

Design of General Command Platform by Means of Modern Technology

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Abstract

This paper presents the design and application of enterprise-class tobacco monopoly management platform. The GIS and GPS technology is introduced into the tobacco monopoly command centre, to set the reasonable layouts of tobacco monopoly licenses, to mark the monopoly information points, to navigate the monopoly law enforcement vehicles and meet the monitoring requirements. Through the investigation and analysis of tobacco monopoly process, the system uses C/S, B/S and M/S modes combined to achieve a geographic data collection, to conduct real-timely the monopoly law enforcement vehicles and complete other functions. With the implementation of tobacco monopoly command center management platform, which can improve the rational allocation of licenses, also can conduct real-timely to intercept illegal tobacco transport vehicles, so as to improve the tobacco monopoly management and command capability.

Keywords: *Command Centre, Rational Layout, GIS, GPS*

1 INTRODUCTION

With the abolition of legal qualification of county level and the centralizations of regional monopoly system and data, how to design a reasonable layout of the tobacco sellers in the whole region, and how to conduct the monopoly law enforcement vehicles in the first time to intercept suspicious vehicle after receiving report calls are the intractable problems under the background of monopoly. Based on GIS (geographic information system) and GPS (global position system) technology, the tobacco monopoly command center management platform is proposed to solve the above problems.

2 SYSTEM DESIGN TARGETS AND REQUIREMENTS

2.1 System Design Targets

Through the construction of Monopoly command center management platform, to achieve the use of existing information resources and information technology for integration, improving and mining, to strengthen monopoly command capabilities, thus, achieving the target "two command, three linkages".

- (1) Taken "two command, three linkage" as a guidance, establish the monopoly integrated command and unified platform, to achieve visualization, refinement and modernization of market management.
- (2) Taken monitor and enforce appropriate separation as a principle, set up two operation centers for the supervision evaluation and command coordination, to achieve the separation of regulatory and monitor.
- (3) Through unified operation from the monopoly command center, achieve unified supervision and regulation to all kinds of resources of the whole region, and evaluate the performance of city (county) board, so as to improve the quality of administration.
- (4) Approved by the Henan Province Tobacco Bureau, take the Hebi City Tobacco Monopoly Bureau as a pilot for the provincial bureau to prepare.

2.2 System Requirements

- (1) After labeling all the tobacco sellers on the electronic map, it can clearly acquire the distribution information and the reasonable layout of tobacco sellers of the whole region, thus, to solve the lag issues of management information.
- (2) After the monopoly law enforcement vehicles access to the command centre via GPS system, can real-time understand the operation of law enforcement vehicles of the whole region, execute scheduling, intercept all kinds of undocumented transport vehicles and find scheduling office nearest to report.
- (3) Labeling the focusing on retailers, undocumented sellers, suspected logistics enterprises and highway checkpoints on the electronic map for classification and annotation, which can maintain and query all kinds of management and execution information;
- (4) Using a unified interface throughout the region, providing hierarchical management function, and the city level users can manage uniformly the resources of the entire region; the counties are only allowed to use their level resources.
- (5) The system can seamlessly connect with existing business system, proprietary management system, customer relationship management system and tobacco logistics platform system, achieving the sharing of cigarette business information, sellers' information, case processing information and logistics information.
- (6) The system can be regularly upgraded with basic geographic information database batch, real-time data and road update data; the update does not affect any application information that constructed on the basis of geographic information.

3 SYSTEM DESIGN

2.1 System Overview

The tobacco monopoly command center management platform based on GPS/GIS uses a kind of auxiliary management mode of tobacco industry to implement innovation, provide basic data for a more comprehensive and effective management and supervision. The application of advanced management methods, innovation patterns and ideas promotes the development of higher level tobacco monopoly. The management platform mainly consists of vehicle monitor and command system, information collection system, information query system, internal management system and other functional modules.

3.2 System Architecture

For the purpose of building monopoly business database and geographic information database, the management platform provide various forms of applications for data processing and query. The system technical architecture is shown in Fig.1.

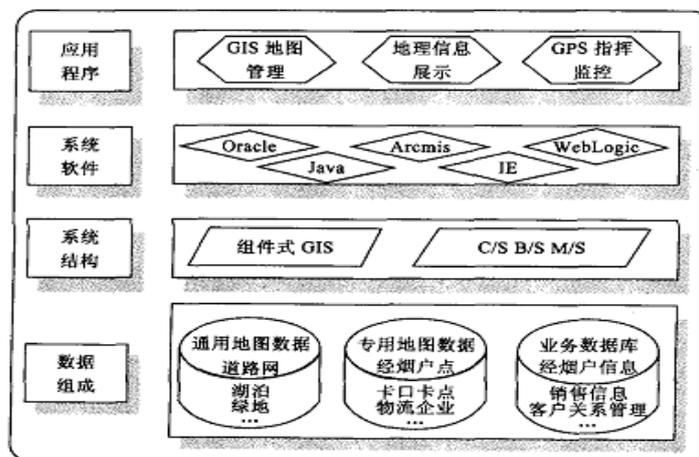


FIG.1 THE SYSTEM TECHNICAL ARCHITECTURE

The geographic information system based on GIS / GPS is built generally with C/S, B/S and M/S architecture to meet different application requirements:

- (1) Due to the basic information query of large number of map and cigarette retailers, the outdoor plot point uses the Mobile/Server (M/S) mode.
- (2) Due to the computer command centre requires fast queries, analyzing data, and scheduling vehicles, the system uses the traditional client/server (C/S) mode.
- (3) The general GIS information query and analysis system uses the browser/server (B/S) mode, performed by the IE browser; the client does not need to install any special software when he queries the interesting data.

3.3 System Security Architecture

- (1) Following strict authentication and limited authorization principle, generally confirmed principle and security tracking principle, the system uses strict security system to ensure data processing and transmission security.
- (2) Providing perfect security measures, be authorized by the authorized users to run on limited authorization principle
- (3) The application system sets up the multi-granularity access mechanism to ensure data security. Not only can effectively prevent the unauthorized users to access from external, but also to reduce the super-user permission to operate the inside legitimate data.
- (4) Satisfying the system design and development of technology related to safety requirements

3.4 Application Modules

According to the requirements and the system architectures of C/S, B/S and M/S, the tobacco monopoly command center management platform is divided into the following subsystems: GPS vehicle location and monitoring system, information collection system, GIS-based inquiry-analysis system and internal management system.

1) GPS Vehicle Location And Monitoring System

The GPS vehicle location and monitoring system is mainly used for the command centre, to locate and monitor the vehicles that equipped GPS terminal. Combined with the GIS application development system, realize the intelligent and spatial visualization management of law enforcement vehicles.

The vehicle terminal receives GPS location information and the collection of vehicle state information, through the mobile communication network timing, spacing or calling to upload data to the GPS control center. GPS monitoring center can keep the vehicle's position and running track at any time. A real-time vehicle location can be displayed on the electronic map, check the properties of the vehicle and reproduce the trajectory of the vehicle.

- (1) The business process flow chart of GPS vehicle location and monitoring system

The business process flow chart of GPS vehicle location and monitoring system is shown in Fig.2.

- (2) The function of GPS vehicle location and monitoring system

- 1) Monitoring center: monitoring center is located in the command centre, configured with scheduling, management, alarm, monitoring and other functions of GIS application software. Monitoring center can talk directly to the driver through the system, for the purpose of rapid command transmission.

- 2) Communication system: a private network connects the monitoring center network to the mobile communication network via the mobile communication data transmission network (GPRS network), to achieve the two-way transmission of vehicle positioning data and scheduling information.

- 3) The GPS vehicle terminal: GPS vehicle terminal is mounted on the monopoly law enforcement vehicles, to locate the vehicles and communicate with the monitoring center.

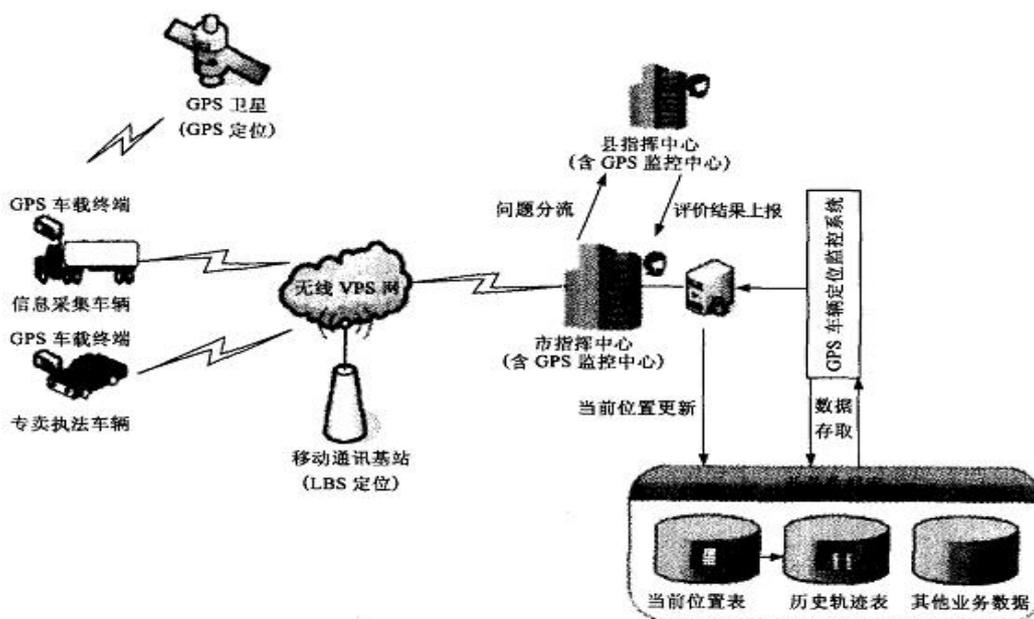


FIG.2 GPS VEHICLE POSITIONING AND MONITORING SYSTEM BUSINESS PROCESS

2) Data Collection System

The data collection system is mainly for specialty personnel, through the handheld and mobile communication network to communicate with the geographic information server and command center. The core of information collection system is the handheld terminal, which is composed of smart handheld terminal hardware, system software, application software, information collection module and other components. The handheld terminal is the daily office platform of monopoly management staff, a special tool for rapid collection and transmission of retailers' geographic position information. Information collection is developed based on intelligent terminal that usually selected in the form of PDA phones. Due to the operation time of B/S mode a little long, the information collection system uses smart client technology, providing asynchronous cache mechanism for users. Smart client application is a thin client; it can provide a rich and fast response interface for the user, provide the ability to work offline, and provide method of local hardware and software resources. Smart client provides users the ability to access information and remote services in a powerful and intuitive client environment, and is used to develop a flexible, user-oriented application, to improve user productivity and satisfaction of effective solution. Information collection system is composed of data acquisition module, mobile communication network and other groups, of which the information collection module is the core system; it includes the server program and PDA program two parts. Positioning technique uses "GPS satellite location + base station location" approach. Information collection system upload retail clients' position information to the space database through mobile communication network, but also can be used as information collection tool of undocumented households and logistics enterprises.

3) Query And Analysis System Based On GIS

The query and analysis system based on GPS includes the following components: license management, case management, quantitative analysis, reasonable layout of sellers, sales management and monopoly thematic issues and so on. Among them, especially in the monopoly feature, classification and annotation are required: the distribution of undocumented sellers, distribution of logistics companies and highway bayonet point and so on.

Through the electronic map can show the each side of monopoly work of the whole region. Since the data using B/S and C/S two display methods, the leadership can directly use the IE browser; the system interface has good usability.

4) Internal Management System

The monopoly internal management system includes abnormal sales enquiries, the same phone orders, the same account deduction, the query of customer attributes modification, the delivery line query etc.

This part is to extract the monopoly system, marketing system, call center and logistics and distribution system data

into GIS system. According the relevant regulations of the National Bureau and the Provincial Bureau, provide the problem finding window and platform for internal management personnel and unit leader. It is a visual aided decision system.

4 ANALYSIS OF KEY PROBLEMS

4.1 Communications between Command Centre and Law Enforcement Vehicles

The system relies on the mobile communication data transmission network (GPRS) to establish a special link between monitoring center and mobile communication network center, to achieve the functions of vehicle calling, sound recording and monitoring the status of the vehicle. System mainly achieves three kinds of communication: data transmission between vehicle and center, talks between vehicle and center, talks among vehicle, driver and command center.

(1) Data transmission between vehicle and center.

The data transmission between vehicle and center passes through the Short Message Service (SMS) or the Short Message Cell Broadcast Service (mobile network support required). For data communications the center initiated, first issued by the monitoring station, via internal LAN, and dedicated to SMSC, then through the GSM by the SMSC network. By the way of point to point Short Message Service (SMS) or Cell Broadcast Short Message, Information will be sent to one or more terminal. For data communications the vehicle launched, first issued by GSM vehicle module, via SMS to SMSC, dedicated to the center LAN via private link, and then through the LAN sends the data to data center server and monitoring workstation.

(2) Talks between vehicle and center.

Talks between vehicle and center are switched via a voice platform between GMSC and monitoring center. For calls the center launched, first through scheduling monitoring workstation screen operation to dial, to GMSC via voice exchange platform interface, then by the GMSC and through the GSM network, connected to a vehicle terminal. The center can launch 30 terminal dealings and switches at the same time. For vehicle -initiated calls, first connected to the GSM network via dial-GMSC, and then via an interface to a central voice switching platform, from voice exchange platform turn to monitoring workstation.

4.2 GPS Point Location

Location technique uses "GPS satellite positioning + base station location". Information collection module with built-in GPS receiver module, with GPS positioning function, can be in a certain precision range to pinpoint the location on a map, and you can display or query their location. By GPS communication interface, you can send the coordinates information to the command center. Because many urban parts or number of events displayed on the map may be more intense, and the precision of GPS may not be fully met by accurate positioning, so when in operation, the first initial positioning using GPS, and then manually select a target location given orientation. Due to the adoption of the "GPS satellite positioning + machine station location", the joint location method, even when GPS signal reception problems arise, the command center can still locate and regulate the monopoly staff through the mobile communication base station.

4.3 Geographic Information Upgrade

Powerful data supports are the indispensable factors to the success of GIS applications. The comprehensive, timely and accurate business data is the foundation for system construction. In management, the establishment of GIS projects require leadership team, equipped with a familiar scene and familiar with the business staff responsible for proofreading and editing the graphic data, and make a series of drawings management regulations and assessment methods, and be controlled from the workflow and system to ensure that GIS accuracy and timeliness of the data. Technically, on the one hand, purchase per year from the provincial mapping institution for the latest geographic data and timely update to the existing system, and timely to update the latest data to existing system; on the other hand, through the detection of professional teams, equipped with a detector and GPS probe equipment, road

troubleshoot the entire region, drawing the latest road map to ensure that roads and other data are current and accurate. The system has the data detection and automatic conversion function. The GIS can automatically convert these data seamlessly, and store the data in ArcSDE.

4.4 Data Exchange with Related Systems

As a dynamic management platform, the integration with other related business systems is also essential. At the beginning of the construction phase of the system, it must take into account the systems that have been put into operation and ongoing (such as the new monopoly system, the marketing system, the call center system, the data center system, the picking system, etc.). By the data interface, the system achieves the combination and sharing in maximum for basic data and business data.

5 CONCLUSIONS

Through the construction of tobacco control center platform based on GIS/GPS technology, we can reasonably plan the distribution of tobacco sellers, timely dispatch law enforcement vehicles throughout the region and solve the hot problems of monopoly management. The smooth operation of the project has strengthened market supervision and standardized services, it has made beneficial explorations and practices, meanwhile the project also has taken a decisive step to achieve the "two command, three linkage" target in Henan Provincial Tobacco Bureau.

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