Multinomial Logistic Regression Approach for Identifying Factors Affecting to Loans: A Study in Seylan Bank in Gampaha District

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ABSTRACT

Sri Lankan customers are now moving toward obtaining bank loans for their day to day activities. Seylan bank provides financial service to customers in terms of value, pricing and service. Hence, this study attempts to examine the factors that motivate customers to obtain a loan. The study mainly focuses on the customers' background, customers' income level, and customers' expectations of bank loans. Through the findings of the research, Seylan bank can identify demand for loans and most affected factors of their loan categories. Secondary data that obtained from the branches of the Seylan bank in Gampaha district have been examined to find the potential factors influencing customer's decision to take out a loan. Correlation analysis and multinomial logistic regression analysis were used to analyze the data. The results of the research show that the loan categories behavior is mostly affected by gender, age categories, job position and loan amount of the customer significantly. This study is mostly important to identify customer behavior in Seylan bank. Hence, Seylan bank can introduce appropriate loan categories and increase their existing quantity.

KEYWORDS: Factors, Loan Category, Seylan Bank

INTRODUCTION

Seylan bank, 'the bank with a heart' offers various types of bank loans. Those are commercial loans, leasing loans and housing loans etc. Commercial loans are perfect solutions for customers' urgent financial needs. Each type of loan has both advantages and disadvantages. Seylan bank helps the customers to determine which loan type is most preferable to them.

Most of customers try to get commercial loans than other types of loans because they can gain more benefits through the commercial loans. Advantages of commercial loans provide more competitive rates on market interest and the more reasonable repayment plans.

Today, the market provides more leasing

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facilities to the customers. But, Seylan bank is different from any other leasing facilitator in the market since it provides more benefits. Apart from the other loans, the customer can obtain Seylan Siri Nivasa loan to purchase a house, build a house, buy own apartment and buy a land.

OBJECTIVE

The main objective of this research is to identify the factors that motivate customers to obtain a loan. Based on the findings of this research, the Seylan bank can identify which factors affect a customer for obtaining a loan and introduce new loan schemes to the customer.

LITERATURE REVIEW

The concept of loyalty has received much consideration from both academics and practitioners in various industries. In this study, the factors that affect customer's decision to get a loan from a particular bank are identified. Customers' decisions are essential asset for many banks. Then bank could attract new customers and satisfy customers' expectations. Purpose of this

study is to identify factors that impact customer's decision to take out a loan from commercial banks. In this study, a number of variables such as demographics, quality of service and customers' satisfaction for making decision to take out a loan were examined. A random sample of customers were selected for data collection. A questionnaire with self-determined scales was created after ensuring the instrument's validity through confirmatory factor analysis. According to the logistic regression analysis customer service, interest rate, personal marital status and shop design were identified as the most significant predictors of taking loan. Several managerial implications suggest that bank managers should focus on giving loans to single individuals as well as change their interest rate policies by decreasing rate for all kinds of loans, especially housing loans (Christos, Konstantinos, Sotiropoulos, Manolopoulos, & Aikaterini, 2012).

Commercial banks have traditionally played an important role in financing agriculture. This study is focused on examining the effects of demand and supply factors. Results show that banks have reduced their agricultural loan portfolios in response to increased use of interest sensitive deposits after deregulation, moreover, almost half of this decrease came from banks that stopped making agricultural loans. Furthermore, in this study, it is recommended that banks join with multi-bank holding companies because they contain less money to agriculture relative to their assets than do self-governing banks (Eustacius & David, 1995).

Furthermore Johansen methodology can be used to identify relationship among real loans, interest rates and gross domestic product. The gross domestic product is negatively related to the real short-term and long-term interest rates and positively related to the long-run real loans. Long-run demand equation describes that both the signs and the magnitude of the coefficients

of the integrating vector. The short-run dynamics of the demand for real loans is subsequently modeled by means of a Vector Error Correction Model (VECM). The VECM suggest that developments in real loans to the private sector can be reasonably explained by the model (Calza & Souse, 2001).

Literature on factors associated with loan systems are customer service, interest rate, personal marital status and shop design. In our research, gender, age, job, education level, income level, state and loan amount were considered to determine as the factors that affect in taking a loan.

METHODOLOGY

Characteristics of bank loan were identified by the literature review. In analyzing data, Chi-square test was done to identify significant relationship between dependent variable and independent variable separately. For further analysis, the Multinomial logistic regression method was used to identify the factors to obtain a loan category.

DATA COLLECTION AND ANALYSIS

Secondary data were obtained from the Seylan bank in Gampaha district. According to the analysis, summary of the loan category has been given in Table 1.

Table 1: Loan Category wise Distribution

Loan category	Frequency	%
Commercial	121	60.5
Leasing	47	23.5
Housing	32	16.0
Total	200	100.0

Most of customers are engaged in obtaining commercial loans than leasing and housing loans.

Table 2: Gender wise Distribution

Gender	Frequency	%
Male	137	68.5
Female	63	31.5
Total	200	100.0

Table 2 shows that the higher percentage of males obtain loans than females. Male percentage value is approximately equal to the double of female percentage.

The summary of the customer education levels of this analysis is given in Table 3.

Table 3: Loan Category with Education Level Distribution

Education Level	Commercial Freq.	Leasing Freq.	Housing Freq.
MBBS	01	03	05
BSc. Degree	02	02	06
IT Degree	02	03	02
Diploma	14	00	03
G.C.E. A/L	72	24	11
G.C.E. O/L	24	14	05
Below O/L	06	01	00
Total	121	47	32

The above table describes that high proportion of all the customers are engaged with commercial loan than others. Customers with advanced level qualification engaged in all loan categories than others.

The chi-square test was done to identify significant relationship between dependent variable and independent variable separately.

H_0: There is no relationship between dependent variable and independent variable

H_1: There is a relationship between dependent variable and independent variable

Table 4: Values of Chi-square Test

Relationship between	P value	Result
Income and Loan category	0.000	Reject H_0
Job and Loan Category	0.000	Reject H_0
Loan Amount and Loan category	0.000	Reject H_0
Education Level and Loan category	0.000	Reject H_0
Time Duration and Loan Category	0.000	Reject H_0
State and Loan category	0.000	Reject H_0

Since all p values are less than 0.05, there are significant evidences that income, job, loan amount, education level, time duration and state had a linear relationship with the loan category.

The Multinomial logistic regression method was used to identify the factors that motivate to obtain a loan category. The stepwise methods can be useful as it is automatically selected the "best" variables to use in the model.

Table 5: Backward Stepwise Step Summary

Model		Action	Effect(s)	df	Sig.
Step 0	0	Entered	<all>[a]		.
Step 1	1	Removed	Gender	2	0.891
	2	Removed	Age	8	0.318
	3	Removed	Job	10	0.161
	4	Removed	Loan amount	8	0.574

Considering P values, the gender, age category, job position and loan amount of the customers have been removed from the model.

The Pearson and deviance statistic can be considered to check the model hypothesis.

Hypothesis
H_0: The model adequately fit the data
H_1: The model does not adequately fit the data

Table 6: Model Diagnostics

	Chi-Square	df	Sig.
Pearson	269.498	296	0.863
Deviance	206.971	296	1.000

Since $0.05 < 0.863$, null hypothesis is accepted at 0.05 level of significance. There is a significant evidence that the model adequately fits the data.

The summary of the significant test of the model is given in Table 7.

Hypothesis
H_0: There is no relationship between chi-square value difference and variables
H_1: There is a relationship between chi-square value difference and variables

Table 7: Significance Test of the Model

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	339.661			
Final	235.744	103.917	30	.000

The initial log likelihood value (constant or intercept) of a model is a measure with no independent variables. The value of final log likelihood of a model is a measure computed after all the independent variables have been entered into the logistic regression. The difference between these two measures is the chi-square value of the model.

In this analysis, significant value is less than 0.05. Hence, there is a significant evidence for the existence of a relationship between chi-square value difference and variables.

Table 8: Coefficient of Determination

	R Square
Cox and Snell	0.405
Nagelkerke	0.479
McFadden	0.277

According to the coefficient of determination, 40.5% of the variation of the dependent variable is explained by the multinomial logistic regression and there is a 47.9% of the relationship between dependent variable and independent variables. However, this model is not a fairly good. Practically, that was the best fitted model for the obtained data.

Equations of the Model of Loan Categories

1. The variables that had a statistically significant relationship to loan category of commercial from loan category of housing,

- $Z = \text{Log}(P(\text{getting commercial loan})/P(\text{getting housing loan}))$

$Z = 13.02 + 21.58(1 \text{ to } 5 \text{ year}) - 18.075(MBBS) - 19.702(BSc. Degree) - 18.721(IT\ Degree\ Holder) - 16.759(Diploma\ Holder) - 16.594(G.C.E.\ A/L) - 15.897(G.C.E.O/L)$

In this model, time duration variable had a positive relationship and MBBS, BSc. Degree, IT Degree holder, Diploma holder, G.C.E. A/L and G.C.E. O/L variables had negative relationship with Z.

2. The variables that had a statistically significant relationship to loan category of leasing from loan category of housing,

- $Z = \text{Log}(P(\text{getting leasing loan})/P(\text{getting housing loan}))$

$Z = 13.495 - 16.192(MBBS) - 17.264(BSc. Degree) - 15.833(IT\ Degree\ Holder) - 15.645(G.C.E.A/L) - 15.897(G.C.E.O/L)$

All the variables (MBBS, BSc. Degree, IT Degree holder, G.C.E. A/L and G.C.E. O/L) had negative relationship with Z.

DISCUSSION

This study performed regression study of Gampaha district in order to determine factors affecting customers' decision to take out a loan from Seylan bank. Results indicate that the following factors determine the demand for bank loans. Firstly, time duration and all types of education level of the customer had significant relationship with the commercial loan. Secondly, education levels are highly impacted to the leasing loan. There are some limitations of this research because the results of this study are based on few customers in Seylan bank.

CONCLUSION

The main goal of research is to identify the factors that motivate customers to obtain a loan. According to the results of the analysis, it can be concluded that there are two main factors that affect to obtain a loan. Regarding the obtained data set, those factors are the level of education and the loan duration. Therefore, Seylan bank can identify what are the weak points and improve their services to attract more customers, Seylan bank can introduce appropriate loan categories and increase their existing quantity.

REFERENCES

- Calza, C., and Souse, J. (2001). Modeling the Demand for Loans to the Private Sector in the Euro Area. Working paper series No. 55, European Central Bank, Germany.

- Christos, C., Konstantinos, C., Sotiropoulos, I., Manolopoulos, G., and Aikaterini, C. (2012). Factors Affecting Customers' Decision for Taking out Bank Loans. *Journal of Marketing Research & Case Studies*, 12, 1- 16.

- Eustacius, N., and David, J. (1995). Factors Affecting Commercial Bank Lending to Agriculture, *Journal of Agricultural and Applied Economics*, 27, 112 – 126.