The Utilization of Customer Information in Korean Retail Bank

Soo-Hwan Kwak[*]

┌─────────────── Contents ───────────────┐

1. Introduction   3. The Case of K Bank

2. Literature Reviews   4. Conclusions

                               • References

└──────────────────────────────────────┘

ABSTRACT

The combination of information and technology makes dramatically increase both information quality and quantity. Almost of company utilize customer information for the purpose of increasing sales amount and profitability. The purpose of this paper is to discover customer information's utilization practices in the Korean financial industry. The case of K Bank's information analysis in the inbound and outbound marketing is provided. The customer segmentation is used for the inbound marketing by using RFM analysis. And the loan card model is used for the outbound marketing by using logit analysis.

1. Introduction

Today we live in an era of information service. The combination of information and technology makes dramatically increase both information quality and quantity. Therefore the utilization of information is more important than the

---
* Professor, Kyungpook National University, School of Business Administration, shkwak@knu.ac.kr

production of information. In the utilization of information, financial service industry and retail industry have placed to take the lead in Korea.

Above both industries use customer information for the purpose of increasing sales amount and profitability. Specially, the financial service industry has been applying to cross-selling, up-selling, and re-selling by using customer behavior information. These practices are possible by analyzing customer information previously.

Meanwhile, customer analysis in the financial service industry has largely focused on the customer relationship management (CRM). The CRM leverages detailed customer understanding to provide relevant products and services, ultimately to manage customer relationship and enhance a company's profitability. Therefore the CRM is the essence of marketing process.

Generally, the marketing process has two ways of inbound and outbound marketing. The customer information has been uses in the both inbound and outbound ways. This paper contains the customer information practices of a Korean K Bank. The bank is Korea's largest personal retail bank and listed on the New York Stock Exchange (NYSE).

The purpose of this paper is to discover customer information's utilization practices in the Korean financial industry. It will analyze on both inbound and outbound marketing view points. These case studies will help to diagnose CRM level and set up the future direction of customer information analysis.

2. Literature Reviews

There are a lot of literatures about customer information analysis. The oldest and basic approach of customer information is customer segmentation. Smith(1956) defined firstly market segmentation as "viewing a heterogeneous market as a number of smaller homogeneous markets, in response to differing preferences, attributable to the desires of consumers for more precise satisfaction of their varying wants."

Though customer segmentation has been developed with various criteria and methodology according to industry, in general, the segmentation in financial industry has done by using demographic and transaction data. In personal retail

banking, externally observed demographic or economic criteria such as profession, age, income or wealth are often the preferred dimensions for segmentation(Meidan 1984; Harrison 1994).

On the other hand, there are specific segmentation studies. Burnett & Chonko (1984) used factor analysis to identify four customer segmentations with similar product usage frequency pattern. Four customer segmentations are named traditional customers, convenience customers, investment customers, and debt customers. In addition, Harrison (1994) used variables such as the individuals' own perceived confidence and ability in dealing with financial matters and the expressed level of interest in financial services. With this study for distinct customer segmentation based on the level of knowledge and on the degree of the customers' financial maturity could be identified. The research results identified that four customer segmentation are named financially confused investors, apathetic minimalists, cautious investors, and capital accumulators.

In addition, McDougall and Levesque (1994) conducted a study of customer benefits in segmentation by using service quality dimensions of retail banking. They identified two customer segmentation by cluster analysis. Two segmentations are named a performance segment and a convenience segment respectively. And Machauer & Morgne (2001) identified 4 customer segmentation by expected benefits and attitudes with cluster analysis. The research results identified that four customer segmentation are named technology opposed customer, service oriented customer, transaction oriented customer, and generally interested customer. Therefore, Alfansi & Sargeant (2000) identified customer benefits unrelated to consumer demographics. They found three customer segmentation using cluster analysis. They named relationship customer, cost-sensitive customer, and service focused customer.

On occasion of customer segmentation research based on loyalty, Dick and Basu(1994) identified 4 customer segments with customer loyalty as an interaction between attitude and behavior. Four customer segmentations are named loyalty customer, latent loyalty customer, spurious loyalty customer, and no loyalty customer.

Customer segmentation of bank industry is still largely limited to categories of corporate and retail customers as tra-

ditionally defined (Machauer & Morgner 2001). This research selected retail customers as research target in customer segmentation category of Machauer & Morgner.

Lejeune (2001) advocate the prediction accuracy of data mining which is demonstrated by Lim et al. (2000). And Ansari et al. (2001) advocate the importance of data related to RFM (Recency, Frequency, Monetary) attributes for evaluating customer churn and profitability. This research adopts a segmentation methodology based on RFM concept for data mining analysis.

3. The Case of K Bank

There are two types of marketing from a corporate perspective: Inbound marketing through which customers are lured to the company; and outbound marketing through which customers are actively bought after. For inbound marketing, the K Bank shared customer segmentation results with the tellers, and for outbound marketing, it executed a campaign to encourage customers to make a loan card.

3.1 Inbound marketing : Customer segmentation

Hoffman & Novak (2000) confirmed that costs incurred for obtaining new customers are much higher than costs linked with customer retention. In actuality, almost of Korean banks are concerned customer retention than new customers for the saving of marketing costs.

The K Bank also focused on customer retention, and that is related to customer segmentation. The bank segmented the customer based on the deposit amount to find out which customers prefer which product. The segmentation was done on the savings customer base, as they make up the second biggest group after ordinary deposit customers.

The K Bank had five major savings product groups (deferred deposit, trust/investment trust of principal security, fixed deposit, deposit in trust, investment trust), which were used as the five clusters. But there are some products which should be defined as other product according to their kinds. For example, customer who paid large amount of money only one time for the advantage of interest rate is not classified as fixed deposit

product but deferred deposit product though originally he or she belongs to fixed deposit product. In the meanwhile, trust/investment trust of principal security product was extracted among investment trust products and deposit in trust products which secure principals.

After categorizing the products, the number of accounts for each product and amount by customer were calculated. The total savings amount of a product in relation to the other four products will provide a reliable reference as to which product is the most preferred product to a customer.

The weights are considered to account open date. The heavier weight was given to the most recently opened account, to understand the changes in customer behavior. The weights were scored by the bank's officials. The weight thus calculated was multiplied by the amount in the corresponding account. The bank multiply each amount of account by weights defined by bank's officials, and add up each product so as to represent each customer group.

For customer segmentation, the concept of the RFM was applied for cluster analysis. The bank generated 5 derivative variables for each product which included RFM, and carried out cluster analysis by using the rates between these input variables.

- Deferred deposit derivative variable =(deferred deposit amount * recency weight)
- Trust/investment trust of principal security derivative variable =(trust/investment trust of principal security amount * recency weight)
- Fixed deposit derivative variable =(fixed deposit amount * recency weight)
- Deposit in trust derivative variable =(deposit in trust amount * recency weight)
- Investment trust derivative variable =(investment trust amount * recency weight)

All of 673,890 customers were extracted for savings product customer segmentation. This is a sample of ten percent of the total savings customers. The least square method was applied to analyze customer segmentation. As a result, 293,510 customers were identified as those who preferred the deferred deposit product;

⟨Table 1⟩ Result of cluster analysis into customer for savings product

Cluster Name	No. of customer	Percentage
Cluster 1 : Customers who prefer deferred deposit product	239,510	35.54
Cluster 2 : Customer who prefer trust/investment trust of principal security product	16,274	2.41
Cluster 3 : Customer who prefer fixed deposit product	345,681	51.30
Cluster 4 : Customer who prefer deposit in trust product	61,820	9.17
Cluster 5 : Customer who prefer investment trust product	10,605	1.57
Total	673,890	100

16,274 customers who favored trust/ investment trust of principal security; 345,681 for the fixed deposit product; 61,820 for deposit in trust; and 10,605 for investment trust products.

As shown in the table below, the results divided by amount of each group/total product amount or product amount/total amount of each group. This results show which product is preferred in each cluster and the reliability of cluster analysis. That is to say, the rate of deferred deposit amount in deferred deposit cluster out of total deferred deposit amount is 95%, and the rate of deferred deposit amount out of deferred deposit cluster amount is 82%. In addition, the results of analysis into other cluster ensures the right class-ification of clusters.

〈Table 2〉 Comparison of 5 clusters' characteristics

Variables		Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Each cluster amount / total deferred deposit amount		95.21	1.49	1.29	1.10	0.92
Each cluster amount / total trust/investment trust of principal security amount		24.38	66.78	3.30	3.91	1.63
Each cluster amount / total fixed deposit amount		27.71	1.34	62.57	6.52	1.86
Each cluster amount / total deposit in trust amount		27.74	3.14	7.90	58.20	3.02
Each cluster amount / total investment trust amount		22.14	3.06	1.42	1.85	71.53
Deferred deposit amount / each cluster amount		82.39	21.49	4.28	6.45	17.29
Trust/investment trust of principal security amount / each cluster amount		1.28	58.46	0.66	1.39	1.85
Ficed deposit amount / each cluster amount		10.26	8.28	89.05	16.35	14.99
Trust amount / each cluster amount		5.31	10.03	5.82	75.39	12.59
Investment trust amount / each cluster amount		0.76	1.75	0.19	0.43	53.28
Period of deferred deposit		23.40	12.81	29.56	18.47	15.99
Period of principal security		143.32	196.26	244.23	217.15	176.96
Period of fixed deposit		35.27	39.82	35.60	44.29	35.41
Period of trust deposit		40.20	41.99	49.16	47.11	38.49
Period of investment trust deposit		15.92	16.54	18.67	19.61	16.47
Means of age		30.07	42.16	29.45	37.59	34.87
Gender	Male	58.88/35.59	60.48/2.48	59.98/52.32	54.61/8.52	40.49/1.08
	Female	41.12 /35.47	39.52/2.32	40.02 /49.83	45.39/10.11	59.51/2.27
SSP code	SSP customer	7.50/59.73	8.25/4.47	1.45/16.67	7.31/15.03	11.65/4.11
	Non-SSP	92.50/ 34.41	91.75/2.32	98.55/52.91	92.69/8.90	88.35/1.46
Customer code	VIP	0.67/58.65	1.29/7.63	0.16/19.48	0.55/12.35	0.49/1.89
	Excellent	2.36/47.37	4.6/6.27	1.05/30.32	2.43/12.61	3.86/3.43
	Good	5.7/48.20	9.12/5.25	2.27/27.73	6.62/14.46	11.64/4.36
	Patron	8.6/53.87	8.38/3.56	3.06/27.68	6.78/10.95	14.2/3.94
	General	82.67/33.41	76.61/2.10	93.46/54.52	83.62/8.72	69.82/1.25

※ The value before slash is percentage of column sum
The value after slash is percentage of row sum

〈Table 3〉 Features of cluster and counter strategy

Cluster 1	
Feature	Strategy
• Deferred deposit amount of cluster 1 / total deferred deposit amount = 95% • Deferred deposit amount / total amount of cluster 1 = 82% average period of deferred deposit = 23months • Customers less equal than teens take up 37% and they take up 58% out of deferred deposit product customers with less than 5,000,000 Won	• New product development strategy school expenses loans at low interest rate for targeting teens or parents with teens • Churn management strategy exemption from commissions in transaction with other banks, benefits of various interest rate and commissions, free golf rounding etc. for profitable cluster 1 who take up 60% out of SSP customers and VIP customers • Acquisition strategy providing luxury goods etc. for VIP customer who recommends a prospective VIP customers

Cluster 2	
Feature	Strategy
• Trust/investment trust of principal security amount of cluster 2 / total trust/investment trust of principal security = 67% • Trust/investment trust of principal security amount / total amount of cluster 2 = 58% • Thirties & forties are nearly 70%	• Up/cross sell strategy providing stable and profitable product for thirties and forties providing house acquisition fund loan for thirties and forties who are interested in getting a house, providing business fund loan for early retirers in forties providing silver product against old ages for forties who are salary man

Cluster 3	
Feature	Strategy
• Fixed deposit amount of cluster 3 / total fixed deposit amount = 63% • Fixed deposit amount / total amount of cluster 3 = 89% • Less equal than thirties are more than 75%	• Up/cross sell strategy providing fixed deposit product for less equal than thirties who want to scrape together some money providing affiliated service card and opening revolving loan account for less equal than thirties who has a big purchasing power • Product development strategy joint product development for converting fixed deposit product into deferred deposit product • Churn management strategy automatic transfer of commission charge(PC communication, mobile communication), payment transfer and credit card settlement in ordinary deposit account for twenties or thirties

Cluster 4 and 5	
Feature	Strategy
• Deposit in trust amount of cluster 4 / total deposit in trust amount = 58% • Deposit in trust amount / total amount of cluster 4 = 75% • Investment trust amount of cluster 5 / total investment trust amount = 72% • Investment trust amount / total amount of cluster 5 = 53% Male:Female=4:6 in cluster 5	• Acquisition strategy developing trust and investment product which woman customers like

It was possible to establish the following marketing strategy based on the understanding of the clusters.

3.2 Outbound marketing : Loan card application

The K Bank made a loan card application model for its outbound marketing campaign. However, the loan card was a new product and therefore had no historical data. The model was created by using revolving loan account analysis presumed to be the most similar to the loan card. The revolving loan account is a kind of ordinary deposit account which has withdraw freely option to the revolving amount limit, though the account balance is less equal than 0. The loan card has withdraw freely option to the card limit is similar to the revolving loan account. However, loan card is not connected with any deposit account, that is different from the revolving loan account.

The population for the modeling was selected among individual customers aged 25-60 who were regular, potential or ordinary customers with one or more year of ordinary deposit transaction

history with the bank. Customers who are employees in the K Bank, customers who have loans from the bank without collateral, customers with a bad credit record and customers who have made payments in arrears during the last 1 year were excluded from the population. A total of 2,800,756 customers fell under the above criteria and thus were selected to make up the population. All of 76,227 customers were selected from the population for the sampling. The forecasting model was done applying a logistic regression analysis using the MLE (Maximum Likelihood Estimation) method. All samples are divided into training and validation data set, 70% (53,923) of sampling data used for model design, and 30%(22,304) of sampling data used for model validation.

The selected input variables are shown in the table below. The customer grade and the credit card grade are included as dummy variables. And deposit balances and channel related variables are included.

The following table describes the coefficient estimates of the selected variables.

The K Bank classified all samples into loan card model. All customers classified into prediction and actual revolving loan

〈Table 4〉 Coefficient estimates of independent variables

	Detail variables	meaning	Estimate	Wald Chi-square	Pr〉Estimate	Odds Ratio
Intercept			−3.1469	855.5369	〈.0001	
Customer grade	Customer grade 1	VIP customer vs. others	0.3354	3.0738	0.0796	0.569
	Customer grade 2	Excellent customer vs. others	0.8163	93.0403	〈.0001	0.483
	Customer grade 3	Superior customer vs. others	0.3117	21.6653	〈.0001	0.765
	Customer grade 4	Regular customer vs. others	0.2219	13.0307	0.0003	0.870
Credit card grade	Credit card grade 1	Ordinary card vs. others	0.2520	5.4015	0.0201	0.696
	Credit card grade 2	Superior card vs. others	−0.0235	0.2824	0.5951	1.008
	Credit card grade 3	Gold card vs. others	0.2492	13.6490	0.0002	0.834
	Credit card grade 4	Platinum card vs. others	0.2694	30.9969	〈.0001	0.829
Credit card sales amount	Credit card sales amount	LOG(credit card 6 months average sales amount)	0.0451	136.9789	〈.0001	1.048
Cash service amount	Cash service amount	LOG(cash service 6 months average amount)	0.0974	843.1586	〈.0001	1.103
Avg. balance of ordinary deposit	Avg. balance of ordinary deposit	LOG(5 months average balance on ordinary deposit)	0.0947	130.9353	〈.0001	1.099
Rate of increase in balance of ordinary deposit	Rate of increase in balance of ordinary deposit 1	Decrease in recent 2 months average balance vs. others	−0.1041	8.3461	0.0039	1.113
	Rate of increase in balance of ordinary deposit 2	Less equal than 1% increase in recent 2 months average balance vs. others	−0.6038	38.6073	〈.0001	2.189
	Rate of increase in balance of ordinary deposit 3	Less equal than 50% increase in recent 2 months average balance vs. others	−0.2202	24.9846	〈.0001	1.341
Existence of saving balance except ordinary deposit and deferred deposit	Existence of saving balance except ordinary deposit and deferred deposit	Existence of savings balance vs. non-existence	0.1137	7.7979	0.0052	0.813
Avg. balance of loan	Avg. balance of loan	LOG(Avg. balance of loan)	0.0167	44.2415	〈.0001	1.023
Rate of increase in transactions on ordinary deposit	Rate of increase in transactions on ordinary deposit 1	No transaction in recent 2 months vs. others	−0.6625	60.8681	〈.0001	1.947
	Rate of increase in transactions on ordinary deposit 2	Greater equal than 25% transaction decrease in recent 2 months vs. others	−0.1642	9.9686	0.0016	1.166
	Rate of increase in transactions on ordinary deposit 3	Less than 25% transaction decrease in recent 2 months vs. others	−0.1187	6.5503	0.0105	0.999
	Rate of increase in transactions on ordinary deposit 4	The same transaction as past vs. others	−0.5281	80.8929	〈.0001	1.510
	Rate of increase in transactions on ordinary deposit 5	Less than 50% transaction decrease in recent 2 months vs. others	−0.1013	5.0847	0.0241	1.073
Avg. withdraw amount on ordinary deposit	Avg. withdraw amount on ordinary deposit	LOG(5 months average withdraw amount on ordinary deposit)	0.0760	131.6568	〈.0001	1.063
No. of account	No. of account	No. of loan and deposit account	0.1006	27.1031	〈.0001	1.073
Channel use	Channel use 1	No use of channel for 5 months vs. others	−1.1069	80.2027	〈.0001	2.883
	Channel use 2	Use of channel 1 for 5 months vs. others	−0.4751	72.7038	〈.0001	1.427
	Channel use 3	Use of channel 4 for 5 months vs. others	0.1455	98.9362	〈.0001	0.642
Avg. transaction number of channel 1	Avg. transaction number of Internet, tele-banking, PC, and electronic financial transaction	Channel 1's avg. transaction for 5 months	0.0400	15.0018	0.0001	1.069
Avg. transaction number of channel 2	Avg. ATM transaction number	Channel 2's avg. transaction for 5 months	0.1035	199.2332	〈.0001	1.099
Avg. transaction number of channel 3	Avg. transaction number of center cut, mobile, ransaction with other bank, CMS	Channel 4's avg. transaction for 5 months	0.0292	71.9922	〈.0001	1.038

<Table 5> Illustration of coefficient estimates

Variables	Variable Type	Implication of the Results
Customer grade	Ordinal	Customer grade is the higher, loan card probability is the higher. Especially, probability of excellent customer is higher than VIP customer's.
Credit card grade	Ordinal	Without credit card, rate of revolving loan is less than 10%, and credit card grade is the higher, loan card probability is the higher.
Card sales amount	Interval	The more card sales amount during 6 months, loan card probability is the higher.
Cash service amount	Interval	The more cash service amount during 6 months, loan card probability is the higher.
Balance of ordinary deposit	Interval	The higher balance of ordinary deposit during 5 months, loan card probability is the higher.
Balance of savings	Binary	If balance of savings except ordinary deposit & deferred deposit during 5 months is, loan card probability is the higher.
Balance of loan	Interval	The higher balance of loan during 5 months, loan card probability is the higher.
Rate of increase in ordinary deposit transaction	Ordinal	The more present transaction compare with past's in ordinary deposit, the loan card probability is higher.
Avg. withdraw amount on ordinary deposit	Interval	The more avg. withdraw amount on ordinary deposit, loan card probability is the higher.
No. of account	Interval	The more no. of account, loan card probability is the higher.
Channel use	Ordinal	The more number of channel used by customer, loan card probability is the higher.
Avg. transaction number of channel 1	Interval	The more avg. transaction number of channel 1, loan card probability is the higher.
Avg. transaction number of channel 2	Interval	The more avg. transaction number of channel 2, loan card probability is the higher.
Avg. transaction number of channel 4	Interval	The more avg. transaction number of channel 4, loan card probability is the higher.

that each data has binary value. The following correct/incorrect classification table shows how accurate the model is. Since the modeling was based on the

⟨Table 6⟩ Correct/Incorrect classification table (threshold = 0.5)

| Classification | | Predict | | Total |
		Non–settlement of revolving loan	Settlement of revolving loan	
Actual	Non–settlement of revolving loan	9,853* (44.18)** (82.50)*** (84.22)****	2,090* (9.37)** (17.50)*** (19.71)****	11,943* (53.55)****
	Settlement of revolving loan	1,846* (8.28)** (17.82)*** (15.78)****	8,515* (38.18)** (82.18)*** (80.29)****	10,361* (46.45)****
Total		11,699* (52.45)***	10,605* (47.55)***	22,304

Number of each cell means respectively *: cell frequency, **: rate out of sum total,
: row percent, *: column percent

revolving loan, the dependent variable is whether a revolving loan customer uses the loan service or not.

The model was evaluated applying the predefined evaluation criteria with a threshold set at 0.5. The accuracy of model could measured by the rate of right classification, sensitivity, and the rate of wrong classification. For the superior model, the precedent two measurements' values should be high. and the last one measurement's value should be low.

Rate of right classification = 44.18 + 38.18 = 82.36%

Rate of wrong classification = 9.37 + 8.28 =17.65%

Specificity = 8,515/10,361 = 82.18%

Sensitivity = 9,853/11,943 = 82.50%

The model was applied to the sample of 225,669 people to calculate the possibility of loan card. They were divided into ten groups, with each group having the same number of customers to identify how the scores are distributed and identify how many customers settled revolving loan account. The following table shows that the group with the higher score has more eligible customers.
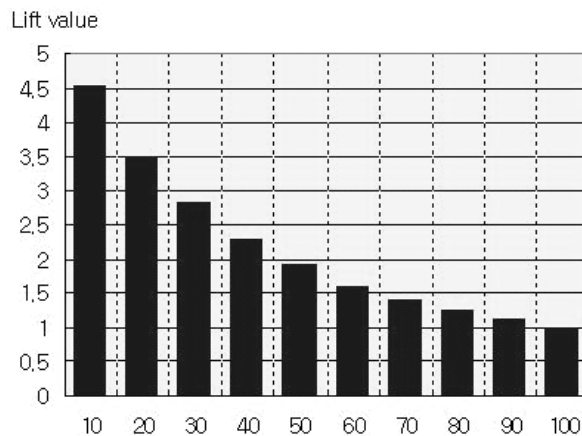
〈Table 7〉 The results of loan card model application

Group	Lowest Score	Highest Score	No. of Customers	No. of Settlement Customers
1	80.59	100.00	22,573	11,883
2	60.81	80.58	22,562	6,483
3	40.67	60.80	22,573	3,929
4	28.56	40.66	22,585	1,850
5	20.55	28.55	22,553	856
6	13.59	20.54	22,559	485
7	6.58	13.58	22,572	435
8	2.53	6.57	22,607	234
9	1.72	2.52	22,535	60
10	0.75	1.71	22,550	27
Total			225,669	26,242

Also, looking at the score's distribution, many of the customers are scored 10 or less.

The following chart shows that the lift value is approximately 4.5 times higher if a campaign is targeted at the top 10 percent customer base, than when targeted randomly. That is, this lift value means appropriability of the model.

〈Figure 1〉 Lift value of the model

4. Conclusions

This paper gives consideration on K Bank's customer segmentation and loan card campaign model. The customers were segmented into five clusters depending on the customers' preferred product, and the loan card campaign model was created based on whether the customer received revolving loan or not. However, it is still early to discuss the result of the bank's customer information utilization. Most banks in Korea, like the K Bank, execute inbound campaign when a customer visits a branch, and then he or she is offered a cross sell using the bank's internally-developed segmentation. This is complemented by outbound marketing such as direct mail and tele-marketing to target customers with a high probability to buy a certain product. In other words, banks are not only offering customized service and selling relevant products through a teller, or the traditional customer touch point, but at the same time are leveraging all available channels such as direct mail, tele-marketers, the internet and email for aggressive selling. The only customer touch point not being fully utilized as a campaign channel is the ATM. The K Bank and most other Korean banks perceive, in general, customer information analysis is necessary for long-term profit and customer retention.

Although customer information analysis is a relatively difficult work, the K Bank's case shows how information analysis is practiced in the Korean scene. Based on such understanding it will be possible to map out the role of information analysis role in tomorrow's financial services market.

References

Alfansi, L. and Sargeant, A. 2000. "Market segmentation in the Indonesian banking sector: the relationship between demographics and desired customer benefits." *International Journal of Bank Marketing*, 18(2): 64-74.

Ansari, S., Kohavi, R., Mason, L., and Zheng, Z. 2001. "Integrating e-commerce and data mining: architecture and challenges." *Proceedings of IEEE International Confe- rence on Data Mining*, 27-34.

Burnett, J. J. and Chonko, L. B. 1984. "A segmental approach to 'packaging'

bank products." *Journal of Retail Banking*, 6(1/2): 8-17.

Dick, A. S. and Basu, K. 1994. "Customer loyalty: toward an integrated conceptual framework." *Journal of the Academy of Marketing Science*, 22(2): 99-113.

Hoffman, D. L. and Novak, T. P. 2000. "How to acquire customers on the web." *Harvard Business Review*, 78(3): 179-188.

Lejeune, M. A. P. M. 2001. "Measuring the impact of data mining on churn management." *Electronic Networking Applications and Policy*, 11(5): 375-387.

Lim, T. S., Loh, W. Y., and Shin, Y. S. 2000. "A Comparison of prediction accuracy, complexity, and training time of thirty-three old and new classification algorithms." *Machine Learning*, 40(3): 203-229.

Machauer, A. and Morgner, S. 2001. "Segmentation of bank customers by expected benefits and attitudes." *International Journal of Bank Marketing*, 19(1): 6-17.

McDougall, M. and Dibb, S. 1998. "Implementing marketing segmentation strategies in UK personal financial services: problems and progress." *The Service Industries Journal*, 18(2): 45-63.

Meidan, A. 1984. *Bank Marketing Management*. New York: Macmillan.

Harrison, T. S. 1994. "Mapping customer segmentation for personal financial services." *International Journal of Bank Marketing*, 12(8): 17-25.

Smith, W. 1956. "Product differentiation and market segmentation as alternative marketing strategies." *Journal of Marketing*, 21(July): 3-8.