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Research on Strategies for Enhancing Payroll Customer Management in Banks Based on Data Analysis

Qifeng Tang

Hefei Thomas School, Anhui, China

Abstract: In the history of banking development, data analysis has gradually become a vital driver of business innovation and competitive advantage. In the field of precision marketing, data analysis can significantly improve marketing efficiency by enabling deeper insights into customer behavior and market trends, thereby accurately identifying target customers and designing personalized services to enhance customer satisfaction and business conversion rates. Payroll services represent a strategic business segment for banks, serving as a typical example of public–private linkage and an important channel for retail customer acquisition. Although payroll customer groups are large in scale, the proportion of high-loyalty customers remains low, and capital retention rates are insufficient. By conducting data-driven analyses of the fundamental characteristics and behavioral patterns of payroll customers, banks can predict potential high-value clients and implement tiered and segmented marketing strategies. This approach not only optimizes resource allocation and improves marketing efficiency but also deepens banks' understanding of customer needs, laying a solid foundation for future business development.

Keywords: Data Analysis; Payroll Customer Enhancement; Precision Marketing

1. Background and Objectives of the Strategy

1.1 Background

Payroll services represent a key strategic business for banks. By providing payroll services, banks can achieve large-scale retail customer acquisition in batches, thereby continuously expanding their customer base. Payroll funds serve as a stable source of demand deposits, which helps reduce liability costs and optimize liability structures. Leveraging the advantages of public–private business linkage, banks can establish multiple service connections with retail customers, effectively enhancing customer loyalty. In summary, payroll services are not merely a basic settlement function but also a critical tool for consolidating customer foundations and optimizing business structures.

Despite the large number of retail customers brought in through payroll services, several challenges remain, including low capital retention rates, a small proportion of high-value customers, and limited customer stickiness. Payroll customers are typically acquired passively—enterprises designate the bank for payroll disbursement, leaving employees with no choice and little awareness of the bank's brand. As a result, employees tend to perceive their payroll account as merely a "salary card" rather than their "primary account." Research indicates that only 12% of corporate payroll clients use their payroll account as their primary daily settlement account, compared with 45% among proactively acquired customers.

1.2 Objectives

To reduce payroll fund outflows, identify high-value payroll customers, and strengthen customer loyalty, this strategy aims to develop operational enhancement measures. Using modern data analytics and information systems, the approach involves analyzing the characteristics and behavioral patterns of the existing payroll customer base, building predictive models, identifying potential high-value customers, and implementing tiered and segmented marketing strategies. The ultimate goal is to focus on customer segments that can be sustainably managed, using model-driven customer development and digital marketing to improve customer engagement.

2. Research and Implementation Process of the Strategy

This study uses a provincial branch of a domestic commercial bank as the research

subject. By analyzing the basic profile of payroll customers, a targeted payroll customer financial asset enhancement model was constructed, followed by the deployment of both online and offline marketing strategies tailored to customers across different probability tiers.

2.1 Customer Group Exploration and Analysis

In terms of customer tiering and Assets Under Management (AUM) distribution, payroll customers generally exhibit higher quality than the bank-wide average, yet most are low-activity accounts, with the majority of asset contributions below RMB 300,000.

From the perspective of asset structure and product holdings, payroll customers' funds are concentrated mainly in savings and wealth management products, with savings accounting for 55%. Wealth management penetration remains below the bank's average. Customers with an average monthly financial asset balance below RMB 50,000 show low willingness to invest in complex products, whereas those with balances between RMB 50,000 and 300,000 display a higher allocation to complex products. Regarding payroll amounts, 25% of customers receive more than RMB 10,000 per month, 35% between RMB 5,000 and 10,000, and 40% less than RMB 5,000. Among customers with monthly payroll above RMB 10,000, 40% are active accounts.

An analysis of fund retention and outflow patterns shows that, on average, 42% of payroll funds are transferred to other banks on the day of salary credit. By the seventh day, an average of 69% of the funds have been withdrawn.

Table 1. Outflow of Funds from Payroll Customers in 2024

Receiving Bank / Platform	Transaction Amount	Funds Transferred In	Net Outflow Amount
Wealth Management Platform (Caifutong)	101,137	18,744	82,393
Alipay	79,121	25,679	53,442
China Construction Bank	125,514	115,750	9,764
China Merchants Bank	78,909	48,098	30,811
Industrial Bank	40,078	23,163	16,915

Table 2. Same-Name Outflow of Funds from Payroll Customers in 2024

Receiving Bank	Transaction Amount	Same-Name Funds Transferred In	Net Outflow Amount
China Merchants Bank	335,831	11,345	324,486
China Construction Bank	71,543	54,171	17,372
Industrial and Commercial Bank of China	21,451	14,646	6,805
Bank of China	20,964	5,899	15,065
China CITIC Bank	15,463	4,978	10,485

2.2 Data Model Development

In this study, the target customer group was defined based on the characteristics of payroll clients and the business objectives of the strategy. Specifically, the focus was on individual customers with an average daily financial asset balance of less than RMB 20,000 per month and with payroll transaction records within the current year. The research objective was to predict which of these customers would achieve an increase of more than 30% in their average daily financial asset balance within the next 12 months, with the incremental amount exceeding RMB 1,000.

To achieve this goal, a comprehensive descriptive statistical analysis was conducted on customers with historical payroll records. Basic demographic and behavioral data were collected and processed through feature engineering, which involved data cleaning, feature selection, and feature construction. The aim was to extract features with significant predictive power for the model. A Random Forest algorithm was applied for feature selection, and based on feature importance scores, over 30 key variables were ultimately identified for model building.

The payroll customer enhancement model was constructed using Python and the Scikit-learn library. Historical payroll customer data served as the training set, and model parameters were optimized through cross-validation and grid search to enhance predictive performance. After multiple iterations and fine-tuning, a stable and well-performing model was obtained.
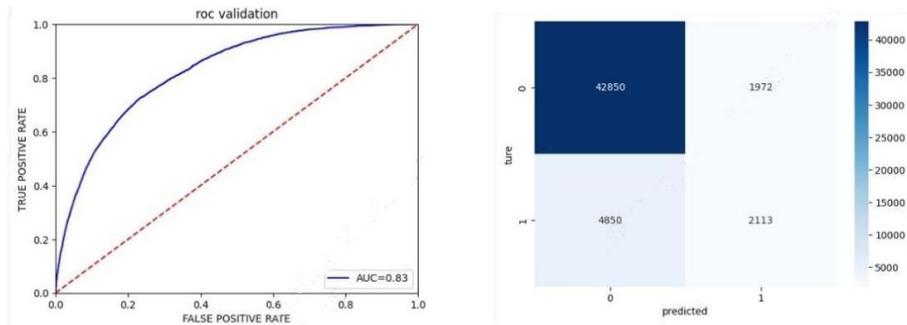
Figure1. Model Evaluation: ROC Curve and Confusion Matrix

Model performance was evaluated using several standard metrics, including the Receiver Operating Characteristic (ROC) curve and the Area Under the Curve (AUC). The results showed an AUC exceeding 0.8, indicating strong predictive capability. In addition, lift analysis was conducted to further validate model effectiveness. Lift, defined as the ratio of results obtained using the model versus without it, was calculated by dividing the scored samples into 20 equal groups and counting the observed positive cases within each group. The results demonstrated a maximum lift of 3.9, meaning that the model's ability to identify customers with effective asset growth in the following month was 3.9 times greater than random selection. This finding highlights the model's practical value and reliability for targeted customer management.

Table3. Model Lift in Different Probability Ranges

Probability Range (Percentile)	Probability Interval	Sample Size	Accuracy in Interval	Cumulative Accuracy	Cumulative Coverage	Cumulative Lift
(0, 5]	(0.534, 0.764]	2,593	0.5762	0.5762	0.2146	3.9020
(5, 10]	(0.475, 0.534]	2,589	0.3978	0.4871	0.3625	3.6224
(10, 15]	(0.424, 0.475]	2,589	0.3515	0.4419	0.4932	3.2864
(15, 20]	(0.377, 0.424]	2,589	0.2557	0.3954	0.5883	2.9404
(20, 30]	(0.284, 0.377]	5,178	0.1727	0.3211	0.7166	2.3884
(30, 40]	(0.204, 0.284]	5,178	0.1313	0.2737	0.8143	2.0355
(40, 50]	(0.150, 0.204]	5,178	0.1018	0.2393	0.8900	1.7798
(50, 60]	(0.108, 0.150]	5,178	0.0689	0.2109	0.9413	1.5687
(60, 70]	(0.071, 0.108]	5,178	0.0452	0.1873	0.9749	1.3926
(70, 80]	(0.035, 0.071]	5,178	0.0191	0.1662	0.9891	1.2363
(80, 90]	(0.011, 0.035]	5,178	0.0112	0.1490	0.9974	1.1082
(90, 100]	(0.000, 0.011]	5,178	0.0035	0.1345	1.0000	1.0000

2.3 Strategy Design and Deployment
Marketing strategies were deployed both online and offline according to customers' predicted probability tiers.
Online marketing primarily utilized the model's probability predictions to identify target customers, reaching them via multiple channels such as the marketing leads platform, interactive SMS, mobile banking applications, and corporate WeChat. This allowed for either precision targeting or large-scale outreach.
Offline marketing focused on payroll enterprises whose employees were predicted to have a higher average probability of asset growth. Engagement activities such as afternoon tea sessions and movie days were organized to foster interaction and promote banking services.

2.4 A/B Testing
To validate both the predictive model and the marketing strategy, 10% of the overall predicted customer base was randomly selected as an A/B test control group, receiving no marketing intervention. The remaining 90% were included in the marketing campaign.
Model effectiveness was evaluated by comparing the success rates of high-, medium-, and low-score segments within the same group. Strategy effectiveness was verified by comparing success rates for customers with the same score segment across the control and treatment groups.

2.5 Execution Results
High-, medium-, and low-score tier enhancement

strategies were deployed for payroll customer segments. From the results, in March, over 11,000 qualifying customers achieved a more than 30% increase in their monthly average daily AUM (Assets Under Management), over 2,600 customers saw their AUM rise above RMB 20,000, and total financial assets increased by RMB 150 million.

Table 4. Payroll Customer Marketing Strategies

| Strategy Category	Strategy Name	Strategy Description	Selection Criteria	Communication Channel
Online Marketing	High-Probability Targeted Outreach for Payroll Customers	For payroll customers with a predicted probability of asset increase greater than 50%, create marketing lead tasks for precise targeting.	Predicted probability of asset increase > 50%	Marketing lead platform – task assignment
	Medium-Probability Outreach for Payroll Customers	For payroll customers with a predicted probability between 30% and 50%, conduct marketing outreach.	1. Predicted probability of asset increase > 30% and < 50%; 2. Historical maximum financial asset balance ≥ RMB 50,000	Two-way SMS → marketing lead platform – task assignment → offline outreach
	Low-Probability Mass Outreach for Payroll Customers	For payroll customers with a predicted probability below 30%, send bulk SMS notifications.	1. Predicted probability of asset increase < 30%; 2. Historical maximum financial asset balance ≥ RMB 50,000	Mobile banking / Enterprise WeChat
Offline Marketing	Afternoon Tea Events for Target Payroll Enterprises	For payroll enterprises with an average predicted probability in the top 10%, organize on-site afternoon tea activities.	Average predicted probability in top 10%	Offline events
	Movie Day Events for Target Payroll Enterprises	For payroll enterprises with an average predicted probability between the top 10% and 20%, organize offline movie events.	Average predicted probability in top 10%–20%	Offline events
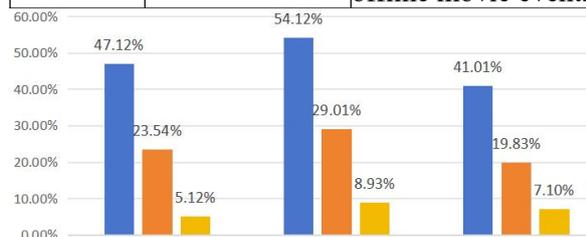
Figure 2. Comparative Analysis of Enhancement Success Rates in the Execution Group

In January, the high-score tier achieved a 47.1% improvement in success rate compared to the initial baseline, which was 23.5 percentage points higher than the medium-score tier and 5.1 percentage points higher than the low-score tier. In February, the high-score tier recorded a 54.1% improvement, 29 percentage points higher than the medium-score tier and 8.9 percentage points higher than the low-score tier. In March, the high-score tier achieved a 41% improvement, 19.8 percentage points higher than the medium-score tier and significantly higher than the low-score tier by 7.1 percentage points.
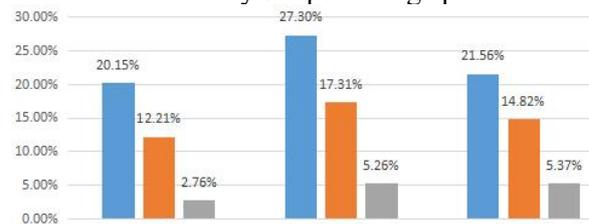

Figure 3. Comparative Analysis of Enhancement Success Rates in the Control Group

For the control group, which did not receive any marketing interventions, the success rates in January to March were consistently lower than those of the execution group. In January, the success rates for the high-, medium-, and low-score tiers were 20.2%, 12.2%, and 2.8%, respectively, which were lower than the execution group's 47.1%, 23.5%, and 5.1%. In February, the corresponding rates were 27.3%,

17.3%, and 5.3%, compared to the execution group's 54.1%, 29%, and 8.9%. In March, the rates were 21.6%, 14.8%, and 5.4%, all lower than the execution group's 41%, 19.8%, and 7.1%.

3. Conclusion

This strategic study conducted an in-depth analysis of payroll customer characteristics, including customer tier and AUM distribution, asset structure and product holdings, as well as fund retention and flow patterns. Based on this analysis, a predictive model was developed by selecting appropriate features and algorithms in alignment with the bank's operational realities.

The final marketing strategy encompassed customer list segmentation, channel allocation, and a structured A/B testing framework to validate the effectiveness of both the model and the campaign.

Data analytics, as a critical quantitative tool, plays an irreplaceable role in precision marketing for banking. By leveraging multidimensional insights into customer behavior and market trends, banks can precisely target customers, deliver tailored services, and significantly improve customer satisfaction and conversion rates. Moreover, data-driven decision-making enables timely adjustments to marketing strategies, ensuring competitive advantage and sustainable growth. In the era of big data, the integration of advanced analytics into banking operations will become increasingly sophisticated and indispensable.

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