Construction of the Unified Logistics CRM Information System Platform

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Abstract： By analyzing the construction of customer relationship management and the technology of unified information system in logistics industry, the author, from the angle of customer participation, proposes a creative model of system design and application for the unified information system in customer relationship management. Supported by computer telecommunication integrating technology and internet technology and directed by users' information ideas and accepting way, the model aims to set up an interactive logistics unified information system integrating decision support, interactive communication and customer's virtual system and prediction. The system presents convenience in service and ubiquitous information service in form and practice. It takes advantage of information technology to know well of customers' individual needs, so as to realize the seamless connection between demand and service and make customers participate in the system, which helps to achieve efficient communication and management between enterprises and customers.

Keywords: logistics; customer relationship management; unified information system

1. INTRODUCTION

The Customer Relationship Management (CRM) system in logistics enterprise is the core of inner management and external window of the enterprise, covering the two customer relationship management models --B2B and B2C in logistic e-business, and works to promote, maintain and re-develop the relationship between logistic enterprises and customers. Presently most of the CRM systems in logistic enterprise can only adopt one-way passive service rather than modern high-tech to promptly meet customers' changeable needs. Unified Information System (UIS) of CRM is the very one to fill this historical gap. UIS in CRM is an intelligent system and creative application in the process of highly development of information technology. It is an attempt of a new management model, mainly the integrate application of CTI (Computer Telecommunication Integration), computer telecommunication and the Internet. Besides various ways of information service supplied by the Internet, CTI also integrates telecommunication means such as cell phones and the Internet to provide easy and convenient service, reflecting the ubiquitous information service model in form and practice. CRM centers on customers' needs and knows customers' individual need well through information technology, realizing seamless connection between demand and business [1][2].

2. THE ARCHITECTURE OF LOGISTICS CRM INFORMATION SYSTEM PLATFORM

2.1. Targets and ideas of constructing the system platform

The common fault for most present logistic enterprises is weak customer relation management. In executing CRM, logistic enterprises over-emphasize technology, not paying so much attention to sort out the basic process of the business. However, the true nature is not technology but management ideas [3]. A lot of problems in logistics customer relationship management are in emergent need of solution. Firstly, common logistics information systems are developed for inner management and they are relatively weak in customer management and short of communication and interconnection between themselves and customers, therefore, they can not realize the business chain management in the whole process. Secondly, coverage rate of the system is not deep enough. Customer service plan and management plan can not be executed in the system and do not play a direct role in it. The system also lacks the functions of collecting service information and customers' feedback as well as interconnection. The third problem lies in the functions of the system. It is not unified integrating information consulting and analyzing one. Means of consulting lag behind, most of which are mainly letters and do not make full use of modern telecommunication and the Internet. That will cause lagging information and passive management decision. Unified information system in CRM should practically solve the problems in management ideas and process, to make CRM progress from over-labored factors to scientific process management and two-way interactive communication, so that customers will, as partners, , get to win-win interest together with the enterprises and gradually make stereoscopic and highly intellectual logistic management come true [4].

The core objective of the Unified Information System (UMS) of Logistics CRM is to establish a unified information interactive model and make the omnipresent in-

formation service system work. It features the fusion application of computer telecommunication integration technology and Internet technology, using frequently used communication tools such as mobile phones, PHS, and the Internet, which common users are dependent on, in their daily life and work. Thus it lays a solid foundation for the application of the Unified Information System [5]. We use an iterative method of system construction and development in the system and progressively deliver the user function module in a user-driven way in the system construction. We also reserve a programmable interface in the system and establish a background function module of a virtual development system to construct and build a new user application module in the background function module, with the purpose of meeting the demand in the reconstruction process of the management. The implementation of a differential strategy through a unified information system of Communication-Enabled Processes can make customer service business processes more intelligent, so that the system can create new value and get user's support.

2.2. General Description of Technology for Building the System Platform

Logistics CRM is designed for general users and customers of all age intellectuals. It's practical and easy to operate. So a B/S (Browser/Server) Web browser is the most appropriate means. The construction of the evolution of intelligent communication framework integrates various communication accesses to customer communication business and workflow, enabling users flexibly deploy its communication resources in all business and management processes to keep pace with the development of the dynamic business needs. In the development of the system, the technology of ASP.NET, Windows Sever2003 and SQLServer2005 can be used to build the unified information technology system. Distributed data is delivered with XML based on Web core for interactive communications among various computer network systems, programming languages and operating system environments. Main hardware includes GSM modem, the CTI server, TTS (Text To Speech), ISMG short message gateway devices, NGN (Next Generation Network, a next - generation networking equipment), etc. [6]. Selection of NGN equipment and ISMG hardware in large enterprise information system will greatly improve the service ability, but the cost is higher; the systems with small concurrent capacity such as GSM modem, CTI server can better meet the needs. With the interconnection exchange agreements between operators, mobile phone users of China mobile, China Unicom and China telecom, who only need one or more cell phone cards in GSM modem, can send and receive SMS. On technology, the open programming interfaces like the second development package and API pro-

vided by manufacturers are made use of for development.

The Framework of Logistics CRM unity information system is showed in **Figure 1.**
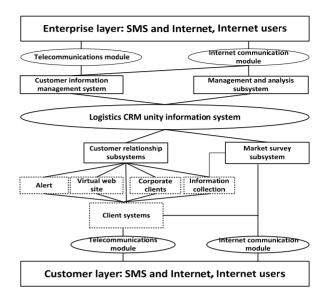

Figure1. The Framework of Logistics CRM unity information system

The design of logistics CRM Unified Information System workflow:

Internet users: PC, PDA, palmtops and mobile phones can be used to get access to the Web page directly to browse and submit information, and set feedback E-mail and mobile phone numbers and so on.

Mobile phones and other mobile users: Major functions include mobile phone SMS, voice - over – IP, automatic voice response, automatic voice calls and voicemail and so on. Send the request information to the CRM system in a canonical format → verify the information of mobile users→ analyze whether the information format is in line with the standards (if not, then return to help information, and adopt a unified information field coding method → analyze the standardizing content → save it to a Database → Web publishing→ return to the user the confirmed information. As showed in algorithm 1.

Notation
I_r the request information
S the CRM system
$F( )$ format ( )
ST the standards
I_h help information
$A( )$ analyze ( )
C_s the standardizing content
D Database
$W( )$ Web publishing( )
I_c the confirmed information
U user

Algorithm 1. Procedure of the request information

Input: the request information

1. $S \leftarrow \sum_{i=1}^{n} Ir$, $1 \le i \le n$

2. If $F(\sum_{i=1}^{n} Ir) \notin ST$ Then $U \leftarrow I_h$, $1 \le i \le n$

3. $D \leftarrow A(\sum_{i=1}^{n} Ir)$, $1 \le i \le n$

4. $W(\sum_{i=1}^{n} Ir)$, $U \leftarrow I_c$, $1 \le i \le n$

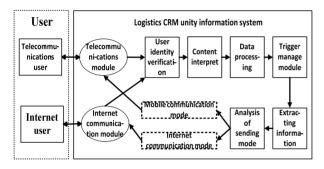Output: Web publishing & the confirmed infor-

Figure2. The work flow of Logistics CRM unity information system

3. DESIGNING SUBSYSTEMS OF THE LOGISTICS CRM UNIFIED INFORMATION PLATFORM

3.1. Data Analysis and Management Subsystem

Data analysis and management subsystem play a management role in Logistics CRM Unified Information System. They supervise, examine, analyze, count and manage all the information. As for operation permission, they are high power modules, and they may authenticate the information of the registered users, including the authentication of communication means like user mobiles, E-MAIL so as to enhance the safety level of the system and the credit of information resource system.

In the information society with customers as the core, customer products and services demand is becoming " personalized ".The Logistics Unified Information System must realize 4C ' S operation and management model. That is: Customer (Customer's needs and wants), Cost (Cost and Value to satisfy consumer's needs and wants) Convenience (Convenience to buy), Communication (Communication with consumers) to tap the potential value of customers, and exactly keep updated with the

trends of customer individual demand. The system also utilizes logistics Products Association of Product To Product (P2P), the relationship between logistics products and customer, that is, Product To Customer (P2C) to make analysis, and then divides the customers into modular groups according to the demand network to find target customer groups for specific products. Rules of well - known client 8/2/2 shows that 20% of the high - end customers create 80% of the profits made by enterprises, while half of which were lost by the 20% of the bottom customers who don't make any profits. Therefore, by analyzing the customer data, Logistics Information System can find out the 20% of the high - end clients and the customers who are in great need of development .Besides giving personalized guidance and training to the 20% of the bottom customers, the System carries out specific module management to help enterprises make more profits.

3.2. Customer Relationship Management Subsystem(s)

The Customer Relationship Management Subsystem is the key to the CRM system of the Logistics, which consists mainly of five modules, that is, Customer Information Acquisition Module, Query and Notification Module, Client Module, Enterprise Customer Management Module and Module of Customer Relationship and Early Warning. The five modules should be complementary to each other, sharing and transforming their information. Among them, Module of Customer Relationship and Early Warning can be used information monitoring.

(1)Customer Information Acquisition Module

The module is mainly aimed at accumulating the customer information that is collecting the customer company's name, the responsible person and telephone number, E-mail address, the scope of business and service requirements. The CRM system of the Logistics is based on the establishment of customer's base data. The forms of data collecting consist of CRM system online survey, user registration, product launches or other conferences, and customers' active consultations. Enterprises can get collected customer information intelligently analyzed through the CRM Unified Information System and establish customer modules of different groups by using Information Behavior Analysis of Mechanism, providing a clear track of individual logistics service products.

(2) Query and Notification Module

The Unified Information System of Logistics CRM is mainly about human-computer interaction, using various query modes: the Internet mode, the telephone mode and the mode of mobile-phone messages. The system provides transit goods, the arrival of goods, prices of logistics, fright information, empty information and storage information query. Telephone voice query is mainly IVR (Interactive Voice Response). Users can use the method of telephone dialing to input waybill a number, service

number and service option and so on for self-help information. The mode of mobile phone short message is to query through "unified information plus encoding service number". According to the service demands, the unified information system can trigger the automatic extraction of database information in accordance with the conditions for customer notification. There are three ways of customer notification: First, E-mail notification; Second, SMS notification; third, automatically dial the customer telephone conversation through CTI Voice Server, transferring it to WAV audio format information through TTS software and notifying customers through auto-playing notifications.

(3)Customer System Modules – Virtual Website System

"Customer System" is a special operating module of the Unified Information System of Logistics CRM, mainly focused on fixed and large customers .It distributes to clients independent-dominating virtual websites and space. All the clients can log into the system through this module, which uses a virtual system mode and are assigned three-level domain names. Background management such as Web Page Template selection and adding system columns and so on can be conducted by customers .Non-private knowledge columns and comment column can be opened to the public so that the users regard the system as their site, where they can manage and maintain the exchange of logistics system information to increase the degree of customers' loyalty and love to the system. Customers can use the user names and passwords distributed by the unified system for receiving, querying and browsing the website, and logistics service trade through the Internet and mobile phones. Through such a benign cycle, enterprises and customers can build a strong relationship so that the enterprises have stable customer resources and maintain their edge in the market competition.

(4) Customer Management Module

Enterprise customer management module is a kind of operational CRM module, collecting large quantities of logistics information, market information and customer service information for market and service integration, standardization and procedure. Its service mainly consists of customer maintenance, project tracking service, service customization, logistics information management and process service monitoring, and so on. The use of decision information technology in the Unified Information System of Logistics CRM can transfer logistics information data to valuable, interesting and reliable information for customers, which will be sent to customers through SMS and E-mail. The intimate service mode can promote the deepening development of customer relationship. The Unified Information System supports online transaction between customers, automatically recording the data for current account transactions for two sides' query and confirmation and notifies customers through SMS, which customers can confirm in the same way.

(5)Modules of Customer relationship and early alarm warning

Modules of Customer relationship and early warning, a collaborative CRM, is to achieve a full range of services and personalized management, mainly providing ways of early warning services: regular review, festival greetings, birthday wishes, service tracking, state tracking, process improvement and maintenance, customer complaint handling and customer feedback, all of which use the classification of time, module and type and early-warning mechanism. Enterprises can use the early warning system for all kinds of information processing and analysis in a timely manner, tap valuable information, and establish a mature and quick customer feedback mechanism, which enables customers to easily communicate with each other through SMS and the Internet in the "customer system".

4. EXPERIMENTS AND EVALUATION

4.1. Experiments

In this section we describe the experiments that we carried out on real-world Logistic CRM data sets. We chose these sets because they are publicly available.

There are voting systems in our Unified Logistics CRM Information System Platform, which is designed to collect the users' feedback. The users' review is presented in scores (0-100). If the user thinks the platform is really helpful for them in logistics business, they will evaluate it with a higher score.

We collect the users' remarks in four logistics web sites in 120 days, and compare the average evaluation scores, before and after the system are used. The results are showed in table1.

Table1. The average evaluation scores of 4 logistic sites, before and after the system are used

	site1	site2	site3	site4
Before	63	67	71	61
After	76	79	84	83

Figure3. The comparison diagram of average evaluation scores of 4 logistic sites, before and after the system are used

4.2. Evaluation

As can be seen in Figure3, the scores of the 4 sites after using our system platform are outperform that of previous without the help of the proposed platform. The result for the real-world data sets proof the effectiveness of the Unified Logistics CRM Information System Platform. However, we notice that the improvement of the users' review in the experiment may be affected by other factors. For example, the site4 is the worst one in users' review before using the proposed platform. The suddenly increase in the scores might be partly the contribution of the advertisement promotion during the days experiments are carried out.

At least the results of 3 sites in our experiment clearly proof the proposed Unified Logistics CRM Information System Platform significantly outperforms the previous situation. The results for the real-world data sets support this conclusion.

5. CONCLUSION

The breadth and depth of the Unified Information System of Logistics CRM is one of the manifestations of the management level. The modernization and digitalization of CRM is the only way for the development of logistics enterprises. The Unified Information System is a Digital Innovation of service model based on the reality of the information society. The ways, methods and means adopted in application suit modern enterprises, people's living habits in this information age and the way to accept information thinking as well, which matches the fast and convenient feature of unified information. The integration of system and internal operational structure provides the possibility of customer orientation and evaluation. CRM platform brings to customers faster and more effective services keep updated with the trends and learn the needs

of customers more accurately to provide suitable services for customers in time. In conclusion, the Unified Information System of Logistics CRM is not only an innovative application, but also an information thinking and management reform. It's the specific measure and practice of enterprise information management and an enterprise information system for sustainable development.

6. ACKNOWLEDGMENT

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