



## Design and Implementation of Sales Management Information System

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### Abstract

The sales works is one key stage in the whole enterprise operation, which importance is more and more obvious in the tide of market economy. "Market surrounded by enterprises" fully shows the sales center position in the enterprise activities. At present, the enterprise sales management level and marketing system directly influence the sales situation of products and the benefits of productive operation. In this article, more than one year's operation of Jinan Refinery Sales Management System indicates that this sales management system is successful in the aspects of the reform of sales mode, the application of IC card and the join with MIS system of the factory.

**Keywords:** Sales management system, IC card, Network

### 1. Introduction

The sales works is one key stage in the whole enterprise operation, which importance is more and more obvious in the tide of market economy. "Market surrounded by enterprises" fully shows the sales center position in the enterprise activities. At present, the enterprise sales management level and marketing system directly influence the sales situation of products and the benefits of productive operation. The traditional sales flow and management mode still have time colors of planned economy and many disadvantages which are mainly represented as follows.

Traditional sales flow and management mode have too many stages and low efficiency and are easy to make mistakes, which brings many inconveniences to clients.

The business management can not be standardized, and management function and operation function have blurry borderlines, so it is difficult to balance strengthening management and servicing clients.

Business personnel are immersed in the business works and can not bind up to market development.

The capital return and sales operation situation have bad diaphaneity and real-time character, which is not convenient to supervise and control, and is easy to produce leaks and unnecessary capital occupation.

The statistical report forms have large quantities and different sources and formats, which often induces mutual conflicts because of different provenances.

The applied level of computer is low, which only limits to bill prints and material management, and the sharing degree of information is very low, and the diaphaneity and real-time character are bad, so the leaders lack reliable references to make decisions.

To make the selling of our factory closely follow the developments of the market economy, the factory director puts forward reforming present mode, strengthening management, emphasizing market development, improving services and servicing clients. Therefore, combining characters and practices of our sales works, we should face the developments of market economy, use foreign advanced experiences as references, firstly establish sales management system and actualize the modernization of sales process and management when preparing to construct Jinan Refinery electronic information technology application project. Our main missions and aims are the following four aspects.

(1) Establishing a set of safe, reliable and perfect sales management system, reasonably adjusting the functional borderlines between management and operation, realizing microcomputer, systematization, network and scientific sales management works, combining with factory information system and fully enhancing the modernization level of enterprise management.

(2) Strengthening management, unifying provenances, ensuring normative and perfect data management, detailed and uniform report forms, exactly reflecting the sales and capital situation of the enterprise, enhancing the objectivity, real-time character and diaphaneity of information feedback, building up leaks and reducing losses.

(3) Establishing IC card applied management system, realizing picking up the goods by cards, and offering convenient and

fast services for clients.

(4) Providing corresponding sales analysis, establishing corresponding leader inquiry system, and offering references for enterprise forward decision-making.

## **2. Total project**

### *2.1 System mode*

The system mode is the most pivotal factor to decide whether the system can be successful. According to the aim that Jinan Refinery sales management information system construction wants to realize, combining with the requirements of market economy and the direction of enterprise restructuring, through almost half year's argumentation, we establish the system mode which takes market as the center to realize the separation of sales business management and operation and strengthen market developments, which takes clients as the center to reasonably adjust the distributions of sales spots, and establish sales and financial central business center, which takes capital as the center to connect sales system and financial system and strengthen finance supervision.

According to this mode, aiming at the situation that our factory has three transport means including railway, auto and pipe transportations at the same time, we decide to adopt two operation and management modes. To railway transport (pipe transport) means, the factory will transact consignment procedures, and because this work is mainly represented as management, so the trade process is completely managed by network, and the operation flow is that when the planner sets down sales plan, the bill of goods needing railway transport will be downloaded to the transport department management system, and the transport department carries out the railway transport plan according this bill and returns the results to the planner system to adjust, and if the plan has been carried out, the bill will be as implementing plan and be downloaded to the railway control or railway shipping or railway measure system, and when the vehicles arrives, the shipping plant will implement shipping and inform quality supervision department to inspect, measure and weigh up and the control department allows departure. After this, business personnel transacts user's carriages or insurances and goods invoices according to the implementing plan and the shipping situations of vehicles, and charges account in the finance department after client returns funds, and the business personnel and planner can manage the capital returns at any moment. The pipe transport is easier than this, so we don't describe it again. To auto transport means, considering the characters of dispersive spots, too many batches, procedure transacted by the client himself, to convenient for client, we adopt management combining card with network in the trade process. Aiming at those unreasonable aspects in the former mode such as business personnel's two functions of making out invoices and contacting business mixing, distribution of sales operation according to product kinds, decentralization of trade work in the finance department, sales business office, various picking spots and weighing spots, we adopt the mode which separates the business personnel's double functions of making out invoices and contacting business and reserves his right of invoice control, and centralizes the function of financial balance and the function of making out invoice to sell and pick up goods at the locale.

### *2.2 Network project*

As one important subsystem of factory CMIS, sales management system independently forms a network, which adopts 100M fast internet, ATM exchange technology (fiber trunk/ twisted-pair/ special MODE line together) and client computer/ server mode, introduces IC card technology, combines shipping spot terminal by the card and network, and connects with factory integrated information management system CIPROS through special port.

### *2.3 Software and hardware environment*

The main hardware facilities of this system include two sets of servers (double computer hot backup), nineteen sets of client computers (IBM PC), ten sets of POS (S900/i), ten sets of IC card read-write machine (ICT800) which IC cards are CPU cards with perfect information encrypting system and firm and high security, and other relative supporting equipments such as printer and modem.

The basic composing of the system includes that servers use Windows NT4.0 Operation system and ORACLE Enterprise 7.3 Server, client computers use Windows95 Operation System and ORACLE Enterprise 7.3 Client, and the communications between servers and client computers are realized by TCP/IP agreements.

### *2.4 Development tool*

The main development tool uses PowerBuilder6.0/ C++ (PowerBuilder is the development tool specially designed for enterprise client/ server mode application programs by Sybase Corporation, and it supports manifold platforms and possesses the abilities to develop application programs among different platforms).

## **3. System design**

### *3.1 Design principles of system*

Facing market, strengthening management, and actualizing science, standardization and network.

Centralizing to work, unifying servicing, simplifying procedures, servicing clients and improving services.

Holding reasonable factors in the former sales flow and management mode, daring to reform, properly adjusting, separating the business personnel's double functions of making out invoices and contacting businesses, reserving invoices control right of business personnel, centralizing functions of financial balance and selling, picking up goods and making up invoices, realizing the separation of management and operation, and emphasizing market development.

Putting the trade and management information on the network timely, and ensuring the real-time character, diaphaneity and security of the trade process and data.

As one subsystem of factory information management system, sales management system must insure the connection with the whole network system of the factory, avoid repeat constructions, and consider the expansibility of the system. Under the premise of ensuring technology and advanced facilities, we should insist on the practicality principle and reduce the investments of the system.

### *3.2 Function and structure design of system*

According to the new demonstrated sales system mode, combining the practical situations of Jinan Refinery, the whole sales management system possesses four functions including sales plan management, sale/ balance management, picking/ consignment management and finance/ statistic/ inquiry decision-making management (see Figure 1).

(1) As the chief and control center of the whole sales management system, the sales plan management system mainly takes charge of the following aspects.

Making and adjusting sales plans according to the production plan established by the factory plan department.

Adjusting and implementing sales plans according to the implementation and production repertory of railway plans.

Signing, modifying and implementing self product sales contracts.

Managing control information of sales trade operation according to clients' reputations and market situations.

Managing prices and relative preferential policies.

Making and issuing IC cards and managing their uses.

Managing clients' files.

(2) The sale/ balance management system mainly takes charge of the following aspects.

Drawing in or refunding users' capitals and filling money into the user cards and drawing money.

Managing sales picking and consignment procedures.

Balancing and managing invoices.

Managing users' inquiry.

(3) The picking/ consignment management system mainly takes charge of the following aspects.

Collecting data of consignment quantities and managing network.

Realizing distribution/ consignment operations according to the information of user cards.

Managing the inquiries of user card information.

Making statistic of entering/ consignments in own spot.

Railway control and shipping management.

Other management systems such as quality inspection system.(4) The finance/ statistic/ inquiry decision-making management system mainly takes charge of the following aspects.

Sales accounts credence and statistic management.

Supervision of sales operation data and collection statistic and sales situation analysis.

Inquiry of sales information for relative departments.

Factory director inquiry system which can be references to make decisions for factory leaders.

### *3.3 Module design diagram of system*

The module design diagram of the system is seen in Figure 2.

### *3.4 Module functional design of applied software*

(1) Design of database application and maintenance management system

Dictionary maintenance, which includes net spot management, operator management, product coding management, business personnel management, purview management, plan coding management, provincial coding management, invoice index management, product variety purview management of business net spots.

System initialization management.

Data settlement and data codes management.

Daily balance/ monthly balance/ yearly balance management.

Products daily repertory management.

Daily output and self using quantities management.

Data copying and recovering management.

(2) Design of IC card initialization system

Accepting empty card according to its transport password and the content of batch card.

Creating keys.

Establishing file structure.

Creating card number.

Dispersing keys.

Explanation: All cards need to be initialized before they are sent to users, and the initialization includes establishing data files and writing card password and other relative keys into the card.

(3) Design of sale and statistic NAC management system

Signing in/ out communication flow management.

Blacklist management.

POS picking varieties maintenance management.

Picking flow management.

Dial-up management.

Loading and installing of POS application system.

Explanation: As one part of POS system, NAC is used for data transmission between front POS machine and back database.

(4) Design of sales planner management system

Making sales plans which include heavy oil scheme, liquefied petroleum gas scheme, schemes of gasoline, kerosene and diesel oil, self monthly scheme.

Making railway transport plans which include monthly plan of products of gasoline, kerosene and diesel oil, added plan of products of gasoline, kerosene and diesel oil, monthly plan of heavy oil and asphalt, added plan of heavy oil and asphalt.

Plan statistic managements which include consignment of national plan products, consignment of self products, accomplishment of kerosene resources, implementation of kerosene supply plan, sales season report of finished oil, heavy oil and liquefied petroleum gas, comprehensive report forms of material supply statistics.

Code maintenance managements which include users list of kerosene supply implementation table, products list of material supply statistic comprehensive report table, users list of heavy oil plan, users list of liquefied gas plan, provincial list of scheme plan of gasoline, kerosene and diesel oil, users list of various railway transport plan.

Price managements which include present planned price management of auto transport products, present self selling price management of auto transport products, present price management of railway transport products, and present price management of pipe transport products.

Users' files maintenance and management.

Explanation: The sales plan management is one manageable function of sales management system.

(5) Design of sales contract management system

Contract catalog inquiry management.

Signing contract management.

Performing contract management.

Purchase and sale agreement catalog inquiry management.

Purchase and sale agreement management.

(6) Design of sales business personnel management system

Client files maintenance management.

Business managements which include picking plan management, sales purview management, and overdraft allowance management.

Railway transport invoice managements which include product invoice management, railway carriage invoice management, railway transport goods invoice register, invoice inquiry, value-added tax invoice collection, copying and declaring tax management, and leaving factory bills maintenance of shipping products.

Code table maintenances which include self user setting, product variety bill of picking plan.

Statistic inquiry managements which includes sales plan inquiry, product price inquiry, daily consignment statistic, railway transport consignment statistic, invoice statistic, product repertory statistic, comparison between auto transport consignment and invoices.

System maintenances which include month end disposal, unlocking golden tax card, locking golden tax card, setting parameters of golden tax card.

(7) Design of pipe transport management system

Pipe transport plan management.

Pipe transport leaving factory bills management.

Pipe transport balance management.

Statistic management.

Maintenance managements which include unlocking golden tax card, locking golden tax card, setting parameters of golden tax card.

Tax control invoices management (printing/ canceling/ balancing).

Value-added tax collection.

(8) Design of transport and sale section transport department management system

Monthly vehicle demand plan management.

Daily vehicle use plan management.

Daily vehicle admission informing management.

Goods transport bills management.

Transport daily report/ monthly report management.

User maintenance.

Spots/ bureaus arrival maintenance.

Products maintenance.

Self-provided autos management (auto renting management, auto renting fees management, servicing management, servicing fees management and so on)

(9) Design of transport and sale section chief management system

Comprehensive inquiry managements which include day/ month/ year sales inquiry, sales plan inquiry, contract inquiry, agreement inquiry, invoice statistic, railway transport consignments statistic, price inquiry, user inquiry, funds return statistic inquiry, comparison between auto transport consignments and invoices, product repertory.

Selling supervision.

Special favors management.

(10) Design of factory director inquiry management system

Sales plan inquiry.

Sales statistic inquiry.

Sales financial income and expenses inquiry.

Sales analysis inquiry.

Quality inspection statistic inquiry.

(11) Design of business window sales management system

Cards managements which include user card issuance, picking card issuance, card password management, loss reporting and canceling, card logout, card identification, user card withdrawing, card operation inquiry.

Batch bill managements which include batch bill editing, batch bill printing, batch bill inquiry, batch bill canceling, batch bill balancing, batch bill withdrawing, batch bill price adjusting, editing batch bill picking card, transacting new batch bill picking card.

Invoices managements which include invoice selection and printing, invoice inquiry, invoice canceling, invoice balancing, invoice statistic, tax report of golden tax card.

Picking card balance.

Business statistic inquiry managements which include capital uses, user account checking, product sales statistic, products month/ year sales analysis.

Statistic report forms managements which include sales day/ month report, user purchase day/ month report, consignment report forms, unprinted invoices and report forms.

System maintenance and abnormal operation treatments which include communication port setting, abnormal operation record, unlocking golden tax card, locking golden tax card, ports management of accounting system.

Sales window management system of agency shipping (subsystem), which includes client files maintenance and user card issuance, picking editing (car number, variety, price, quantity, and money), balance, tax control invoices management, ports management of accounting system, value-added invoice collection.

Sales window management system of gas products (subsystem), which includes client files maintenance management, picking editing (car number, variety, price, quantity, and money), batch bill management, invoice management, operation inquiry, statistic report forms management, system maintenance management, tax control application management, ports management of accounting system, value-added invoice collection.

Explanation: The business window management system is the main stage of the sales system, where two subsystems of sales window management system of agency shipping and sales window management system of gas products are designed according to actual situations of our factory.

#### (12) Design of business window finance management system

Deposit management.

Balance management.

Offset account management.

Period balance management.

Check-out management.

Cash refundment management.

Check clearance account management.

Finance inquiry management.

Accounting system ports.

#### (13) Design of auto transport weighing management system

Taring management.

Gross weighing management.

Balance and out certificates management.

Weighing statistic inquiry management.

Consignment statistic management.

System maintenance management.

Card inquiry management.

#### (14) Design of auto transport consignment management POS application system

Signing in/ out managements which include equipment signing in, equipment signing out, blacklist obtaining, operator signing in/ out.

Operator management.

Facility initialization (telephone setting, spot number setting, and time setting) and operation parameters setting (light oil ton/ liter parameters setting, operator increase or deleting management).

Inquiry managements which include card inquiry, picking record inquiry, operator inquiry, picking variety inquiry and blacklist inquiry.

Consignment managements which include read-write operation, consignment trade and consignment trade canceling.

#### (15) Design of railway control management system

Vehicle entering factory management.

Daily vehicle admission management.  
Actual leaving factory vehicles management.  
Vehicles distribution management.  
Task bills management.  
Simulation management.  
Shipping plan management.  
Handing over and taking over management.  
Daily report management.  
Dictionary maintenance.  
(16) Design of railway shipping measure management system

Current leaving factory bill management.  
Daily vehicle admission informing management.  
Shipping management.  
Empty measure bill management.  
Manual measure input management.  
Leaving factory bill management.  
Manual measure leaving factory bill management.

(17) Design of dynamic orbit weighing management system

Actual shipping management.  
Daily vehicle admission informing management.  
Empty measure bill management.  
Measure bill management.  
Dynamic weighing measure.  
Oil products leaving factory bills.

(18) Design of static orbit weighing management system

Actual shipping management.  
Daily vehicle admission informing management.  
Empty measure bill management.  
Measure bill management.  
Single vehicle taring.  
Single vehicle gross weighing.  
Patches weighing.  
Oil products leaving factory bills.

(19) Design of sales section sales statistic management system

Product sale statistic day/ month account management.

Report forms for General Corporation which include sales month table of enterprise oil finished products, direction month table of enterprise oil finished products, transport and storage month table of enterprise oil finished products.

Market marketing statistic month report.

#### **4. Applied effects of system**

Since Jinan Refinery sales management information system was used, it obtains obvious economical benefits and social benefits and wins extensive recognitions, which can be summarized in the following aspects.

The management level has been enhanced.

The work efficiency has been enhanced.

The labor intension has been reduced.

The mistake ratio has been reduced.

The clients have felt conveniences.

The labor costs have been reduced.

Before the sales management system was used, clients needed half day at least to transport oils form entering factory to go out factory, and needed to arrive several places and make out several invoices, and they complained “they almost need to arrive every place of the factory to transport oils one time”. But after the sales management system is used, the relative personnel of transport and sale section, finance section and other sections are centralized together, and the sales balance center was established, which works at the locale, and the IC card technology was introduced, and it is very convenient, fast and safe to trade using cards. At the consignment spot, weighing, invoices printing and go-off certificate are completed in one time, and it only needs half hour from entering factory to leaving factory, and the clients’ waiting time is reduced obviously, which makes clients obtain many conveniences. Furthermore, the balance center also real-timely displays the product price from the net through big screen to convenient for uses to know.

Before the sales management system was used, various sales stages were independent, and the responsibilities were blurry, the statistic, inquiry, account checking, report forms depended on handworks, which wasted energy and times very seriously. The sales situation, repertory situation and capital returns could not be grasped timely, which produced many difficulties to reasonably arrange, exactly make decisions and control real-timely. When the sales management system was applied, various sales stages had been connected through computers, and all data were “running” on the net, and the data and information can be sharing, which overcomes the above various advantages. For example, it usually needed transport and sale section transport department a few days to complete one work before the sales management system was used, but now this work only needs a few hours. The statistic and inquiry which often made personnel headache ago can be printed by pushing button, which fully reduces labor intensions and enhances work efficiencies. For example again, one operation personnel in transport and sale section transport department ago took charge of not only product salesmanship but also invoices. When he did sale promotion, there were no personnel to make out invoices for clients, but when he made out invoices at “home”, he couldn’t to do sale promotion. After the sales management system was applied, the mode is changed, and the operation personnel only needs do sale promotion and develop market intently. There are special personnel to take charge of sales invoices, and the product prices are transferred from the net, which has transparent and clear responsibilities and avoids human factors. The sales management system specially designs factory director and section chief inquiries, and the leaders can inquiry sales plans, sales statistics, sales financial income and expenses and product repertory at any time, and can do sales analysis according to appointed conditions, which fully supports leaders to manage, control and make decisions as viewed form the macro-standpoints.

Before the sales management system was used, at auto transport shipping spot, it needed eight personnel to manage oils distribution, make out lading bill and go-off certificate. Now clients use IC card to pick up the goods, which only needs brush card on the POS machine, and doesn’t need make out invoices by hand, and this work only need two personnel, accordingly the labor costs are reduced for the enterprise and the economical benefits are increased.

One year’s operation indicates that this sales management system is successful in the aspects of the reform of sales mode, the application of IC card and the join with MIS system of the factory. The system operation is table and reliable, and achieves the design requirements. This system is one successful exploration of the enterprise in the information-based construction, and exerts active influences for the enterprise to improve service, strengthen management, development market and increase benefits.

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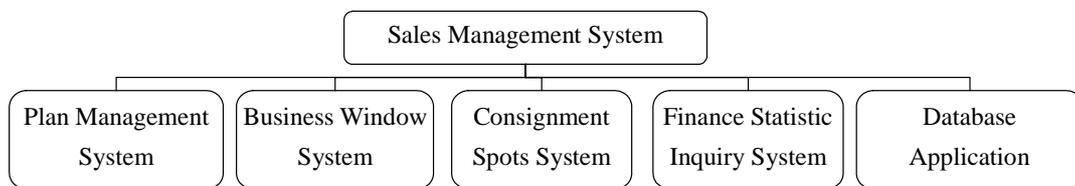


Figure 1. Function and Structure Diagram of Jinan Refinery Sales Management System

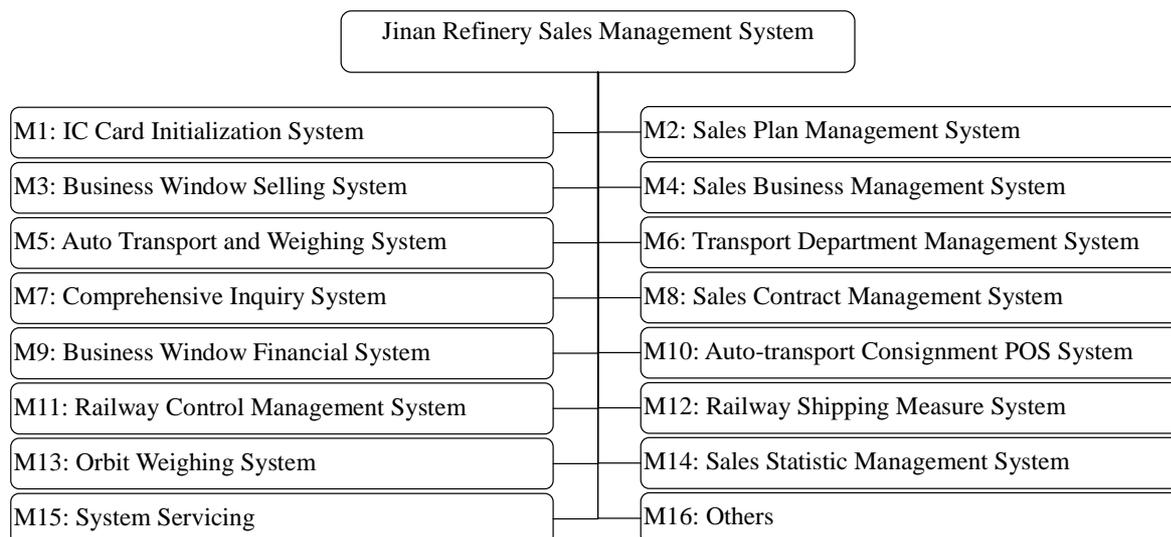


Figure 2. System Module Design Diagram