Design of Mobile Phone Sales Decision Support System for College Students

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Abstract. It has been 30 years since the first mobile phone entered Chinese market in 1989. As it has changed from "luxury" of a few people to common consumer goods with high popularity, market competition of mobile phone sales industry is becoming increasingly fierce. College students have formed a special consumer group due to their unformed sales habits and great plasticity. They have limited consumption ability but pursue new things. Their consumption status is quite different, which is of great research value. Therefore, this study designs a marketing decision support system for college students. Starting from the mobile sales management business and combining with the decision support system, this study deeply studied the key technologies and implementation approaches of the mobile sales decision support system, including data mining, data warehouse technology and model library to help enterprises better seize the student market and gain competitive advantages.

Introduction

With the change of seller's market to buyer's market, marketing has become the core focus of enterprise management. Enterprise sales is not only the starting point of enterprise management, but also the key to achieve enterprise benefits [1]. Based on research, consumer habits and attitudes research and brand diagnosis, mobile phone sales need to select appropriate sales channels and develop appropriate pricing and promotion strategies [2]. Thus, the profit maximization can be achieved by increasing the sales volume of mobile phones and reducing the selling cost.

In the fierce competition, it is particularly important for enterprises to acquire more relevant information and knowledge in a faster and more timely manner to make scientific and effective decisions. However, it is difficult to put forward scientific and effective decision plans in a timely and accurate manner merely relying on the subjective judgment of decision makers. Decision support system can solve this problem. Decision support system can be on the basis of a large number of data analysis, application of information technology, intelligent computing technology combining with the knowledge of experts, through the human-computer interaction, analysis of market environment, find the market opportunity, evading market risk, the target market segment, analysis of consumer behavior, and formulate marketing strategy, marketing strategy choice and so on [3]. Due to its wide coverage and accurate data calculation, an effective decision support solution can be obtained.

Therefore, this study designs a mobile phone sales decision support system for college students. Based on analysis of historical data, we strive to get useful experience and rules for enterprises, and make decision support on this basis, in order to become a reliable basis for mobile phone retail
enterprises [4,5]. As a result, they can be less detours, achieve profit in the competition to remain invincible in the purpose.

Decision Support System

Introduction to Decision Support System

Some scholars on the basis of a large number of literature research, the decision-making sales system summarized as: on the basis of a management information system, using computer software technology, data mining, data warehouse, etc.) will be selling enterprise of historical data, on the basis of the analysis further concludes that there are regular, experienced, accurate and reliable information. This information can be used to support the decision of the enterprise, realize the long-term development of the enterprise and maximize the profit of the enterprise [6]. In this process, not only computer software technology, but also the corresponding management, marketing, psychology and other relevant theories.

The decision-making process can generally be divided into the following four steps:

(1) Identify problems and form decision-making objectives, which is the starting point of decision-making activities. (2) Describe the probability of various outcomes generated by each scheme quantitatively with probability. (3) Decision-makers quantitatively evaluate various results. It’s usually expressed as a utility value. (4) Comprehensive analysis of all aspects of information, in order to finally decide the program [7]. Sometimes, the sensitivity analysis of the scheme is also done to study the influence on the optimal solution when the original data changes, and to determine the parameter range information that has a great influence on the scheme.

Decisions are often not made all at once, but rather in an iterative process. It can be completed with the aid of computer decision support system, which is used to assist the determination of goals, formulation of plans, analysis and evaluation, simulation and verification. In this process, human-computer interaction can be used to provide the parameters of different schemes and select the schemes.

Key Technologies of Decision Support System

Data Warehouse. Data warehouse is a structured data environment of decision support system and on - line analysis application data source. Data warehouse studies and solves the problem of obtaining information from database. The characteristics of data warehouse are subject - oriented, integration, stability and time varying. Data warehouse has the following four characteristics:(1) Theme-oriented. (2) Integration: the data of the data warehouse comes from scattered operational data. (3) Non-update: the data warehouse is mainly to provide data for decision analysis, and the operation involved is mainly to query the data. (4) Change over time: the traditional relational database system is more suitable for processing formatted data and can better meet the needs of commercial business processing [8].

It has achieved great success in the commercial field. Data warehouse technology is an information integration technology. It can take information from multiple sources. The original data is obtained, further processed and sorted, and stored in the internal database of the data warehouse. The end user provides the information access tool, provides the coordinated, unified and integrated information environment to the data warehouse user, supports the enterprise overall decision-making activity and carries on the thorough comprehensive analysis to the enterprise management work.

Data Mining. Data mining is the process of extracting hidden but potentially useful information and knowledge from numbers of incomplete, noisy, fuzzy and random practical application data. Data mining can be described as an advanced and effective method to explore and analyze a large amount of enterprise data according to the established business objectives, reveal hidden, unknown or verified laws, and further model them. Its main tasks include correlation analysis, cluster analysis, classification, timing pattern and deviation analysis.

Data Mining Algorithm. Data mining algorithms mainly include: neural network method,
genetic algorithm, decision tree method, rough set method, positive case exclusion negative case method, statistical analysis method, fuzzy set and so on. Each has its own advantages and functions in different situations.

Sales Decision Support System

Overall Structure Design of Sales Decision System

In the sales process, there are great differences in the applicable sales decisions for different products and market environments. Therefore, it is necessary to make a full investigation, combine the internal and external environment, develop a variety of feasible schemes, select the appropriate model, and select the optimal decision-making scheme through comparison, evaluation and judgment. To achieve this goal, the sales decision system will be composed of three parts, including human-computer interaction subsystem, database subsystem and model library subsystem. Therefore, the overall structure of the system is shown in figure 1.

Figure 1. Overall system framework.

Human-computer interaction subsystem: design interface, used for input and output, and realize the interaction with the system. Database management subsystem: business management, including sales management, customer information, contract information and payment collection. Model library management subsystem: maintain module library, as adding model, deleting model and modifying model. In this model base are mainly sales forecasting, price analysis and other aspects of the model, for sales analysis, prediction and evaluation to provide an auxiliary decision-making means.

The Functional Module Design of the Sales Decision System

The system is mainly aimed at marketing management personnel at all levels of the enterprise, involving the scope of market analysis, customer analysis, product analysis, quantitative marketing four themes, they contain many sub-themes. Figure 2 for details.
Model Library System Design

The model library is mainly used to store models, and the storage and organization methods of models described by different methods are also different. After the design of the model library, it is necessary to manage the model in the model library. This responsibility is completed by the model management system, which is mainly to realize the maintenance of the model.

The main functions of the model library management system include: retrieval and maintenance of the model in the model library; model invocation management; unified data organization. Model library in the process of decision support system operation, can according to the parameters of the incoming caller may need from the database query sales related information, and call the corresponding algorithm to calculate model, is completed, the calculated results returned to the caller, and at the same time computation results may be stored in a database system.

Market Choice-Decision Tree Model

Decision tree analysis method can solve the problem of how to find the right time to enter the market [9]. The main steps include:

User Analysis—RFM Model

In the RFM model, R stands for production, F stands for Frequency, and M stands for Money. This model can measure and analyze user loyalty and intrinsic value through user behavior characteristics [10]. Specific processes include:

Arrange all customers according to the value of production, from small to large, and divide them into a group of 50%, based on 2,1 points at one time;

Arrange all customers according to the value of Frequency/production, from large to small, and divide them into a group of 50%, based on 2,1 points at one time;

By integrating above data, eight combinations can be obtained: high-value customers (2-2-2), focus on developing customers (2-1-2), focus on maintaining customers (1-2-2), focus on retaining customers (1-1-2), potential customers (1-1-1), and three general customers [11]. Through the above steps, customer segmentation can be realized, so as to have targeted sales, so as to achieve precision marketing of main products.
Product Pricing—PSM Model

PSM model is price sensitivity test, and its implementation process includes:
For each price within the specified price range, testers propose four specific test questions. Start to feel cheap; Starting to feel expensive; Too cheap to doubt the quality and refuse to accept the price of the product; Too expensive to consider the price of the product or service [12]. The respondents need to select the appropriate price data in the corresponding place of the questionnaire from high to low or from low to high.
Calculate the percentage of the number of people who tick the four questions on each price, and calculate the cumulative percentage of the number of people [13].

New Product Market Forecast—Bath Model

Bath model is often used as a market analysis tool to describe and predict the market demand of innovative products or technologies [14]. The specific formula is as follows:

\[ n_t = N_t - N_{t-1} = p(N - N_{t-1}) + q^* \frac{N_{t-1}}{N}(N - N_{t-1}) \]  

(1)

Where, \( n_t, N_{t-1}, N \) respectively represent the sales volume in the future year; the total number of new products adopted by t-1; maximum market potential for first-time purchase. \( P \) means innovation coefficient (external influence), the possibility of people who have not used it being exposed to factors such as media to start using it. q represents imitation coefficient (internal influence), the likelihood that a person who has not yet used it will start using it under the influence of word of mouth.
According to the model, the market prediction of new products can be made, thus helping enterprises to make relevant solutions [15].

Summary and Prospect

In this paper, the decision support system for mobile phone sales is designed for each stage of the marketing management process. A complete decision support system technical solution. The system provides market analysis, customer analysis, product analysis, quantitative marketing functions. Specific include: analysis of market opportunities, research and selection of target market, development of marketing strategy and marketing work organization, implementation and control.
This project involves sales business knowledge, conventional information system development technology, decision support intelligent information system development technology, data warehouse, intelligent algorithm and other aspects of knowledge, which puts forward very high requirements on the breadth and depth of knowledge of researchers. At the same time, in the future application and research, we must also pay attention to the combination of technology and industry experience, choose a reasonable and optimized algorithm or model according to the needs, and combine it more closely with the sales characteristics and background of the mobile phone industry, so as to improve the accuracy and efficiency of mining.

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