The Design of Operator Multi-channel Marketing System in the Context of Big Data

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Abstract. Telecom operators have a large number of customer data data and communication behavior data, which are typical data -intensive enterprises. These data contain a large amount of important information that is valuable to the development of the enterprise, so operators have the innate advantages of developing the "big data" application. The purpose of the research in this article is: (1) Detish, summarize, process, and analyze the large number of customer data possessed by operators and communication behavior data generated in actual operations to generate data warehouse tables; (2) help telecommunications operations operation Multi -channel marketing systems are designed and realized. Realize the integration of lightweight data warehouses through ETL (Extract/Transformation/load) data processing; (3) Combining real -time dynamic decision -making functions to help the marketing department of telecommunications operators achieve marketing target group screening, marketing target customer group segmentation, thereby improving the marketing efficiency of operators.

Keywords: big data, data extraction, data analysis, marketing

1 Introduction

As the user market users tend to be saturated, the growth rate of users of telecommunications operators gradually grows slowly. Traditional voice business consumption is gradually replaced by data business consumption. Traditional telecommunications marketing is difficult to promote user consumption and increase operator income. In addition, telecommunications operators have a large amount of customer data data and communication behavior data, which are typical data-intensive enterprises. These data contain a large amount of important information that is valuable to the development of the enterprise, so operators have the innate advantages of developing the "big data" application.

2 System Architecture

According to the current big data marketing needs of telecommunications operators, a multi - channel marketing system is designed in this article [1]. The system mainly includes four major business modules: "marketing management", "dynamic decision -making", "marketing data warehouse", and "digital marketing". The data sources include "billing management system", "customer relationship management system", "third -party network element system",

and customer contact channels include "SMS", "MMS", "Email", and "Customer Service Center".As shown in Figure 1.

In the context of big data, multi -channel marketing must first have data. The data studied in this article comes from customer information owned by telecommunications operators [2]. Obtain the basic information information of customers from the CRM system. From the billing system to the customer's call information. Obtain customer location information from the third -party network element system [3]. Through SPSS big data processing analysis, three -dimensional portrait and accurate groups are achieved from user attributes and user behavior dimensions. Periodic customer groups such as users, potential data business users, and high - value users are accurately identified, and then customer label information is obtained [4]. This accurate customer information can provide strong data support for marketing activities.
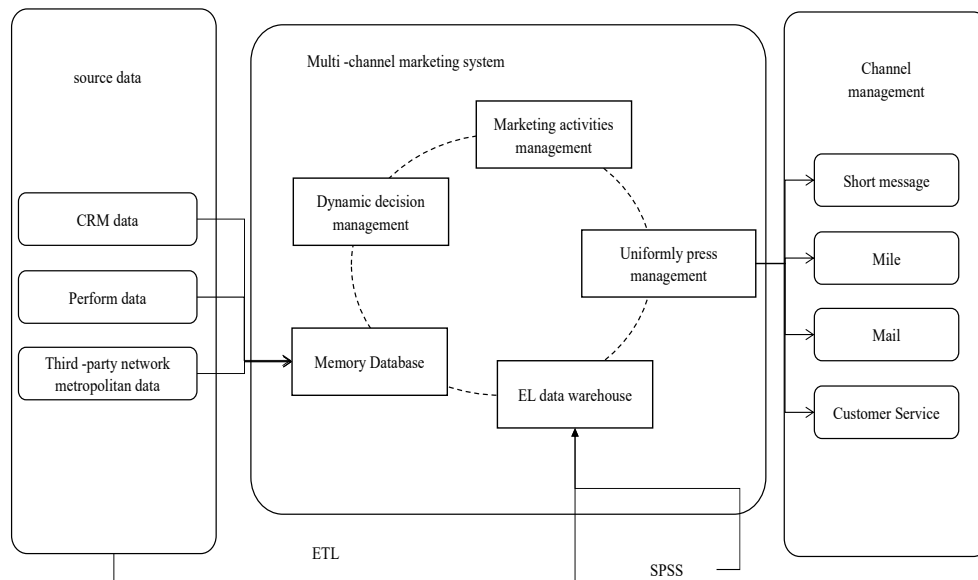

Fig. 1. System architecture

During the overall marketing process, it is necessary to segmented the customer label data source to provide a visual interface. It is necessary to configure, generate and deploy marketing strategy processes according to changes in market demand, and then achieve the best matching of target market and marketing demand [5-6]. Through the best contact communication channels and review management processes, the allocation, review, and management of telecommunications marketing activities are realized. This marketing activity management project in the corresponding framework. It provides functions of marketing activities management, marketing activities, allocation of marketing activities, and marketing activities [7].

In order to meet the effective improvement of existing customers, the system has designed a marketing dynamic decision -making module. This module can be flexibly configured according to different needs to achieve precise and fast marketing. Dynamic decision -making

data are pre -loaded in the memory database [8]. The purpose is to accelerate the judgment of marketing strategies in big data environments. The data of the memory database comes from the ETL data warehouse. The corresponding target marketing group needs to be generated according to the configuration of marketing activities [9].

After determining the configuration of the marketing activity process and the decision of marketing dynamic events, the final marketing goal is to push the corresponding information to the customer, so the data -based marketing module needs to be designed [10]. Its role is to unify the contact management of customers, including the unified configuration of marketing packages, unified control of marketing contact frequency, unified configuration of marketing contact channels and contact templates. This can flexibly and effectively support the development of marketing activities. This module provides commodity management, communication template allocation, and marketing execution monitoring functions.

2.1 Data acquisition

This module is mainly used in the source database. The main role is to obtain customer information, including basic information, customer service, customer relationship management, customer consumption behavior, customer recharge payment, and third -party network element. This module can also be cleaned, transmitted, and processed on the data, and finally loaded them to the target database.

Data management can divide the data large category and divide the data into different theme domains. Then, the data is summarized according to a certain processing logic. By setting the corresponding data refresh mechanism, it refreshes the source data in time to the data warehouse, and finally the wide meter data used by the marketing system directly uses.

2.2 Marketing system management

This module establishes a set of marketing processes by configuring marketing activities management, marketing dynamic decision -making rules, and data -based marketing functions. Based on the data acquisition and management of big data above to achieve the purpose of effective management and data marketing.

2.3 Contact channel management

After obtaining targeted marketing data, customers need to be notified through effective channels. This module can configure the corresponding channels to achieve contact management with customers by controlling frequency.

3 System design

Big data multi -channel marketing system has achieved full -process activity configuration of big data multi -channel marketing system through big data mining analysis and multi -channel marketing analysis technologies to achieve the full process activity configuration from user needs, target user group discovery, target user subdivision, marketing review management, marketing strategy formulation, and marketing strategy dynamic matching Essence The system's function is very powerful. The system design is shown in Figure 2.
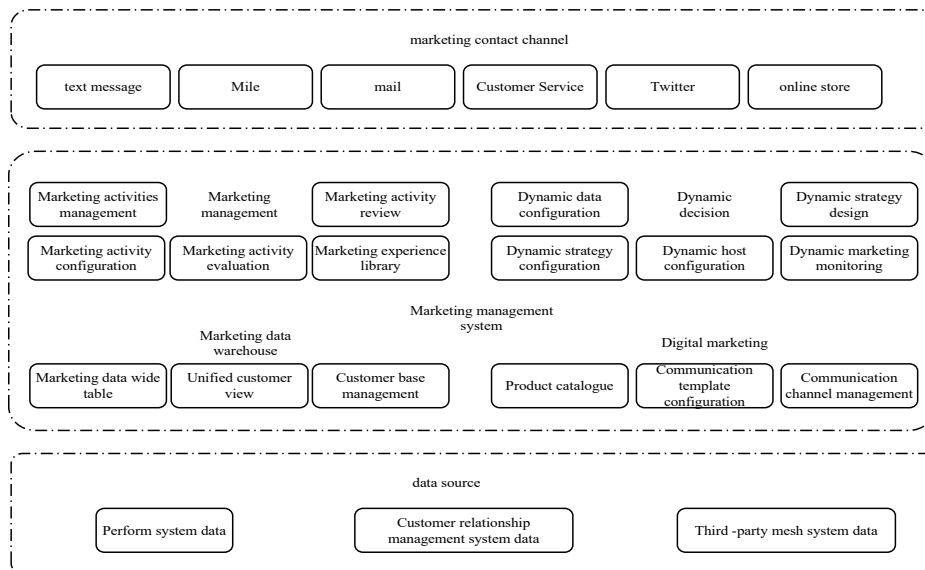
marketing contact channel

| text message | Mile | mail | Customer Service | Twitter | online store |

Marketing management system

| Marketing activities management | Marketing management | Marketing activity review | Dynamic data configuration | Dynamic decision | Dynamic strategy design |
| Marketing activity configuration | Marketing activity evaluation | Marketing experience library | Dynamic strategy configuration | Dynamic host configuration | Dynamic marketing monitoring |

Marketing data warehouse / **Digital marketing**

| Marketing data wide table | Unified customer view | Customer base management | Product catalogue | Communication template configuration | Communication channel management |

data source

| Perform system data | Customer relationship management system data | Third -party mesh system data |

Fig. 2. System design

Multi -channel marketing system uses data such as CRM systems, billing management systems, and customer service support systems for extraction and analysis. Then build a multi -dimensional user portrait in conjunction with the user's behavior characteristics. In this way, the user's precise group can be achieved. The system can identify potential customers, high - value users and other target customer groups, providing protection for marketing activities. At the same time, this system can also provide visual product development tools. The system can timely customize, generate and deploy new marketing strategies according to changes in market demand, so as to achieve the best matching of target market and tariff strategies. In addition, the system can also associate the customer service system, which can choose the most suitable marketing channel for accurate information push, so as to achieve efficient integration of marketing resources.

For the overall architecture of big data multi -channel marketing systems, the data is required to collect, analyze, and loaded data. Need to load metad data to the system lightweight data warehouse ODS. Metal data is then extracted, cleaned, and processed through ETL data warehouse technology. Data processing, summary, and pre -processing according to different data domains to generate data wide tables that can be used for marketing. This helps improve the level of business analysis and rapid decision -making capabilities. Then analyze the consumption behavior and basic business behavior of the customer, including the characteristics of the customer base, the set meal analysis, and the market research. Finally, the corresponding target customer base is selected. Then subdivide and sample the target customer group. For different marketing customers, configure different marketing strategy rules and design corresponding marketing audit templates, marketing communication templates, package design, and tariff design. Finally, through marketing execution and marketing monitoring, marketing evaluation makes marketing simple. The specific process is shown in Figure 3.
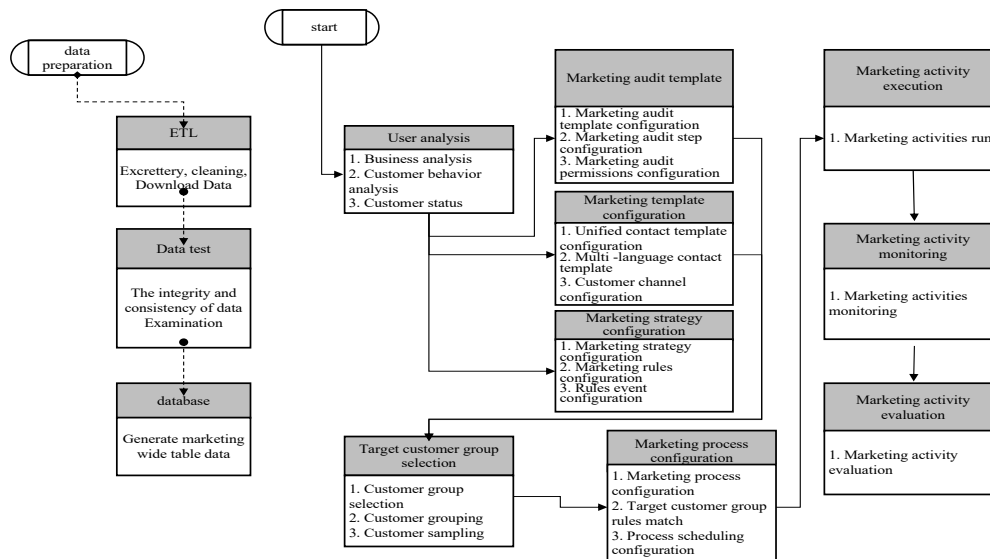
Fig. 3. Marketing process implementation

4 Module Design

4.1 Marketing operation data warehouse ODS

ODS marketing data warehouse is used to manage customer panoramic views. It can collect data from customer relationship management systems, billing systems, and third -party network element systems. ODS data models can help market personnel have an overall view of activity data. These data include the amount and recharge information, data mining results, user attributes, etc. Data wide meters that can be used by generating marketing systems to provide data for marketing systems. Customer information mainly includes the following parts.

(1)Customer description category information. Customers describe the class information mainly to describe the basic information of the customer, such as the customer's mobile phone number, gender, age, and education. Customer location information, such as family address, the company name mainly comes from the customer's registration information.

(2)Customer behavior information. This type of information is mainly used to describe customer behavior data, such as customer purchase service records, customer payment records, customer consumption records, and customer regional location.

(3)Customer associated information. This type of information is mainly used to describe attributes other than customer basic information. For example, the customer satisfaction, customer loyalty, and customer preferences obtained. These data generally need to analyze and process customer description information and customer behavior information.

Through the above information, the system can establish a unified customer information view to form large wide meter data that can be used in marketing data. These data can be used for the visualization of marketing systems. The user information chart is shown in Figure 4.
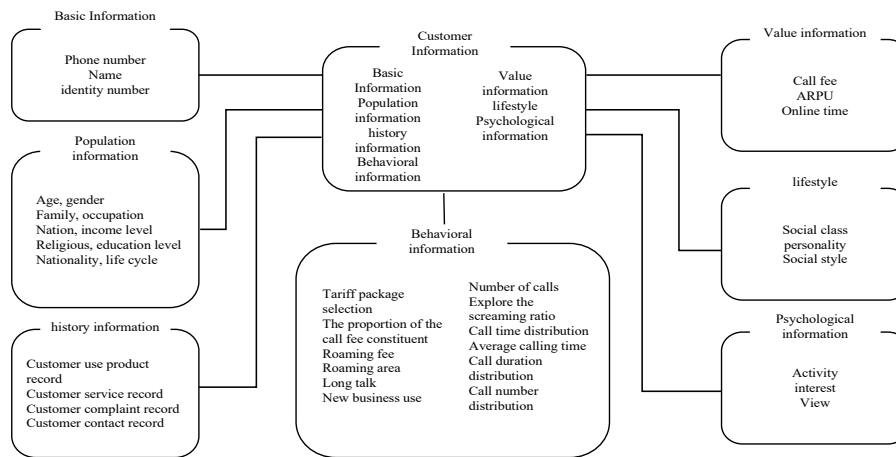
Fig. 4. User information chart

4.2 Marketing Activity Management CMS

Marketing activities management CMS focuses on marketing process design. CMS is equivalent to a tool. The main role is to help operators provide appropriate information to appropriate customers at the right time (as shown in Figure 5) to appropriate customers. It is usually used as a plan, design, execution, and measuring personalized marketing activities. CMS can manage all large -scale, multi -wave activities.
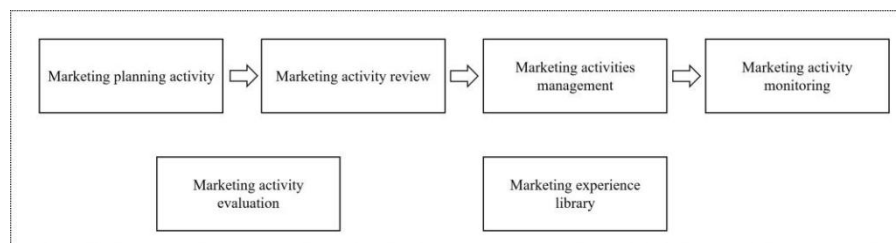

Fig. 5. Marketing Management Activity

As shown in Figure 5 above. Marketing activity management will first pass four steps, namely marketing activities planning, marketing activities review, marketing activities management, and marketing activity monitoring to complete the configuration of marketing activities. After completing the operation of marketing activities, the activity needs to be evaluated accordingly. Provide embedded reports in the system. The report is followed by the implementation effect of marketing activities at any time, and then the message delivery status of the marketing activity can be viewed in a chart. The effect of marketing activities is mainly reflected in the use of reports.

The system provides data support for reports. The effect of marketing activities can be analyzed from the following perspective. The system can set the control group of the marketing activity group during the grouping process. The members in the control group do

not participate in marketing activities. The report can show whether the members in the Program Cell and Control Cell are different in consumer recharge, thereby reflecting the effect of marketing activities. For marketing activities that stimulate user behavior, the system can also be recorded in the control group. For example, marketing activities recommend to users in the marketing group for 20 minutes of local calls for more than 3 minutes. At the same time, the marketing team has a control group. In the system recorded marketing group, the user's international length exceeds 3 minutes for data. Then record data in the control group for more than 3 minutes. If the proportion of international long distances in the marketing group and the control group after the marketing activity is almost the same, it shows that this marketing activity does not have a lot of role in users. The system will record the contact situation with the user at a time, thereby counting the participation of marketing activities. Because the system contains the consumption record of user wide meter data, as long as the marketing activity data is combined, it can reflect whether the marketing activity has a stimulating effect on the consumption of users within a period of time. Different marketing activities can also be compared horizontally to find marketing activities with better effects.

4.3 Dynamic operation decision -making

Dynamic operating decision -making DOD (Dynamic Operator Decision) focuses on marketing event detection. DOD can customize the data format of various customer behaviors flowing into various external systems and convert it into internal formats in the system. Marketing data is the foundation of all marketing. Before performing dynamic real -time marketing decisions, the first thing to consider is the acquisition of the data source and the matching settings of the data source format rules. The data source configuration function in DOD can support SCHEMA and data collection. Support collecting user event flow data through various protocols, including FTP, File System, Socket Message (as shown in Figure 6).
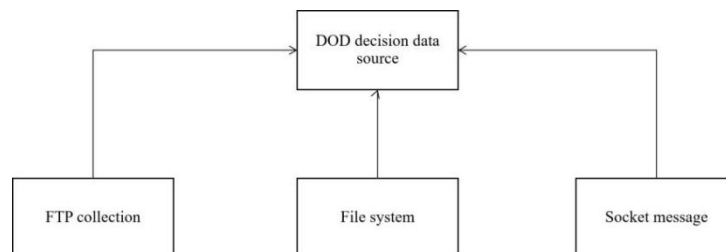

Fig. 6. Marketing Data Source Supervision Listening

4.4 Digital Marketing

Data marketing channel management is responsible for marketing product management, content template design, message delivery and monitoring. Specifically includes four categories.

First, the life cycle, specifications, ranking management of the package. The opening management of the package includes the business design and implementation of the lottery and market research.

Second, the content template design of SMS, MMS, mail, and call center, including SMS (Short Message Service) interactive strategy design and online interactive strategy design.

Third, large -capacity distributed message delivery, including information delivery automatic retry, customer channel recovery content analysis and response, delay message delivery (time or time -based window).

Fourth, the most important thing is the status and efficiency monitoring of message delivery, including the monitoring of message delivery rate and artificial message delivery (single or batch).

The unified interface template configuration provides a visualized channel communication script designer. Through the interface, users can use text toolbars, typesetting tool bars, design text messages, MMS, emails, and reporters to communicate scripts. In addition, the system is also embedded with rich variables and macro, such as user status, mobile phone number, gender. This can help users design personalized communication scripts. The predetermined communication template can be bound to a specific population in marketing activities. The communication template also supports a variety of message protocols, including SMS, mail, flash letter, USSD, Twitter. For international operators, the system supports multi -language template configuration. You can automatically select the applicable language template according to the language coding in the user information. If you can automatically judge whether to push a local language or English text message according to the user's language attributes. The corresponding activities need to be monitored during marketing. It is necessary to have data for the success of the activity and failure. Provide real -time statistical charts in marketing operation monitoring and provide interface. The visual view can be displayed on each batch success, failure, and suspension of sending, and also supports the details of each batch of sending details. For failed SMS, and it can be sent manually to the message interface. The interface provides query conditions to quickly position marketing activities to be monitored.

5 Conclusion

This article designed a multi -channel marketing system architecture. Through the overall design of the system design and the functional design of the four major modules in the system. From the construction of marketing target data to the segmentation of marketing activities, management to the decision -making of dynamic marketing events, the functions of unified configuration, multi -channel management and real -time event marketing have been realized. It provides a guarantee for improving the marketing efficiency of operators.

In the design and implementation process of a multi-channel marketing system for telecommunication operators, introducing a marketing automation platform or Customer Relationship Management (CRM) system is a crucial initiative to further enhance marketing effectiveness. The integration of such systems facilitates comprehensive monitoring, analysis, and optimization of marketing activities, enabling operators to precisely target customers, enhance customer engagement, and achieve higher conversion rates.

Firstly, with the incorporation of a CRM system, operators can manage customer information more comprehensively, including individual customer interaction history, purchasing behavior,

and responses to marketing activities. Such data integration contributes to the establishment of customer profiles, allowing more accurate identification of potential target customers in multi-channel marketing. Additionally, the CRM system provides real-time customer data, supporting personalized marketing decisions to enhance the effectiveness of targeted marketing.

Secondly, the introduction of a marketing automation platform assists operators in achieving consistent brand communication and information dissemination across different channels. Through automated processes and triggers, the system can respond in real-time based on customer behavior or specific events, optimizing the timing and content of marketing activities. This not only improves operational efficiency but also helps better understand customer interests and needs, thereby enhancing user experience and brand loyalty.

Furthermore, incorporating an effectiveness assessment module is a critical aspect of the design. By monitoring key performance indicators (KPIs) for each marketing channel, such as conversion rates, click-through rates, and customer satisfaction, the system can provide real-time feedback on the actual impact of marketing activities. Based on this data, operators can undertake timely optimizations and adjustments, continually improving the overall effectiveness of their marketing strategy.

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