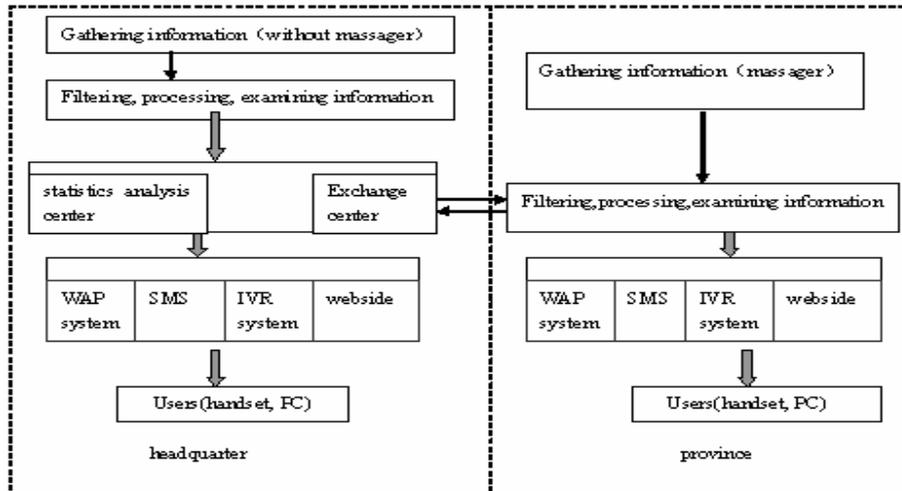


Figure 2. China Unicom's Agriculture Information System [2]

First of all, both of the systems contain information examining and processing step. But this step just checks whether the content of information is felicitous or not.

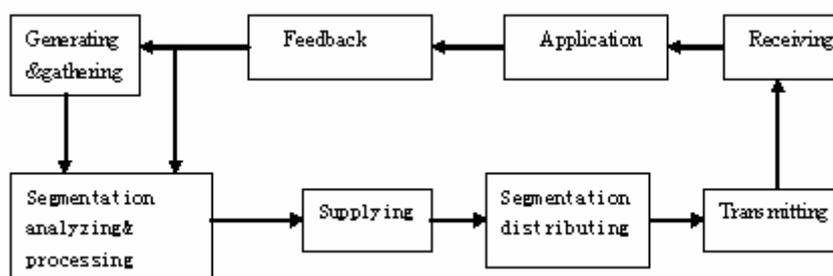
Second, in the information system of China Mobile, examined information will be sorted according to the rule of B-B-E (mobile operator-enterprise or government-employees), B-B-C (mobile operator-enterprise or government-customers), and B-B-P (mobile operator-enterprise or government-promotion) and B-B-M (mobile operator-enterprise or government-machine)[3], on the other hand, China Unicom's system classifies the information in the terms of politics, economy, culture and science in statistics & analysis center. Obviously, the classifying method of China Mobile is more superior and suitable than that of China Unicom. Even through, in the light of the two classifying methods, we can not weigh the matching degree of users' requirements and the information sending to them.

Third, owing to the information are not subdivided according to user's requirements, it is impossible to transmit subdivided information to subdivided users. Unapt classification and transmission will generate irrelevant and impractical information. What's more, their information system is short of feedback. They just push information to users, and can not get the feedback information immediately after users used it. As we know, the value of information product is judged by users, without the feedback step, the price of information product will be ambiguous and short of persuasion.

## 2.2 Segmentation Transmission

This paper presents a segmentation transmission when transmitting agriculture information based on mobile communication. This approach gathers information from agricultural sectors, messengers of agriculture information stations, SP/CP, every member of farm produce value chain on the nationwide agriculture information platform, employs network sources covering countryside to transmit the information to the subdivided farmers after gathering, sorting, analyzing, differentiating, and subdividing the information. This approach achieves the segmentation transmission of agriculture information, and accordingly solves the "last kilometer" problem of agriculture information sources and transmission effectively.

Figure.3 shows the module of segmentation transmission for agriculture information system based on mobile communication, which includes 8 steps below.



**Figure 3. Method of Segmentation Transmission for Agriculture Information System  
Based on Mobile communication**

① generating & gathering: Generate feedback information from agriculture or users, and gather agriculture policies, laws etc. Messengers of agriculture information station in the countryside, CP, agricultural sectors, Agricultural Techniques Organizations, related organizations in the farm produce value chain can take part in

generating& gathering agriculture information, e.g. related organizations in the farm produce value chain generate the foodstuff demanding information , Agricultural Techniques Organizations generate pests preventing information, agriculture sectors gather the prices of farm produce.

②segmentation analyzing& processing: For the primitive, massive, high-redundant information in the generating & gathering step, we need to subdivide them. In this step, we employ data mining technology to arrange, collect, mine and analyze the above information, and then, store it.

③supplying: In order to keep the information brief, practical and secure, the stored information need to be gathered and edited, examined.

④segmentation distributing: In this step, we distribute the stored information by the technology of identifying users' attributes intelligently. To achieve this purpose, we should activate the data list engine according to the agriculture information users' attributes and classification lists, and choice the different segmentation distributing channel based on the users' key attributes.

⑤transmitting: Transmit the agriculture information by the nationwide mobile network, wired data network, Beeper network, internet etc. This transmission is real time and includes message channel, data channel and voice channel.

⑥receiving: Agriculture users can receive needed information after segmentation by using communication terminals, such as handsets, Beepers, PC etc.

⑦application: Agriculture users can apply the received individual information to the agriculture produce according to the actual situation.

⑧feedback: Agriculture users give the feedback information about application effect or new agriculture information to the agriculture information station and CP. This step can improve and perfect the information, so as to satisfy the pertinence, accuracy, Timeliness and practicability of agriculture information based on segmentation transmitting.

### 2.3 IMS

Aimed to improve the efficiency and accuracy of segmentation distributing, we adopt information matching system showing in Figure.4 in this step, and control the correlation of agriculture information and users' requirements. We can determine agriculture information firstly, then, score the agriculture users in the terms of their attributes. In this situation, agriculture information can be sent to many agriculture users who satisfy the qualifications. On the other hand, scoring the agriculture information according to the special agriculture users' attributes, much suitable agriculture information can be sent to single user.

IMS contains intelligent analyzing module, IMS database, data extraction module. As described in Figure.4, arrow.1 denotes extracting the data analyses and sending the result to IMS database; arrow.2 means extracting data from data extracting module and putting it in IMS database; arrow.3 shows getting agriculture information from client business system; arrow.4 Figures gaining the information of agriculture users from agriculture users' attributes database.

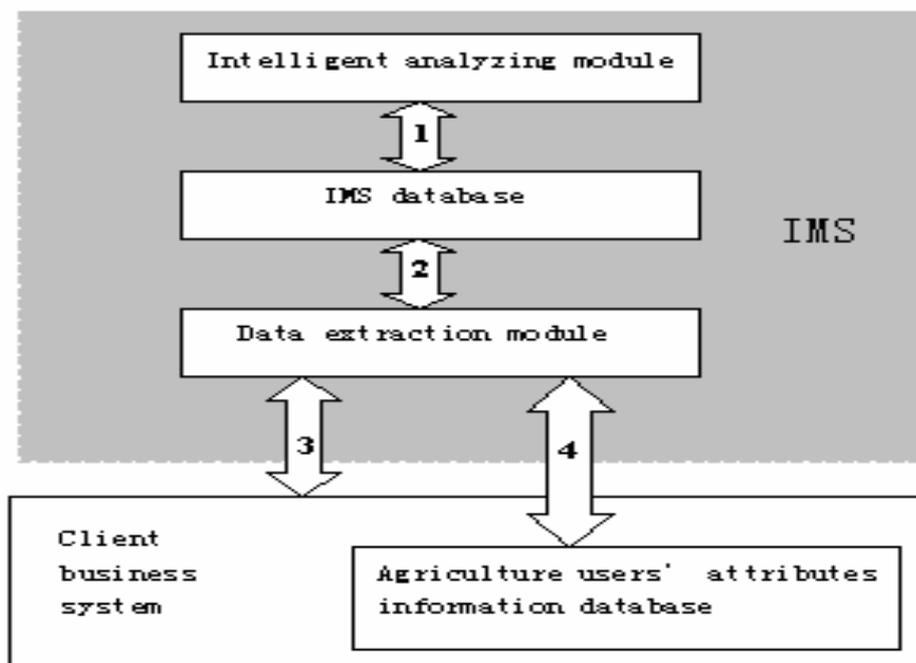


Figure 4. IMS (Information Matching System)

Intelligent analyzing module includes U-C (from user to content) model and C-U (from content to user) model. From content to user means that single information may match many users in the whole country, namely, many users need this information. From user to content means that single user may need a lot of information to match kinds of information. IMS database module contains users' list, short message list, industry sorting list, column location setting list, scoring rules list, scoring result list, data association list. Short message list stores short message. Data extraction module extracts agriculture information and users' attributes information. Client business system in Figure.4 is a part of agriculture information platform, which is composed of three layers, namely, application layer, supporting layer and under layer. The under layer contains operation system and database using to store agriculture information and users' attributes information. Agriculture users' attributes information database mentioned in Figure.4 is part of under layer database, which stores users' attributes given by users when they registered. Employing OLAP method, we extract data from the users' information database module, then, convert and load it to IMS database by ETL tool. The data concludes region, industry, interest, column and correlation of industry upstream and downstream etc.

IMS can match the single user and intercommunity user clusters with information. When scoring agriculture information, we should consider relative factors and their weighs, such as, region, product similarity, product attributes preference, time and so on. E.g.:

Score=region score\*region weigh+ product similarity score\* product similarity weigh+ product attributes score\* product attributes weigh+ time score \*time weigh.

If the result of above equation is higher than the threshold, this item can be segmentation distributed, or else, give up it.

We should pay more attention to: single agriculture user's requirement may correspond with single or many farm produce information. The classifying database of farm produce should conform to the standards classification established by government. On the basis of standard keywords of farm produce, all the agriculture information can be stored in corresponding to subordinate data list of farm produce database.

In a similar way, since single agriculture user's requirement may correspond with one or many farm produce information, we should mark the users' attributes. Thereby, both C-U and U-C meet the relation of single vs. many. But it is not enough to send information to users based on product, because there are regional differences in the whole country, notable time attribute of farm produces, subdivided farm produce differences (there are many kinds of rice and cow) etc.

### 3. CONCLUSIONS

Adopting the above mentioned segmentation transmission pattern and IMS in current agriculture information system will solve the problem of poor pertinence and practicability effectively.

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