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Research on Optimizing Precision Marketing Strategies for Personal Financial Products Driven by Big Data

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Keywords: Personal financial products, precision marketing, RFMLT model, K-means clustering, data-driven.

Abstract: Personal financial products, as an area of high concern for global financial consumers, are undergoing a transformation from traditional marketing to data driven precision marketing under the deep penetration of Internet technology breakthroughs and the digital economy. However, existing research has limitations such as insufficient systematic analysis of the marketing environment, lack of research on the integration and application of technological paths, and a lack of quantitative evaluation frameworks for practical cases. Traditional marketing models face severe challenges due to issues such as vague user profiles and low channel efficiency. This study is based on precision marketing theory and marketing 4P theory, using K-means clustering method and deep learning data mining technology to construct an RFMLT model (integrating five core variables: time proximity R, consumption frequency F, consumption amount M, total transaction duration L, and interaction frequency T, sorted by importance as R>F>M>L>T). Through clustering analysis, customers are divided into four categories: high growth, high value, active, and general customers, and further refined into four groups: "frequent inquiries but not purchases", "inquiries/collections but not purchases", "frequent searches but not purchases", and "special marketing customers". Targeted differentiated marketing strategies are designed from four aspects: product, price, channel, and promotion. Dimension proposes a precise marketing strategy guarantee system for personal financial products in the era of big data. The study emphasizes that precision marketing needs to rely on continuous data accumulation and empirical research to promote the transformation of financial institutions from "experience driven" to "data-driven", achieve personalized marketing content push, improve customer matching, marketing efficiency and long-term benefits, and promote the healthy development of customers and banks.

1. Introduction

Personal financial products[1]were first born in the United States and quickly gained social recognition and expanded to developed countries and regions such as Europe, America, and Japan due to their targeted service characteristics. Its broad scope covers financial products and services aimed at the public, while its narrow scope focuses on exclusive financial products and services designed by financial institutions for individual customers. It has become one of the most popular and densely selected areas for global financial consumers; With the breakthrough development of Internet technology, the improvement of global network infrastructure has accelerated, the scale of

users has continued to expand, and the penetration rate of 5G technology has significantly improved. The scale of industrial Internet industry has reached hundreds of billions of dollars. The digital economy has penetrated deeply into the real industry, resulting in a data intensive economic form. Big data, as a core element, has been deeply integrated into the construction of digital China since it was incorporated into the national strategy, and has promoted the digital and intelligent transformation of various industries through data sharing mechanisms and improved utilization efficiency. In this context, the marketing logic of personal financial products is evolving from the traditional model to the data driven precision direction; However, existing research still has significant limitations, including a lack of systematic analysis of the overall marketing environment of personal financial products in the era of big data (such as comprehensive evaluation of technology ecology, user behavior, and competitive landscape), research perspectives that focus more on theoretical derivation or a single technical path (such as insufficient research on the integration and application of data mining, user stratification models, and dynamic feedback mechanisms), and practical case analysis that mostly stays at strategy description (lacking quantifiable effect evaluation and dynamic optimization frameworks); The current macroeconomic environment and technological changes have raised higher requirements for the marketing capabilities of financial institutions. Traditional marketing models face severe challenges due to unclear user profiles and low channel efficiency. The maturity of big data technology provides technical support for precision marketing. This study aims to systematically analyze and solve core problems such as user demand insight, personalized design of solutions, and dynamic optimization of effects, and promote the transformation of financial institutions from "experience driven" to "data-driven"; The ultimate goal is to integrate user growth models, RFM models, cluster analysis and other tools to propose the "RFM-LT" extended model to improve the precision marketing theory tool chain, and combine data mining technology to design a layered marketing plan and a guarantee system that includes technology, organization, and risk control. This will provide a more systematic marketing environment analysis framework and quantitative evaluation method for academia, a replicable precision marketing strategy template for financial institutions, and help improve customer matching, marketing efficiency, and long-term benefits.

2. Correlation theory

2.1. Big Data and Precision Marketing

Big data [2] is defined by Wikipedia as a vast amount of data, which refers to a database composed of massive amounts of data; Research firm Gartner regards it as an information asset that can optimize processes, enhance decision-making power, and insights; The McKinsey Global Institute emphasizes that it is a data collection that exceeds the scope of traditional database software tools in terms of data acquisition, storage, management, and analysis. It has four characteristics: massive data scale, fast circulation, diverse types, and low-density value. The high popularity of the Internet is the basis for the generation of big data. Human informatization data is mostly produced in recent years. It relies on the Internet to achieve communication, sharing and storage. Data processing capability is the key to its industrialization profitability and data appreciation. Precision marketing was first proposed by Youlester in the late 1990s, and has been supplemented and improved by scholars to form the widely recognized "4P" rule. It requires enterprises to comprehensively understand users and transmit relevant information to target customer groups through specific channels and methods, influencing their consumption willingness and behavior to achieve marketing goals. According to its theoretical connotation, the emergence of precision marketing is closely related to the development of the Internet. Philip pointed out in his research that the application of Internet technology in the marketing field provides support for the

realization of precision marketing. The premise lies in the precise positioning of the enterprise, identifying the target customer groups based on its own positioning, building a sound communication mechanism and service system through the Internet, adhering to the customer-centric marketing concept, and realizing the accurate dissemination of product and service information. Compared to traditional marketing, the core value of precision marketing lies in "accuracy", with key characteristics such as measurability and high returns. Its advantages are significant - it can greatly improve the accuracy of marketing work, maximize the value of limited marketing resources, improve enterprise marketing efficiency, strengthen market competitiveness, and achieve precise product and service promotion by cultivating highly sticky customers and targeting target groups.

2.2. Analysis of Marketing Theory Framework and Data Analysis Model

The 4P theory[3]was proposed by American marketing expert Jerome McCarthy in "Basic Marketing", covering four core elements: product, price, channel, and promotion, forming a classic framework for marketing strategy combination. The product includes physical, service, and ideological products, and the price needs to be formulated based on cost, market conditions, and competitive factors. The channel emphasizes the integrity of the process of transferring goods or services to consumers, and promotion enhances product awareness and market share through advertising, promotion, public relations, and other means. The user growth model [4] was first proposed by Silicon Valley entrepreneurship expert Dave in 2007, which includes five components: user acquisition, activation, profitability, retention, and recommendation. It forms a closed cycle of user traffic propagation, expands market share through fission, and has the characteristic of low-cost expansion of new users. The RFM customer model[5] measures customer value through three indicators: the most recent consumption time interval, consumption frequency, and consumption amount. Customers are classified into low value, high value, low price sensitive, and high price sensitive categories to assist in developing personalized marketing strategies. In data mining and analysis methods, clustering analysis uses algorithms to classify data based on similarity, which is suitable for fields such as market segmentation, biological research, and image analysis; The Analytic Hierarchy Process (AHP) decomposes decision elements into levels such as objective layer, rule layer, and solution layer, and combines qualitative and quantitative analysis to calculate weights through matrix eigenvectors, providing scientific basis for complex decision-making.

3. Research method

3.1. Multidimensional Analysis of the Marketing Status of Personal Financial Products in Commercial Banks

The marketing status of personal financial products of commercial banks can be systematically sorted out from four dimensions: product, price, channel, and promotion: the product system covers savings products (including check acceptance, savings deposit and withdrawal functions, accounting for 33.22% in 2021), personal wealth management products (realizing asset appreciation through investment portfolios, foreign exchange, securities, etc., with risks and returns coexisting), bank card products (divided into RMB cards/foreign currency cards/dual currency cards by currency, and credit cards/debit cards by credit function), personal loan products (including credit loans, consumer loans, etc.), and agency products (involving economic affairs such as water, electricity, gas payment, payroll, and insurance agency); According to institutional data, in 2021, savings products accounted for 33.22%, personal wealth management products accounted for 19.88%, bank card related products accounted for 14.51%, personal loan products accounted for

22.41%, and agency products accounted for 9.98%. Moreover, the product structure dynamically changed in different years - for example, the proportion of savings products increased from 30.21% in 2018 to 33.22% in 2021, while bank card related products decreased from 24.91% to 18.52%. As shown in Table 1 below:

Table 1 Distribution of Annual Proportion of Personal Financial Products in Commercial Banks

Product Type	2018 Share	2019 Share	2020 Share	2021 Share
Savings Products	30.21%	30.69%	32.52%	33.22%
Personal Wealth Management Products	11.36%	12.22%	13.25%	14.61%
Bank Card Related Products	24.91%	22.65%	20.82%	18.52%
Personal Loan Products	23.66%	22.36%	21.35%	24.66%
Agency Products	8.25%	12.11%	11.62%	8.23%

The pricing strategy tends to be cautious due to financial characteristics, mainly using cost pricing [7] (based on cost and profit calculations to determine prices) and customer driven pricing (based on customer expectations to negotiate flexible pricing). Insurance products need to go through multiple processes such as actuarial calculations to determine prices. In terms of channels, with the development of e-banking, Internet banking and big data concepts, a pattern of coexistence of offline traditional models (outlets publicity, advertising light boxes, regional advertising to build loyal customer groups) and online emerging models (mobile apps, online banking to achieve product viewing and handling, simplify the operation process and improve the convenience of transactions) has been formed. At the promotion level, effective customer management is achieved through a customer relationship management system (CRM), which is accompanied by a "seven part process" service process (including SMS contact, phone invitation, face-to-face meeting, VIP service, gift giving, etc.) and an assessment mechanism (such as VIP customer base, phone tracking feedback, customer satisfaction). At the same time, customer complaint attention and personnel team building are strengthened to maximize service satisfaction.

3.2. Customer segmentation and precision marketing strategy design based on RFMLT model

Relying on the extended RFMLT model (integrating five core variables: time proximity R, consumption frequency F, consumption amount M, total transaction duration L, and interaction frequency T), through customer data collection (covering basic information, behavior data, and order data), variable value calculation (using SQL language processing), weight determination (using Analytic Hierarchy Process to assign R 43.8%, F 23.7%, M 18.6%, L 9.1%, T 4.8% weights), and K-means clustering analysis [8] (dividing into 5 user groups), we achieve precise customer segmentation - growth type (low R, low F, low M, low L, low T, with great potential to be cultivated), high-value (low R, high F, high M, high L, high T, high loyalty needs to be emphasized). Maintenance), bureau value (low R, high F, high M, high L, high T, requiring strengthened interaction), active type (high R, low F, low M, low L, high T, with few transactions but strong influence), general customers (high R, low F, low M, low L, low T, Insufficient stickiness needs to be activated), and differentiated marketing plans should be designed based on customer behavior characteristics (such as personalized recommendations from product followers, holiday coupons from price followers, and enhanced exclusive financial advisory experience from service providers), ultimately improving customer conversion rates and stickiness through a dual strategy of "attracting new customers" and "promoting activity". The specific data support and operation path are shown in Table 2 below

Table 2 Customer Database Structure Aggregated by Customer ID

Customer ID	R (Recency/Days)	F (Frequency/Times)	M (Monetary Value/Yuan)	L (Total Duration/Days)	T (Interaction Count/Times)
3427	30	2	77,184	348	0
2457	22	7	6,106	175	2
5237	98	4	449	379	0
5314	41	3	1,758	416	3
1362	333	11	3,341	33	0
2918	59	8	3,183	47	1
1443	408	41	16,131	1,185	4
1453	116	58	15,544	264	6

3.3. RFMLT Precision Marketing Full Cycle Management Framework

Precision marketing is based on customer segmentation as its core premise, and achieves precise customer segmentation through the RFMLT model that integrates five dimensions: time proximity, consumption frequency, consumption amount, total transaction duration, and interaction frequency, such as growth type (high potential needs to be cultivated), high-value (high loyalty needs to be maintained), active type (strong influence needs to strengthen interaction), etc. Design differentiated strategies based on the characteristics of different groups: recommend low-risk products of the same type and push price discounts to customers who visit frequently but have not traded; Analyze the focus of demand and decision-making pain points for customers who have not made purchases through inquiry/collection, and push targeted product feature information; For customers who frequently search but have not purchased, recommend accurate products through keyword similarity modeling; Specialized marketing combines online and offline channel placement to establish the correlation between advertising data and conversion data, in order to expand user base. From a global perspective, marketing plans need to be combined with customer lifecycle stages (customer acquisition, promotion, level maintenance, care, recovery, etc.), extract customer characteristics through cluster analysis, conduct data mining and similar group training, and ultimately form a precise marketing model that includes reach timing, methods, content, and effectiveness evaluation, achieving efficient resource utilization and customer stickiness enhancement.

4. Results and discussion

4.1. Customer segmentation and marketing content design under precision marketing

In the financial market, there are significant differences in investor behavior, with some investors preferring short-term trading, especially for individual stock trends that are more complex due to irrational investment behavior, requiring higher accuracy in short-term forecasting than in long-term forecasting. To improve the accuracy of short-term forecasting, this chapter combines the investor sentiment index, uses the sentiment attention module [9] to achieve multi feature fusion, and introduces the xLSTM network to construct a stock price prediction model[10]. By combining multi-scale attention and emotional attention modules, the model can simultaneously capture the temporal dependence of technical information (such as highly correlated technical indicators filtered by Spearman correlation coefficient) and emotional information (emotional index calculated by FinBERT model for news and stock evaluation data). The problem definition focuses on using a historical sequence of length L (including C-dimensional features) to predict the closing price of the next trading day, and mapping the feature sequence to the target value through a time series

prediction model. Although existing research has focused on the application of emotional features, there is still room for improvement in terms of feature fusion timeliness, technical indicator screening, and model structure design. The MSA xLSTM model proposed in this chapter has been validated for its effectiveness on multiple stock datasets through multi-scale feature extraction and xLSTM layer design.

4.2. Model experiment

In the context of the service-oriented transformation of the financial industry, it is necessary to meet diverse customer needs through differentiated services and dynamic pricing strategies. At the level of product assurance, we focus on service differentiation (such as urban-rural, individual and enterprise, and consumption capacity stratification), build a dedicated product system for major customers, improve quality and service efficiency, and expand service content to areas such as stock trading, financial data query, business management, credit card and virtual systems, and household property mortgage; Synchronize the establishment of a customer information management system, design personalized product combinations based on actual customer needs, and strengthen customer stickiness and quality. At the level of price guarantee, relying on data mining to optimize pricing mechanisms, implementing differentiated pricing strategies to enhance flexibility, expanding sales through scientific pricing, and achieving marketing goals; Collaborate with mobile terminal platforms to enhance online marketing rates and expand information recommendation channels to achieve user traffic; At the same time, utilizing big data to analyze market trends, dynamically adjusting pricing strategies to resist risks and enhance returns, and strengthening brand image and market share through branded, highly simplified, and rapidly iterating product features.

4.3. Effect analysis

The digital transformation of commercial banks requires strengthening the construction of offline branches, digital platforms, and strategic cooperation platforms: offline branches, as the cornerstone of channels, should be the main scenario for attracting new customers, and customers should be transformed into online users through face-to-face trust; The digitization of the platform requires enhancing its technological application capabilities, integrating data from industries such as commerce, housing provident fund, and taxation to enrich online functions, enhancing customer stickiness, and dynamically adjusting strategies to adapt to market changes; Strategic cooperation requires establishing resource sharing and reciprocal relationships with multiple platforms, improving online marketing rates, expanding information recommendation channels, and expanding financial service boundaries (such as coverage of daily life and travel consumption scenarios). At the promotion level, relying on the mobile Internet to accurately obtain user data and feedback information, improve the level of service specialization; The marketing of personal financial products needs to combine the characteristics of mobile Internet, dynamically follow the changes in demand, provide differentiated services, and classify customers by income level to improve the accuracy of supply; Strengthen experiential marketing, enhance consumer interest and cognition through "experience" binding, and reduce resistance to traditional products; Pay attention to after-sales service follow-up and full process support to enhance customer satisfaction. At the same time, establish a marketing calendar (including brand, holiday, and care marketing), periodically push professional content to enhance platform trust, use holiday opportunities to push special content, and use exclusive discounts to promote purchase decisions at key nodes (such as card anniversary, payday, birthday), ultimately achieving customer conversion and revenue improvement.

5. Conclusion

This article is based on the theory of precision marketing and the 4P theory of marketing, using K-means clustering method and deep learning data mining technology to conduct research on precision marketing of personal financial products. By constructing an RFMLT model (integrating five core variables, namely time proximity R, consumption frequency F, consumption amount M, total transaction duration L, and interaction frequency T, sorted by importance as R>F>M>L>T), and combining K-means clustering analysis, customers are divided into four categories: high growth, high-value, active, and general customers. Based on deep learning, a precise marketing plan is constructed, further refined into four groups: "frequently asked but not purchased", "asked/collected but not purchased", "frequently searched but not purchased", and "special marketing customers". Differentiated marketing strategies are designed for different categories. Ultimately, precise marketing strategies for personal financial products in the era of big data are proposed from four dimensions: product, price, channel, and promotion. It emphasizes that precision marketing needs to rely on data accumulation and empirical research to help banks better understand customer needs, achieve personalized marketing content push, and promote the healthy development of customers and banks.

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