

Web-based Distributed Certification System of Green Food

Wang Qiang¹ Yu Hua¹ Zhang Hui¹

College of Information & Management Science
Henan Agricultural University, HAU
Zhengzhou, The PRC
wqhda@sina.com

Ma Xinming²

College of Information & Management Science
Henan Agricultural University, HAU
Zhengzhou, The PRC
xinmingma@126.com

Abstract—The National Green Food certification is an important measure of food safety. Green Food certification system simplifies the whole certification process, improves the efficiency, and provides an easy access to data query based on Web GIS. And this system is a national platform for the regional analysis and management of green foods manufacturing. Using software engineering methods, the system processes is designed, the system framework is built, and the functions of Green Food application and examination are achieved.

Keywords- green food; certification; Distributed System; Web GIS

I. INTRODUCTION

In the 21st century, new and advanced agricultural technologies have brought benefits to human being. However, after the 2008 "melamine" milk powder incident in China, people are doubting whether the advanced technologies can thoroughly guarantee the food safety. In February 28th, 2009, *Food Safety Law* of the PRC was enacted by the seventh plenary meeting of the Eleventh National People's Congress Standing Committee, and it will be enforced from June 1st, 2009^[1]. It is reported that in China, the green food products will reach 180,000 in the year of 2009, and about 1000 enterprises of agricultural industry have obtained the green food certification, and the annual sales volumes of these enterprises have surpassed 200 billion yuan, and the export is over 2 billion yuan, taking 7% of agricultural products export of the country^[2]. In such a context, it is particularly important to control the green food certification process.

At present, the green food certification process is still using the traditional way, that is, firstly, the applicant (individual or business) submits paper-based application to the Provincial Green Food Office (referred to as the PGFO), then the PGFO submits the qualified applications to the China Green Food Development Center (referred to as the CGFDC) for final authentication. This traditional authentication method is wasting time, effort and money. Against the national informationization and the e-government, we have devoted to the analysis of green food certification process and designed a Web-based green food certification system. The green food certification system is an easy access for management departments to completing the green food certification process and achieving the

thorough analysis and supervision of green food manufacturing.

The system adopts a two-tier distributed framework, and The PGFO authentication server and the CGFDC authentication server provide services and management such as the examination of applications, upload of the test reports from the testing facilities, the use of green food logo, etc.

II. SYSTEM FRAME ANALYSIS

Totally different from the traditional process, This new system is simple, accurate and efficient, avoiding wastes caused by the complicated and repetitive process of the traditional method. We have designed the figure of the system progress stream and the structure model, according summarization and conclusion on the basis of our analysis of the materials and files on the china's green food certification.

A. Process Analysis of the System

In the traditional green food certification, pre-trial and trial of program is finished through the preliminarily examine of the county and the PGFO, finally the material of certification is submitted to the CGFDC to review. This web-based distributed system can directly send the data stream to the target server without space limit. The applied documents in this system include *the Application of Using Green Food Logo, Survey of the Applicant and Manufacturing, manufacturing criteria, product executive standard*. The applicants firstly submit the applications to the PGFO server, the PGFO preliminarily examine the applications, and authorizes the testing facilities to test the products of the applicants. Then the PGFO submit the qualified applications to the CGFDC server. And the final result is done by the Green Food Authentication and Review Committee authorized by the CGFDC. The process is shown by Figure 1.

B. The System Construction Mode

The system is using two-tier structure, and the root and leaf nodes are respectively the CGFDC authentication server and the PGFO authentication servers. The system structure is shown by Figure 2.

The PGFO authentication servers are used to process the data stream, including the admissibility of information form the applicant, sending message to the applicant, communicating between the PGFO authentication server and the CGFDC authentication server for data transfer, and so on. The CGFDC authentication server is responsible for the data

record, providing data query and analysis based on Web GIS, etc.

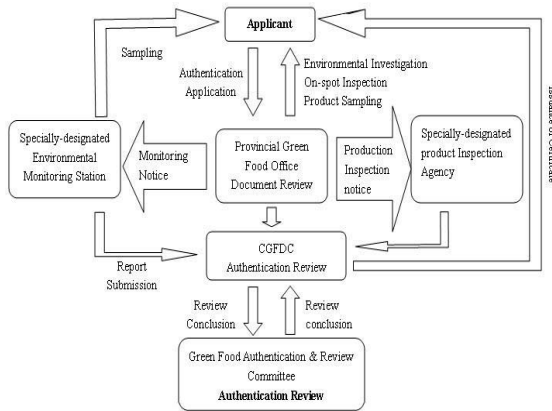


Figure 1. The process of the web-based distributed system

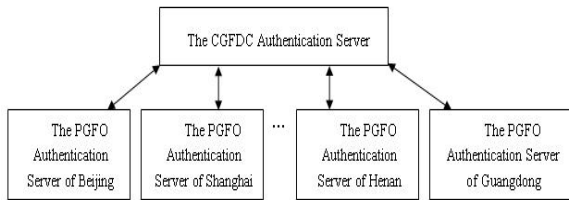


Figure 2. The system distributed structure

III. SYSTEM DESIGN

The database of the System is designed based on the data stream and abstract data model of the System. The function of the System is designed in order to realize the business logic. The information query and analysis functions based on the Web GIS are designed in order to carry out the analysis and supervision of green good manufacturing and the convenient information query of green food products.

A. The Database Design

The system includes various kinds of data including text data, picture data, GIS spatial data, attribute data, and so on. The text data is stored through relational database and at the same time the text data is used as the attribute data in the Web GIS. The picture data is stored in the Corresponding Fields designated folder location. GIS spatial database is stored in the spatial database designed by the GIS desktop software. At the same time, SQL Server 2000 is employed in this system to create and maintain the database, and SuperMap Deskpro 2008 is used to create data source in the form of "SQL+Data Source" to set up spatial database as well as attribute database. In this way, the relational data in the SQL Server is used as the attribute data in SuperMap Deskpro. The database is designed and finished through abstracting entities, and by setting up a entity relationship

model and a logical model, setting the integral restriction, and establishing the relation among tables.

B. The System Function Design

On the basis of the two-tier structure, the function of the system is designed. The whole system is divided into many branch systems in order to optimize the data structure. In this way, the operation of the system eliminates the redundant work and achieves efficiency with clear process, optimized structure and easy operation. The system function is shown by Figure 3.

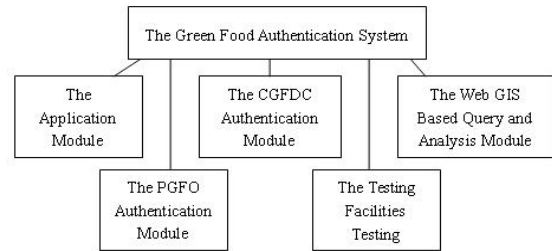


Figure 3. The system function

The application module: applicant information typing-in and uploading; data downloading; data formatting, etc.

The PGFO Authentication module: preliminary examining of the applications submitted; sending qualified applicants list to the testing facilities; submitting the applicants information to the CGFDC Server, etc.

The CGFDC Authentication module: examining and approving the applied materials from the PGFOs; publicizing the final result; filing authentication data, etc.

Testing facilities testing module: testing manufacturing environment of the applicants; reporting and submitting the testing results, etc.

The WebGIS-based query and analysis module: querying the filed authentication data; analyzing the distributions of green food manufacturing, etc.

IV. SYSTEM TECHNOLOGICAL STRUCTURE

The system employs the technological framework of "Windows Server 2003 + VS2005 + IIS6.0 + SuperMap Objects + SuperMap IS.NET"^{[3][4]}. It is shown by Figure 4.

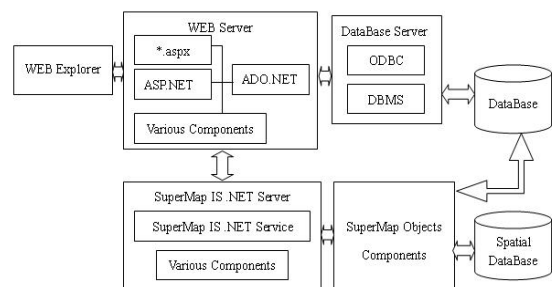


Figure 4. System technological structure

A. Microsoft.NET technology

Microsoft.NET technology is a web-based software development platform supporting all kinds of software designing. It provides an advanced system model for programming new interactive software. It can easily develop web-based services. Microsoft.NET has a rich common language runtime and various kinds of objects to support many programming languages. In addition, it has the cross-language and cross-platform interoperability. In this way, the program design is less difficult under the distributed Internet environment^[5]. The latest platform for Microsoft.NET, VS2005 is used on the platform of Windows Server 2003 to realize the various functions of the green food authentication application.

B. Web GIS Technology

GIS (Geographic Information System) joins the spatial data with computer technology, and based on the spatial database, it processes, analyzes, displays and updates the spatial data, providing services to geographical research, macro-management and multi-purpose design^[6]. Web GIS is a combination of distributed computing technology and GIS. Compared with the intranet GIS, the Web GIS is platform-independent with wide visiting range, simple operation, and its capacity is balanced and efficient and its cost is low^[7]. Web GIS is used in the System as the spatial information. The WebGIS-based query and analysis module of the system is designed on SuperMap Deskpro platform. At the same time the services are implemented in SuperMap IS.NET server environment. The series software Products of SuperMap developed by SuperMap corporation are used in order to build a component-based construction in design of electronic map and services. As the foundation of green food authentication data query, the electronic map carries out the query and analysis of the spatial distribution of the authentication information

V. SYSTEM REALIZATION AND FOREGROUND OF APPLICATION

A. System Realization

The system is realized on Windows server 2003 platform using the VS2005 development platform. The web server is set up in Using IIS6.0, and the GIS server is set up in SuperMap IS.NET. The web server communicates with GIS server through the Component Object. VS2005 is a object-oriented designing environment, web form designs through components and HTML codes, and business logic is realized through loading components and running the server codes. The relational data communication is achieved through objects in ADO.NET. The GIS spatial data sends request to GIS server, and the GIS server obtains spatial data through its objects. The system users include different roles, which are stored within the database. And the power and control of a task permitted by the users are handled by these roles.

B. Foreground of the System Application

At present, there are 219 standardized green good manufacturing bases in China, and the total area of these

bases amounts to 56.35 million mu with total yearly volumes of 29 million tons, and the incomes of about 6.4 million farmers has increased^[2]. The green food certification system will be able to further promote the country's information construction, and improve the people's awareness of green food production. Also the system will bring profit to green food farmers and green food manufacturers, and it will gurantee more and more safe green food coming into the market. Through the survey about desire of 300 applicants, we find that 91% of the applicants wish using such a system for applying for green food certification, 28% of the applicants are in accordance with the cost of using this system. The survey results is shown in table 1.

TABLE I. THE QUESTIONNAIRE OF WISHES FOR USING THE SYSTEM

Survey population : 300				
	Agreement	Cost	Convenience	Indifference
Satisfaction	273	80	27	30
Satisfaction Rate	91%	28%	9%	11%

VI. CONCLUSION

The Green Food Certification is an important measure of food safety control in China. The Green Food Certification system is designed to improve the efficiency of the process and enforce the policies of green food certification. Depending on the system, the applicants could get easy access to edit and submit the application materials and meanwhile, the Authentication and Review committee of the green food certification could conviniently finish the examination and approval. At the same time, the system has the functions of information publication, query, analysis, management, etc, facilitating the supervision of green food and food safety.

REFERENCES

- [1] http://www.gov.cn/zwgk/2009-03/06/content_1252629.htm
- [2] http://www.hljagri.gov.cn/lssp/scxx/200901/t20090106_237023.htm
- [3] Lee Hua, Qi Xindan, Yin Wenqing. Realization of Agricultural Machine Statistics Management System Based on Web [J]. Computer Engineering and Design .2007,28 (20) :5009-5011.
- [4] Beijing SuperMap Software Company. SuperMap IS. NET User Manual [M]. Beijing, 2008.
- [5] Yang Xiaofeng. Design of Light WebGIS Based on .NET Technology - to Xi'an Pollution-free Agricultural Production Environment Evaluation System As An Example [D]. Master Degree Thesis of Northwestern University. 2008.6.
- [6] Wu Lun, Zhang Jing, Zhao Wei. Geographic Information System [M]. Beijing: Electronics Industry Publishing Company, 2002.13-16.
- [7] Du Jiang, Yang Hebiao, Ding Yong. Research And Application of Web GIS in the Field of Public Health [J]. Computer Engineering and Design. 2006,27 (3): 538-540.