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Factors Affecting Repayment Performance of Borrowers- The case of Development Bank of Ethiopia (DBE) Head office

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STATEMENT OF DECLARATION

I, Yehualashet Demissie, declare that this thesis work entitled "Factors Affecting Repayment Performance of Borrowers the Case of DBE Head office" is my own original work. I have carried out it independently with guidance and comments of the research advisor. This thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma or certificate and that all sources of material used for the study have been duly acknowledged.

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Lists of Tables

Table 3.1: Study Population Summarized in Strata 18
Table 4.1: Descriptive statistics of continuous variables 22
Table 4.2.: Summary of loan size against loan status 23
Table 4.3.: Summary of collateral value against Loan Status 23
Table 4.4: Summary of Borrowers' Past Business Experience against Loan Status 24
Table 4.5: Summary of Projects' distance against Loan Status 25
Table 4.6: Summary of Loan tenure against Loan status 25
Table 4.7: Frequency and Percentage Results of Dummy Variables 26
Table 4.8: Table 4.8: Summary of sector against Loan Status 27
Table 4.9: Summary of Loan Type against Loan Status 27
Table 4.10: Summary of loan type against loan tenure 28
Table 4.11: Summary of Borrowers' Nationality against Loan Status 29
Table 4.12: Summary of Business form against loan status 29
Table 4.13: Regression outcomes of the multinomial model on delinquent when NPL set as a base outcome 30
Table 4.14: Regression outcomes of the multinomial model on Pass when NPL as a base outcome 31
Table 4.15: Regression outcomes of the multinomial model on Delinquent when NPL as a base outcome with RRR 32
Table 4.16: Regression outcomes of the multinomial model on pass when NPL as a base outcome with RRR 33
Table 417: Test of independent variables using LR test. 36
Table 4.18: Tests for combining dependent categories using LR 36
Table 4.19: MulticollinarityTest 37
Table 4.20: Test for the mlogit model fit 38

List of Acronyms

DBE	Development Bank of Ethiopia
GDP	Gross Domestic Product
ACSI	Addis credit and Saving Institution
RRR	Relative risk ratio
NPL	Non-Performing Loans
ECCU	Eastern Caribbean Currency Union

Abstract

Borrowers' repayment performance is about how borrowers behave in repaying the borrowed fund. In this regard a borrower behavior may fall in one of the three outcomes. 1. Paying at expected or earlier time than expected, 2. Paying in arrears and 3. Stop paying and become default. These repayment outcomes are determined by internal and external factors in which the borrowers are living. The objective of the study was to identify factors that affect repayment performance of borrowers at Development Bank of Ethiopia. The total study population 137 was categorised in three strata. The first stratum composed of 51 cases without payment problem, 23 were included in the sample. Similarly in the second stratum of 53 cases with delinquent status 28 were included in the sample and finally from the 33 cases in NPL category, 19 cases were included. Quantitative research approach and explanatory research design were used in the research. Secondary data sources were used to acquire data pertaining to the individual borrowers, the loan and the project for which the loan is taken. From the nine independent variables included in the study, four variables namely loan size, loan tenure, business, experience and nationality were significant in explaining variations in the categorical dependent variables at 1%, 5% and 10% level of confidence. To improve the repayment performance of the borrowers it is important to consider loan rescheduling for short and medium loans as long term loan shown better repayment status, balance loan release with the project work already executed and assess the progress of the project to repay the loan since big loans have poor payment status, assigning of loan follow-up activities of projects located in remote location to nearby districts and finally, the bank should work toward inclusion of significant variables as collateral value, past business experience of the borrower *in their loans decision.*

Key terms: Repayment performance, NPL, default, delinquent, pass, relative risk-ratio(RRR)

Contents Pages

Acknowledgment iv

List of Tables v

Acronyms vi

Abstract vii

Table of Contents viii

CHAPTER ONE 1

INTRODUCTION 1

1.1. Background of the problem 1

1.2. Statement of the problem 2

1.3. Research objectives 4

1.4. Scope of the Study 5

1.5. Significance of the study 5

1.6. Limitation of the study 5

1.7. Organization of the Paper 6

1.8. Definition of Key Terms 6

CHAPTER TWO 7

REVIEW OF RELATED LITERATURES 7
2.1. Introduction 7
2.2. Theoretical literature review 7
2.3. Empirical Literature Review 10
2.4. Conceptual Framework 13
CHAPTER THREE 15
RESEARCH DESIGN AND METHODOLOGY 15
3.1. Introduction 15
3.2. Research Approach 15
3.3. Research Design 15
3.4. Data type, Source and Methods of data Collection 15
3.5. Sampling method and sample size 16
3.6. Method of data analysis 17
CHAPTER FOUR 20
RESULT AND DISCUSSION 20
4.1. Introduction 20
4.2. Description of Continuous Variables 20
4.3. Description of Categorical Variables 24
4.4. Analysis of Regression Results 28
CHAPTER FIVE 38
CONCLUSIONS, RECOMMENDATIONS AND FUTURE RESEARCH AREA 38
5.1. Summary 38
5.2. Conclusions 38
5.3. Recommendations 39
5.4. Future Research Area 40

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CHAPTER ONE
INTRODUCTION

1.1. Background of the problem

Repayment performance is about how effectively borrowers repay their obligation in a timely manner and the performance of any financial institution is highly determined by the rate of loan collection. In the functioning of any economy, the financial sector in general and the banking sector in particular play an important role in facilitating the developmental activities. Financial institutions particularly banks generate the major share of their income from their role of financial mediation where fund from surplus units is transferred to deficit units. Lending is one of the main activities of a bank and interest income makes up the lion share of banks' profit. What is natural to lending activity is the existence of credit risk. The business of banking involves risks, and banks make profit by taking risk and managing risk. Banks are faced with different risks including credit risk, liquidity risk, asset risk, foreign currency risk, payment risk, settlement risk and Off-balance-sheet risk (Kent and john, 2008).

According to Alessandra et.al (2015), credit risk is defined as the risk of default on a debt that may arise from a borrower failing to make required payments. Credit risk results in Non-performing-Loans (NPLs). As to IMF's Compilation Guide on Financial Soundness Indicators (2004 cited in Monicah 2013) "A loan is nonperforming when payments of interest and/or principal are past due by 90 days or more, or interest payments equal to 90 days or more have been capitalized, refinanced, or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons to doubt that payments will be made in full". As indicated by Kumar & Woo (2015), NPLs mark the beginning of banking or financial crisis. In the year 2006-2009 the world major economies have suffered from financial crises that spread from banks inability to meet their obligations due to huge NPLs position (Swedberg, 2010 cited in Amir Ikram 2016). NPLs are becoming major concern as failure to manage them affects economic and social output and diminish the production growth (Barseghyan (2010). It is also noted as the most important indicator of financial stability for banks since it depicts credit risk, operational risk and resources allocation efficiency.

Development Bank of Ethiopia is engaged in financing of various developmental projects in the country. Moreover, the bank is specially known for its role of financing government

priority sectors ranging from agriculture and manufacturing to mining and services. As the bank's report shows nearly 40% of its loans are Non-Performing which require further investigation into the causes the problem. The NPL ratio of the bank is far greater than the minimum acceptable level of 15%.

From the arguments raised in the above sections we can understand that, the immediate cause of NPLs is failures from the borrower side to make the required payments on a timely manner.

Therefore identifying the factors (borrower specific and bank specific factors) affecting repayment performances of borrowers has a direct role to play in diminishing the causes of NPLs from the source.

1.2. Statement of the problem

Banking business involves fund mobilization from the surplus units and lending to the deficit units. Financial sectors in general and the banking industry in particular play essential role in financing of development project and thereby enhance economic development. In running their business banks are exposed to a number of risks such as credit risk, liquidity risk, and so on. Inherent to lending activities is credit default risk. As defined by Alessandra et.al (2015), credit default is the risk of loss arising from a debtor being unlikely to pay its loan obligations in full or the debtor is more than 90 days past due on any material credit obligation. A loan is said to be in default when it fails to make the repayments of principal and /or interest specified in its loan contract and has no intention of repaying in the future (Pilbeam, 1998 cited in Arega et al 2016).

A study made by Cyrus Munyua (2016) on factors affecting default rate in micro finance institutions, has identified that variables as loan collection procedures, loan default, loan deviation, financial management practice to impact default rate.

Uma Murthy & Paul Anthony Mariadas(2017) have found that nature of business to affect repayment performance of micro finance borrowers in Malaysia. In another study, Ibtissem Baklouti (2013) has discovered that borrowers' socio-demographic characteristics, past participation in microcredit loans and past credit history have significant impacts on their repayment performance. Findings of case study carried out on Development Bank of Ethiopia (DBE) by Arega et.al (2016) factor affecting NPLs shows that poor credit assessment and credit monitoring as major factors to affect NPL.

Monicah (2011) has figured out that inflation rate and interest rate to influence non performing loan.

As a specialised financial institution established to promote national development agendas, DBE has been engaged in financing of project in priority areas of government such as agricultural and manufacturing. The bank gives long, medium and short term loans for private companies, public agencies, cooperatives and individuals who present viable projects in addition to micro finance institutions. (DBE Annual report condensed statistics 2017/2018)

In doing so the bank carryout various activities to minimize the risk of loss from the loan guaranteed to projects. Adequate Pre approval and post approval activities of loan are important to reduce risk of default.

One of the measurements by which bank's asset quality can be measured is the nonperforming loan ratio (NPLs ratio) that shows proportion of the total loan outstanding which is in problem.

The average NPLs ratio of the bank for the period from 2008 to 2017 is found to be 39.55 % which is far bigger than the minimum acceptable rate of 15% set by the association of African development finance institutions. Further the total NPLs during the fiscal year 2017/2018 amounted to birr 15.44 billion. From the total NPLs amount *Sub-standard, doubtful and loss loans amounted to 9.01 billion, 5.03billion and 1.39 billion birr respectively (DBE Annual report condensed statistics 2017/2018). Some of the main reasons behind increased NPLs at the bank according to the report were; infrastructure problem, failure of rain feed agriculture projects, unwillingness to repay loans by borrowers and so on.

> **Based on NBE directive, the status of arrears loan is classified into five ageing categories of Pass, Special mention, Substandard, Doubtful and Loss where the first two are considered as performing loans and the last three are Non-performing-loans.*

Although a number of studies that focused on determinants of NPLs within and outside Ethiopia are carried out, they were not complete in incorporating economic and social factors such as the loan sector, sub- sectors, business experience, nature of the business and nature of the projects as determining factors of repayment performance and some of the

studies focus was on default customers only not incorporated borrowers without repayment problems to check the influence of study variables on borrowers without repayment problem and those with repayment problem.

A study that aimed at identifying factors affecting repayment performance of the borrowers is important since it can help to reduce default rate by incorporating the factors in credit assessment and monitoring policy of the bank.

Therefore, the aim of the study is to identify factors (borrowers' specific and bank specific) that affect repayment performance of borrowers at DBE head office credit unit where the major proportion of the bank's borrowers is found.

The study attempted to address the following questions:

What are the factors behind the huge NPL position of Development Bank of Ethiopia-Head office?

What measures can be taken to minimize and maintain the minimum acceptable rate of NPL?

1.3. Research objectives

General Objective

As a general objective, the research aims to identify factors affecting repayment performance of borrowers at Development Bank of Ethiopia-Head office.

Specific Objectives

-Identification of the effect of socio-demographic factors on repayment performance of borrowers.

-Identify how project sector differences affect repayment performance

-Identify the contribution of nature of the loan toward repayment performance

Research hypothesis

As discussed in the summary part of literature review, repayment performance of a borrower and level of NPL is affected by many factors including socio-demographic factors, economic factors, institutional factors and environmental factors. And based on research variables the following hypotheses are developed:

Hypothesis on socio-demographic factors:

- **H1: Past Business Experience**: there is a positive and significant relationship between past business experience of the borrower and repayment performance.
- **H2: Form of business organization**: there is significant and positive relationship between form of organization and repayment performance. Deteriorating repayment performance is related with Public enterprises when compared to private and individual businesses.

- **H3: Nationality:** businesses owned by nationals have better repayment performance than foreign owned

Hypothesis on economic factors:

- **H4: Loan size:** worsening repayment performance is related with higher loan size compared to lower loan size.
- **H5: Loan type:** loan type significantly affects repayment performance of borrowers. It is further hypothesized that import substitute loan borrowers have better repayment performance than project loan borrowers.
- **H6: Collateral Value:** value of collateral has a positive relation with repayment performance of the borrower**.**
- **H7: Sector:** there is significant relationship between business sector and repayment performance.
- **H8: Loan Tenure:** borrowers with longer loan repayment period have better repayment performance. It is measured in years.

Hypothesis on environmental factors:

- **H9: Distance from capital:** There is negative and significant relationship between distance of business from capital city and repayment performance.

1.4. Scope of the Study

Although loan operations are performed in all 12 districts of DBE, the study was confined to borrowers at head office. This is for the reason that according to 2017/2018 fiscal year report, 77% of the bank's loan operation is concentrated at head office units and the prevalence of NPLs at this unit is also expected to be high. This fact takes attention and initiate investigation into the causes of poor repayment performances and the researcher believe borrowers at this centre can be representative of other districts. Socio-demographic, economic and environmental factors, which are believed to have an impact on repayment performance and not taken in past studies are included. The study was conducted in the period from April-June, 2020.

1.5. Significance of the study

As the major objective of the study is identifying variables that influence repayment performance of borrowers at DBE head office it is believed to contribute to the existing loan policy of the bank in a way that factors found to have impact on borrowers repayment can be taken as an input. Moreover, as the existing empirical evidences lacks the influence of study variables such as borrowers' business experience, project location and others on repayment performance, new empirical evidences will be uncovered. . Furthermore, the

study will contribute in reducing the current huge amount of NPL in the bank book to a large extent by providing relevant recommendations based on research findings.

1.6. Limitation of the study

Study data retrieved from the loan file of the bank may suffer timeliness since the current status of the borrowers in terms of educational qualification or business experience may not be reflected. In addition, the study findings may not be applicable to all 12 district borrowers of Development Bank of Ethiopia, since they are operating in different social, economic and environmental factors .There are still other variables which could affect repayment performance and not included in this research rejected due to inaccessibility, inapplicability in the research period due to covid-19 pandemic. Finally, study findings may not be applicable to all banks operating in the country since DBE is special bank that focus on financing of prioritized sectors by the government.

1.7. Organization of the Paper

The paper is organised in five chapters where the first three namely introduction, review of related literature, and research methodology are presented. In the first chapter issues as background of the study, statement of the problem together with research questions and hypothesis, scope of the study, significance of the study, and limitations of the study are discussed in detail. In the second chapter which is about review of related literature deals with discussion of issues such as theoretical, empirical framework and conceptual framework of the research title to identify the research gap. The third chapter deals with research approach, research design, sampling method and sample size , data type, data source, method of data collection ,method of data analysis, timeline and budget..

1.8. Definition of Key Terms

- ✓ **Credit Risk:** is the risk of default on a debt that may arise from a borrower failing to make required payments.
- ✓ **Pass:** a term used in DBE to show a loan status of a borrower who is paying on time.
- ✓ **Special Mentioned**: a term used in DBE to show a loan status of a borrower who fail to pay on a due date
- ✓ **Sub-standard, doubtful and loss**: a term used in DBE to show a loan status of a borrower who is in a default status**.**
- ✓ **Delinquency**: is defined as a failure to meet a loan payment by a due date

CHAPTER TWO
REVIEW OF RELATED LITERATURES

2.1. Introduction

This chapter present the theoretical and empirical literature review relevant to the topic under study. The theoretical review will discuss on the concept of credit, credit risk and Non- Performing Loans. The empirical review will present views of researchers on the variables of the study as guided by the purpose of the study and the research questions.

2.2. Theoretical literature review

A. The Concept of Credit

Credit is defined as an agreement whereby a financial institution agrees to lend a borrower an amount of money for return over a given time period. Oxford Dictionaries defines credit as the ability of a customer to obtain goods or services before payment. Banks receive the fund from the public on promise of paying interest and principal at some days in the future. At the same time, individuals and companies borrows from a bank on a ground that the fund will be repaid as per the terms and the condition of the loan contract.

From the analysis of the above two definition one can understand the existence of uncertainties between the date of agreement and maturity. There are three out comes from any credit contract 1.Repaying the loan as per the agreement 2.Failing to pay on the specified date or the specified amount (paying in arrears) and 3. Default

I. Credit Risk

A credit risk is the risk of default on a debt that may arise from a borrower failing to make required payments.

Types of credit risks

- **Credit default risk** – The risk of loss arising from a debtor being unlikely to pay its loan obligations in full or the debtor is more than 90 days past due on any material

credit obligation; default risk may impact all credit-sensitive transactions, including loans, securities and derivatives.

- **Concentration risk** – The risk associated with any single exposure or group of exposures with the potential to produce large enough losses to threaten a bank's core operations. It may arise in the form of single-name concentration or industry concentration.
- **Country risk** – The risk of loss arising from a sovereign state freezing foreign currency payments (transfer/conversion risk) or when it defaults on its obligations (sovereign risk); this type of risk is prominently associated with the country's macroeconomic performance and its political stability.

II. Causes of Credit Risk in Banks

According to wallstreetmojo.com, the top three causes of credit risk in banks are; credit concentration, credit issuing process and cyclical performance.

1. Credit Concentration

When a majority of the lending of the banks is concentrated on specific borrower/borrowers or specific sectors, it causes a credit concentration. The conventional form of credit concentration includes lending to single borrowers, a group of connected borrowers, a particular sector or industry.

2. **Credit Issuing Process**: This includes flaws in the banks' credit granting and monitoring processes.

a. Incomplete Credit Assessment

In order to evaluate the creditworthiness of any borrower, the bank needs to check for (1) credit history of the borrower, (2) capacity to repay, (3) capital, (4) loan conditions and (5) collateral. In the absence of any of the above information, the creditworthiness of the borrower cannot be evaluated accurately. In such a case, the bank must exercise caution while lending.

b. Subjective Decision Making

This is a common practice in many banks and other institutions wherein the senior management is given free rein in taking decisions. Where the senior management is allowed to make decisions independent of the company policies, which are not subject to any approvals, there could be instances where loans are granted to related parties with no credit evaluations being done and accordingly the risk of default also increases.

c. Inadequate monitoring

Where the lending is for the long term, they are almost always secured against assets. However, the value of assets may deteriorate over time. Therefore, it is not only important

to monitor the performance of the borrowers, but also monitor the value of assets. If there is any deterioration in their value, additional collateral may help reduce credit problems for the bank. Also, another issue could be the instances of fraud relating to collaterals. It is important for banks to verify the existence and value of collaterals prior to lending to minimize the risk of any fraud.

3. Cyclical Performances

The last cause of risk in banks is cyclical performance where almost all industries go through a depression and a boom period. During the boom period, the evaluations may result in the good creditworthiness of the borrower. However, the cyclical performance of the industry must also be taken into account in order to arrive at the results of credit evaluations more accurately. **(**www.wallstreetmojo.com**)**

B. Theories of Credit Default

According to Wilsen (2013), there are two concept in credit default theory; -Delinquency
-Insolvency

1. Delinquency: is defined as a failure to meet a loan payment by a due date. It is a condition of liquidity failure or having insufficient cash flow to service the loan. Delinquency occurs as soon as a borrower misses a payment on a loan. Negative cash flow is considered as one of the main causes of liquidity failure. There are three broad types of delinquency indicators: collection rates which measures amounts actually paid against amounts that have fallen due; arrears rates measures overdue amounts against total loan amounts; and portfolio at risk rates which measures the outstanding balance of loans that are not being paid on time against the outstanding balance of total loans (Wilsen, 2013)

2. Insolvency: is defined as a situation where the values of assets are less than liabilities. It underlies most definitions of credit defaults. There are essentially two approaches in determining insolvency: insolvency in the equity sense and under the balance-sheet approach. Insolvency in the equity sense denotes the inability of the debtor to pay his debts as they become due in the ordinary course of business. Insolvency under the balance-sheet approach means that the total liabilities of the debtor exceed his total assets (IBID)

C. Theories of Non-performing Loans

i. Asymmetry Theory

The theory of asymmetric information states that asymmetric information occurs when one party in a transactional relationship is more informed about the transaction than the other party that may result into adverse selection and moral hazard. Lenders offering credit facilities to borrower's are exposed for credit default in that the borrowing party may fail to

make the required payments, as they cannot observe the characteristics and actions of the borrower, thus making it difficult to assess the creditworthiness of the borrower (Ariccia 1998, cited in Peter 2018).

Moral hazard in the banking sector is a concept with a variety of principal-agent problems. The theory dictates that in the market, the party that possesses more information on a specific item to be transacted is in a position to negotiate on optimal terms of the transaction than the other counterpart. It is normally related to bank management behaviour through balance sheet items such as bank size, loan growth, asset growth, deposit growth and capital adequacy ratio as, changes in all these items is associated with decisions made by bank management.

Adverse selection: Generally adverse selection refers to a situation in which seller have information that buyers do not have or vise versa about some aspect of product quality. Disparity in the perceived value of an investment between buyers and seller is an example of adverse selection where a lender has asymmetrical and less than ideal information regarding the actual creditworthiness of a borrower.

Adverse selection and moral hazards have led to significant accumulation of Non-Performing loan in banks (IBID).

ii. Agency theory: According to the Agency theory, the principal agency problem can be reduced by better monitoring such as establishing more appropriate incentives for managers. The theory also explains a possible mismatch of interest between shareholder management and debt holders due to asymmetries in earning distribution, which can result in the firm taking too much risk or not engaging in positive net value project (Smith and Stulz, 1987 cited in Monicah 2013).

2.3. Empirical Literature Review

Since recent time, a number of researches are carried out on determinants of non-performing loans. For this, financial crisis that happened in the world major economies and developing nations can be mentioned as main reason.

a. Evidences on determinants of NPL in banks

A study made by Basel (2013 cited in Monicah **2013**) to investigate the macroeconomic determinants of non-performing loans, has indicated real GDP growth as the main driver of Non-performing loans.

Salas and Saurina (2002) investigated the determinants of problem loans of Spanish Commercial and Savings Banks, have indicated that real growth in GDP, rapid credit expansions, bank size, capital ratio and market power all explain variation in NPLs. Hu et al

(2006) who analysed the relationship between NPLs and ownership structure of commercial banks in Taiwan have showed banks with higher government ownership recorded lower non performing loans. Warue (2012) that studied the effects of Bank Specific and Macroeconomic factor on non-performing loans in commercial bank in Kenya has indicated that bank specific factors in particular, weak credit risk management, poor organizational and operating structure contribute to NPLs performance at higher magnitude compared with macroeconomic factors. In another study of Gorter and Bloem, (2002) insider lending; poor monitoring of loan accounts, under-qualified staff, little or no cash flow appraisal of loan requests, lack of continuous monitoring of customer conditions and proper follow up on how the loan has been utilized were indicated to lead into project failure. (IBID)

A study by Ahmad and Ariff (2007 cited in **Peter, 2018)** on determinants of non-performing loans in emerging countries shown that the increase in non-performing loans is associated with bank-specific factors, specifically; incapable bank management and bank regulatory capital.

Similarly, Ozili (2017) study on determinants of NPLs using a sample of banks from 134 countries concluded that more efficient banks (low cost to income ratio) tend to have less NPLs compare to inefficient banks. The Espinoza and Prasad (2010) in their study on determinants of non-performing loans in the Gulf Cooperative Council countries (GCCC) have found that NPL associated with bank specific factors (asset growth, operating efficiency, and ownership structure). Louzis et al. (2010) study on the determinants of non-performing loans in Greece (2003 to 2009) indicated bank-specific factors such as poor performance and cost inefficiency have a significant effect on the level of NPL. On the other hand, Xu (2005) study on causes of non-performing loans in China indicated that non-performing loans were largely a result of sustained losses at state-owned enterprises and lack of a commercial credit culture.(IBID)

A study result by Arega et.al (2016) shows that poor credit assessment and credit monitoring are the major causes for the occurrence of NPL in DBE central region district. Kimberly et al (2016) on the study of determinants and macroeconomic impact of Non-performing loan in ECCU, suggest that the deterioration in asset quality (high NPLs) in the ECCU can be attributed to both macroeconomic factors, including the prolonged recession in the region.

Summary of knowledge gap

Repayment performance of borrowers and NPL position of lenders are affected by many factors including socio-demographic factors, economic factors, institutional factors and environmental factors. Bank specific factors are identified as the main causes of NPL by many studies. In that, banks size, weak credit management poor organizational structure, insider lending, under qualified staff, efficiency, poor credit documentation, unrealistic repayment assumption and others are falling under bank specific factors. Other factors include poor credit governance, debt size, size of loss sustained by state owned enterprise, repayment amount, ownership structure, business and borrowers' character and so on.

Almost all the studies as shown in the empirical literature part, were focusing on bank specific factors using cross-sectional panel data except the one carried by Arega et.al (2016) that included both bank specific and customer specific factors as determinants of NPL though it suffers from non inclusion of performing loans in the study population.

Therefore, this research works toward filling the research gap by including bank specific and customer specific factors and show those factors affecting repayment performances of borrowers at Development Bank of Ethiopia(DBE)

2.4. Conceptual Framework

In this section of the review of related literature, key concepts, factors and variables that relate to the study are defined.

Credit risk

It is the risk of default on a debt that may arise from a borrower failing to make required payments. It is a risk of losing both principal and interest in loan contractual agreements.

Causes of Credit Risk in Banks

The top three causes of credit risk in banks are; credit concentration, credit issuing process and cyclical performance.

Credit Concentration: this is a situation where a majority of lending of a given bank is concentrated on specific borrower/borrowers or specific sectors

Credit Issuing Process: This includes flaws in the banks' credit granting and monitoring processes comprising of incomplete credit assessment, subjective decision making and inadequate monitoring. This one is the common cause of Non-performing loan in many banks as stated in the empirical literature part. The bank may give a loan without performing adequate assessment on the loan request, and fails to conduct the 5Cs analysis giving rise to incomplete credit assessment. In another scenario, top management of many banks are involved in making decision without adherence to the banks' policies resulting in high NPLs due to subjective decision making. The last element in credit issuing process is inadequate

monitoring. Banks after giving loans are supposed to make monitoring activities to ensure collection of the money failure to do so may increase level of Non-performing-loans resulting poor repayment performance of borrowers.

Cyclical Performances: this is a situation where the industries experiences a depression or a boom period creating difficulties to measure the true creditworthiness a loan request.

Determinants of Non-performing loans: socio-demographic, economic, and institutional factors are mentioned as the major driving forces behind high Non-performing loan position of financial institutions.

Description of Research Variables

Dependent Variables

In our model of multinomial logistic, the outcome variable is loan repayment status of borrowers at DBE head office unit classified into three categorical variables that is labelled as 'Currently paying', representing those borrowers without repayment problem, 'Delinquent ' representing borrowers paying their debt after due date and 'NPLs' who have stopped paying their loan . Further, the three categorical variables are indexed as 1, 2 and 3 representing currently paying, delinquent and NPLs respectively.

From the three outcome variable, the category constituting borrowers who are in the NPL category will be used as a base category. Furthermore, after assigning base category, there is a need to calculate log-odds for all other categories relative to the baseline category which has to be a linear function of the predictors (Rodriguez, 2007; Khan, 2010,cited in Osman and Ramakrishna ,2017)

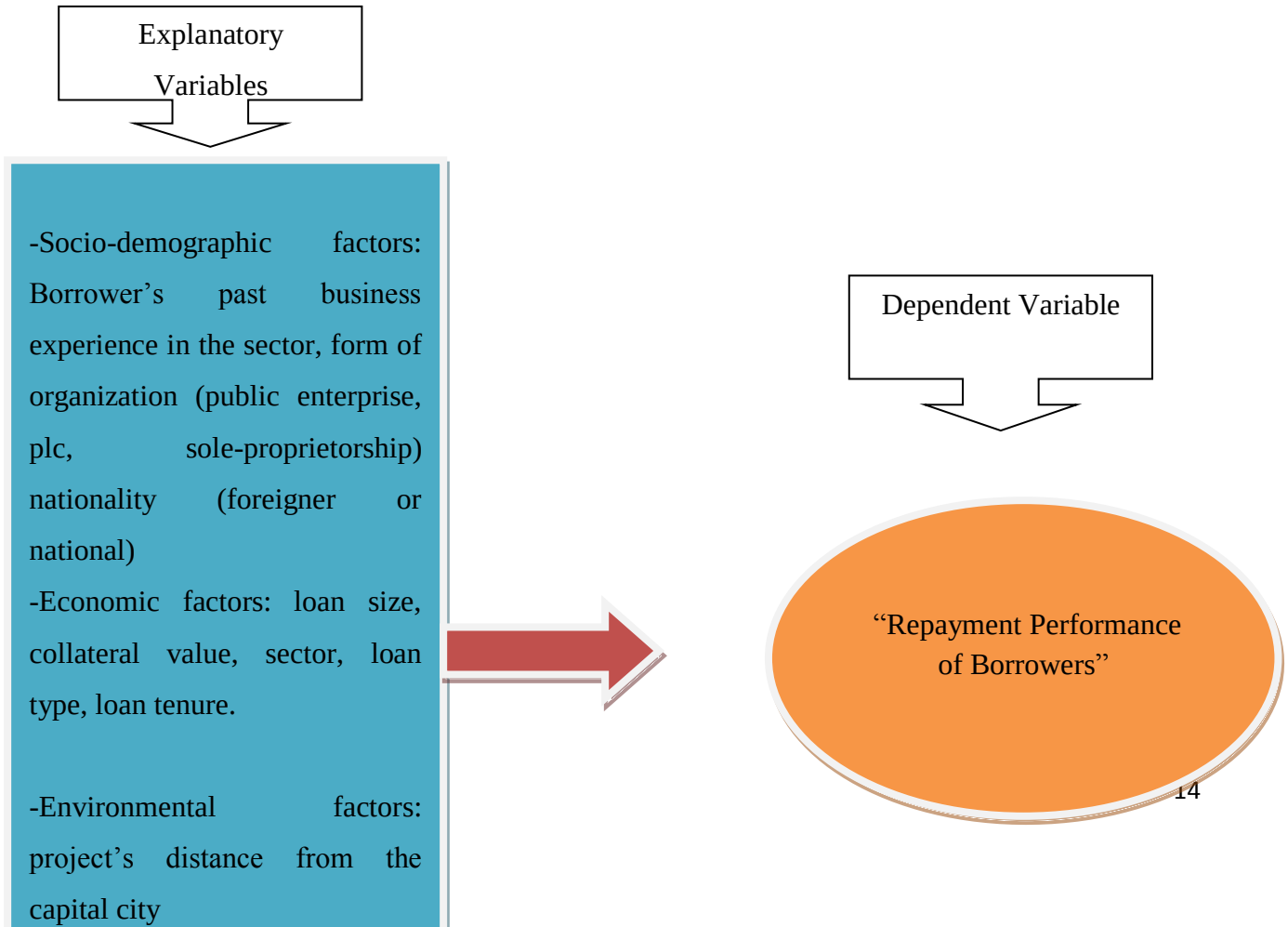
Description of Independent Variables

1. **Past Business Experience**: the variable past business experience represents the number of years that the borrower has in the sector when he/she takes the loan.
2. **Loan size** measured in currency: this variable represents the amount of loan taken by the respondents.
3. **Loan type:** dummy variable loan type has two categories of project loan and import substitute loan. The value 1 for project loan and 2 for import substitute is assigned.
4. **Form of business organization**: dummy variable form of business organization represents how the borrower' business is established. It has three forms (public enterprise, Private limited company and solepropritership). The numbers 1-3 is assigned to represent public, private and solepropritership respectively.

5. **Nationality:** the variable nationality represents the nationality of the owners of the business. As a dummy variable it has two categories of domestic or Ethiopian and foreigner with a value of 1 and 0
6. **Sector:** The variable sector tells us the sector in which the business operates. There are three sectors namely agricultural, manufacturing and other sectors(service, mining, etc). Furthermore, values 1,2 and 3 are assigned for agriculture, manufacturing and others sectors respectively.
7. **Project distance from capital:** This variable represent the distance of the business from the capital city Addis Ababa. It is measured in kilometres.
8. **Collateral value:** Collateral is value of property kept as a security against default of the borrower. It is stated in terms of birr.
9. **Loan Tenure:** this variable represent the loan repayment period including the grace period that the bank gives. It is measured in years.

Based on Earp and Ennett (1991) model, the conceptual framework showing the relationship between the dependent and independent variables is represented in diagram below

Conceptual Framework



Source: Earp and Ennett (1991)

CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

The research design and methodology part of any research plays the key role in achieving the desired outcome of the study. Therefore, in this chapter we will be going through determining the research approach, the design, data type, sources and method of data collection and method of data analysis.

3.2. Research Approach

Since the main purpose of the research was to identify and describe the influence of explanatory variable and explained variable (repayment performance) quantitative research approach were used in the study.

3.3. Research Design

Based on the method used by Osman and Ramakrishna (2017), both explanatory research design and multinomial regression technique were used in an attempt to explain the relationship between categorical dependent variables and independent variables.

3.4. Data type, Source and Methods of data Collection

Data Type: quantitative data was used to analyse relationship between dependent and independent variables.

Data Source: Secondary data are used in the study. The secondary data pertaining to the borrowers gathered from sample respondents loan file. Secondary data pertaining to the bank, and overall economic data are retrieved from reports compiled by the bank and other bodies from the bank's report that include annual reports, bulletins, manuals, directives and procedures.

Method of Data Collection: questionnaire/form developed by the researcher was used as a tool of data collection from borrowers loan file. This method was adopted in response to

covid-19 pandemic and the related restriction on physical contact to control the spread by the government through its state emergency. It was also impractical to convince borrowers to directly participate in the research since they are struggling to cope up the economic crisis they are facing as a result of the pandemic. With these all difficulties the research methodology designed in a way that enables to gather the necessary data pertaining to research variables were employed.

3.5. Sampling method and sample size

Target population: the target population for study includes all borrowers of the bank in all 12 districts. The total number of borrowers in these districts is 4010. When this figure is seen in detail by sector, 866 of them agriculture, 1445 consumer, 380 financial institutions, 1011 manufacturing, 112 in mining and energy, 123 services and the remaining falls in other sectors.

Study population: The study population constitutes all 137 active borrowers of Development Bank of Ethiopia head office credit departments. This figure includes only borrowers of manufacturing, agriculture, service and mining sectors. Consumer loans given to internal borrowers are excluded since they are not handled by credit departments and their files are kept in human resource department. From the total borrowers of 137, 51 of them were having a pass payment status, 53 of them special mentioned and 33 of them were in sub standard, doubtful and loss status. The data shows about 63% of the total borrowers have payment problem in that they fall either in the delinquent category (they are paying late) or NPL(have stopped payment).

Sampling Frame: According to C.R.Kothari, 2004, sampling frame serves as a frame from which study sample to be drawn. Likewise the sampling frame for this specific study is the list 137 borrowers of DBE head office departments as at June 31 2019 where borrowers of DBE head office unit is reorganised in strata of payment status.

Sampling Method: in selecting the samples from study population, probability and non probability method of sampling were applied. After classifying the sampling frame into three strata (strata one list of borrowers with pass repayment status, strata two list of customer with payment status of special mentioned and strata three list of customers with payment status of sub-standard, doubtful and loss) systematic random sampling for the first two strata and purposive sampling for the last one were used. The reason for using this method of sampling was that the numbers of cases in the first two strata are more or less similar while in the last category are small compared to the other two. So that respondents

from the defaulters group were selected purposively considering the sector, sub sector and variables.

i. **Sample Size**: in order to include the appropriate sample size that is in line with the cost, time and other environmental factors in which the research is conducted, the sample size was decided by the researcher. Accordingly, 23 cases from the first strata 28, from the second stratum and 19 from the third strata were included to makeup a total sample size of 70 cases.

Table 3.1: Study Population and sample size Summarized in Strata

No.	Name of strata	Number of Cases	Sample size
1	Currently paying(Pass)	51	23
2	Delinquent (special mentioned)	53	28
3	NPLs(Sub-standard, doubtful and loss)	33	19
	Total	137	70

Source: Summarized from DBE Report for the year 2018/2019

3.6. Method of data analysis

Descriptive statistics

To summarize the data collected from the sample respondents, and create association between variables, frequency, percentages, means and standard deviations were used.

Multinomial logistic regression

Since we have categorical dependent variable(repayment performance of paying on time, late and default), multinomial model enable to nominate one of the categorical dependent variable(with more than two response categories) as a base category. Therefore multinomial logit model is found the most suitable for the study.

As Starkweather and Moske, (2011) state, multinomial logistic regression is used to predict categorical placement in or the probability of category membership on a dependent variable based on multiple independent variables which could be either dichotomous or continuous (cited in Osman and Ramakrishna, 2017)

Further, multinomial logit model is often considered as an attractive analysis as it does not consider normality, linearity or homoscedasticity assumptions (O'Halloran, Ibid).

Assumption of Multinomial Regression

a. Independence among the dependent variable choices: this assumption states that the choice of or membership in one category is not related to the choice or membership of another category (Starkweather and Moske, 2011 cited in Osman and Ramakrishna, 2017).

b. Test of independent variables: with J dependent categories, there would be J–1non redundant coefficients associated with each independent variables *x*k. The hypothesis that *x*k doesn't affect the dependent variable can be written as:

H0: β1k= β2k = ---------- = βJk

where β1k, β2k, ----------, βJk are parameters of 1, 2, ------, J categories relative to the base group (Freese and Long, 2000 cited in Osman and Ramakrishna, 2017).

c. Assumption of multicollinearity: it occurs when two or more independent variables in the model are approximately determined by a linear combination of other independent variables. The degree of multicollinearity can vary and have different effects on the multinomial model (Freese and Long, 2000 and Schofer, 2007, Ibid).

Description of Research Variables

Dependent Variables

In our model of multinomial logistic, the outcome variable is loan repayment status of borrowers at DBE head office unit classified into three categorical variables that is labelled as 'Currently paying', representing those borrowers without repayment problem, 'Delinquent ' representing borrowers paying their debt after due date and 'NPLs' who have stopped paying their loan . Further, the three categorical variables are indexed as 1, 2 and 3 representing currently paying, delinquent and NPLs respectively.

From the three outcome variable, the category constituting borrowers who are paying late will be considered as a base category; in our case (delinquent) category**.** Furthermore, after assigning base category, there is a need to calculate log-odds for all other categories relative to the baseline category which has to be a linear function of the predictors (Rodriguez, 2007; Khan, 2010,cited in Osman and Ramakrishna ,2017)

Finally the below model will be employed to estimate the effect of the 9 explanatory variables on the loan repayment performance of respondents using Stata software.

The general model:

$Ln\pi i2/\pi i1 = \beta 02 + \beta 12\, x1 + \beta 12\, x2 + \ldots\ldots\ldots + \beta 72 x9$ (1)

Lnπi3/πi1= β03 + β13 *x*1+ β13 *x*2 +……+β73*x*9 (2)

Where (β02, β12… β92 and β03, β13,……,β93) are parameters of outcome categories paid-on-time relative to delinquents and defaulters relative to delinquents clients whereas (*x*1,*x*2,……,*x*9) are independent variables in the above outcome categories.`

Moreover, the multinomial logit model can also be written in terms of predicted probabilities (Rodriguez, 2007; Hegre, 2011, Ibid).

$$P(Y_{i=}1) = \frac{1}{1 + e^{X\beta(^2)} + e^{X\beta(^3)}}$$

$$P(Y_{i=}2) = \frac{1}{1 + e^{X\beta(^2)} + e^{X\beta(^3)}}$$

$$P(Y_{i=}3) = \frac{1}{1 + e^{X\beta(^2)} + e^{X\beta(^3)}}$$

Where: $\beta^{(1)} = 0$

eXβ 2 and eXβ(3)are exponential functions of equation (1) and (2) in matrix form.

The relative probability of *y* = 2 (pass) to the base outcome y = 1 (NPL) is:

$$\Pr(y=2)/\Pr(y=1) = e^{X\beta(2)}$$

The ratio denoted by the above equation is the Relative Risk Ratio (RRR) which is probability of choosing one outcome category over the probability of choosing the baseline category. Thus, it is obtained by exponentiating the coefficients of the linear regression equations.

Specific model:

Lnπi2/πi1= = β0 +β1collav + β2Tenure +β3Bexp + β4Nati +β5Forg+ β6Lsize +β7sec + β8dis+ β9Ltype

Lnπi3/πi1= β0 +β1collav + β2Tenure +β3Bexp + β4Nati +β5Form+ β6Lsize +β7sec + β8dis+ β9Ltype

Where;

Collav.= collateral value

Tenure= period of the loan in years

Busexp.= Past business experience of the borrowers in the sector

Nati. = Nationality of the Borrower (National or Foreigner)

Form. = Form of organization (Public, Private and Sole-proprietorship)

Lsize = loan size in birr

Loant = Loan type

Sec. = Sector of the loan

Dist. = Distance of physical location of the business from the capital city

CHAPTER FOUR
RESULT AND DISCUSSION

4.1. Introduction

This chapter deals with the data presentation and analysis of the research work. The data is analyzed using descriptive statistics and multinomial logistic regressions. The results are presented in tabular summaries.

4.2. Description of Continuous Variables

Table 4.1: Descriptive statistics of continuous variables

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Variables	Obs	Mean	Std.dev.	Min.	Max.
Loan size	70	177,000.00	307,000.00	2077.68	1,710,000.00
Collateral value	70	206,000.00	413,000.00	0.00	2,330,000.00
Borrowers' Experience	70	12.8	8.02	4	40
Loantenure	70	12.7	5.46	4	20
Project Dis. from capital city	70	389.02	296.25	0	965.50

Source: Own Computation 2020

i. Loan Size: The loan size of sample borrowers ranges from ETB2m to ETB1.7b with mean loan size of ETB177m. Accordingly, the average loan size of respondents with NPL repayment status was ETB194m, for delinquent ETB278m and ETB40m for respondents without repayment problem respectively. The figures show that payment performance gets worsened with the increment of the loan size, and larger loan size lower probability of repaying the loan on time. This can be attributed to inability of project to generate enough cash to cover the loan repayment since the bank finance development

projects that require long time for entering into operation and start repayment before the end of the grace period.

Table 4.2. Summary of loan size against loan status

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Loan status	Summary of Loan Size		
	Mean	**Std.Dev.**	**Freq.**
Delinquent	278,300.00	339,600.00	28
NPL	194,500.00	381,600.00	19
Pass	40,494,957.00	35671294	23
Total	**177,400.00**	**306,500.00**	**70**

Source: Own Computation 2020

ii. Collateral value: The collateral value of property held as a security for loan repayment of sample respondents ranges from ETB0.00* to 2.3b with mean value of ETB206m. The mean collateral value of defaulter and delinquent respondents were ETB78m and ETB364M respectively while it is 119m for respondents in pass category. When the collateral value of the borrowers seen from payment performance perspective, higher collateral value is associated with better repayment performance in the delinquent borrowers. This is in line with the earlier hypothesis that higher collateral value is related with better repayment performance and vise-versa. But this argument cannot hold for borrowers in the pass category where the mean value of collateral is much lower than delinquent category.

*Non collateral loan

Table 4.3: Summary of collateral value against Loan Status

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Loan status	Summary of collateral value		
	Mean	**Std. Dev.**	**Freq.**
Delinquent	ETB364,600.00	ETB592,900.00	28

NPL	78,800.36	119.70	19
Pass	119,300.00	195,900.00	23
Total	**206,400.00**	**413,200.00**	**70**

Source: Own Computation 2020

iii. Past Business Experience: The average past business experience of sample borrowers was 12.8 years and the maximum and minimum past business experience were 4 years and 40 years respectively. Furthermore, the average past business experience of borrowers with default repayment status was, 6.84, for delinquent 13.21 and 17.22 years for borrowers without repayment problem. From the above figures, the higher average experience of borrowers in the pass category could be taken as enabling factor for them to pay their loan than those in the delinquent and NPL borrowers' category. In the same token the higher average business experience of borrowers in the delinquent category can be taken as a determining factor that result in better repayment performance than borrowers in the NPL category with lower average past business experience. Behind these differences in repayment performance as a result of difference in past business experience could be that borrowers with higher past business experience have good position in the operational performance of their businesses. This result support the hypothesis that state experience of business owner or managers matter in the success or failure of a business.

Table 4.4: Summary of Borrowers' Past Business Experience against Loan Status

Loan status	**Summary of Past Business Exp. in years**		
	Mean	**Std. Dev.**	**Freq.**
Delinquent	13.21	8.23	28
NPL	6.84	2.89	19
Pass	17.22	7.79	23
Total	12.80	8.02	70

Source: Own Computation 2020

iv. Project Distance from the capital: The average distance of the location of the projects from the capital city is 389km with minimum 0km for projects in the capital city and maximum 965km outside the capital city. The mean project distance in kilo meters for NPL and delinquent borrowers were 390.80km and 454.56km respectively while it is 332.72km for borrowers in pass category. These indicate that borrowers repayment performance improve as their project location nears to the capital city. This can be related to

the fact that the financing unit is located in the capital city gives better loan repayment follow-up for projects in the near distance than those far distances. In addition, projects located in far areas suffer from shortage of human and material resources which are essential for the efficient and smooth operation of projects since in most cases availability of these resources are scarce in far areas from the capital city and have poor repayment performance. Moreover, businesses in near distance are able to seek expertise advice from the bank personnel and improve their repayment status while it is difficult for business in the far areas. The bank experts have also better control over the activities of borrowers and ascertain proper usage of fund for business in the near distance than far distance. The result has also supported the hypothesis that there is inverse relation between repayment performance and location distance of projects.

Table 4.5: Summary of Projects' distance against Loan Status

Loan status	Summary of project distance in km		
	Mean(km)	**Std. Dev.**	**Freq.**
Delinquent	390.80	309.46	28
NPL	454.56	225.57	19
Pass	332.72	330.25	23
Total	389.02	296.24	70

Source: Own Computation 2020

v. Loan tenure: The mean loan tenure for sample borrowers was 9.58 years and the minimum and the maximum loan period were 3 and 20 respectively. The average repayment period for default borrowers was 7.63, for delinquent borrowers 9.46 and 11.34 for borrowers paying their debt on a timely manner. The average loan repayment period for default and delinquent respondents were smaller than those paying on time. The result is an indication that borrowers with longer repayment period have better repayment performance than those with shorter repayment period**.** It implies that giving relatively longer payment period will improve repayment performance. This is from the fact that longer repayment period is associated with lower repayment amount**.**

Table 4.6: Summary of Loan tenure against Loan status

Loan status	Summary of loan tenure		
	Mean	**Std. Dev.**	**Freq.**
Delinquent	9.4642857	4.4761	28

NPL	7.6315789	4.9013	19
Pass	11.347826	5.2967	23
Total	9.5857	5.0144	70

Source: Own Computation 2020

4.3. Description of Categorical Variables

Table 4.7: Frequency and Percentage Results of Dummy Variables

Variable	Categorical Dependent Variable						
	Pass N=23		Delinquent N=28		NPL N=19		Total N=70
	N	%	N	%	N	%	
Sector:							
-Agriculture	3	13.04	5	17.86	6	31.59	14
-Manufacturing	17	73.92	23	82.14	13	68.41	53
-Other	3	13.04	-		-	-	3
Loan type:-							
Project	17	73.92	18	64.28	8	42.11	43
Import Substitute	6	26.08	10	35.72	11	57.89	27
Nationality: -							
Ethiopian	20	86.96	22	78.57	10	53.63	52
Foreigner	3	13.04	6	21.43	9	47.77	18
Business Form:-							
-Solepropritership	3	13.04	6	21.43	4	21.05	13
-Private Company	19	82.61	20	71.43	15	78.95	54
-Public Enterprises	1	4.35	2	7.14	-	-	3

Source: Own Computation 2

I. Sector: From the total sample borrowers' 20% in agricultural sector, 76% in the manufacturing, and 4% are engaged in other sectors (comprising of services and mining). . When the dependent variable category is analysed in terms of sectors out of the total defaulters included in the sample 31.59% of them are engaged in agricultural sector and the rest 68.41 % of them are engaged in manufacturing sector, under borrowers in delinquent category, 17.86% in agriculture and 82.14% are in manufacturing sector. Regarding borrowers in the pass category, 13.04% in agriculture, 73.92% in manufacturing and 13.04% falls in other sectors. The above figures indicate that the proportion of agricultural sector in NPL status borrowers' category is higher than the proportions in the other two category of delinquent and pass. Meanwhile the share of agriculture in the pass category is lower than the other two category of NPL and delinquent. One cause for lower repayment performance of agriculture sector could be susceptibility of the sector to climate change, fluctuation in rainfall and draught that impact performance of borrowers' businesses. On the other hand the share of manufacturing sector in delinquent category is higher than pass category indicating borrowers in the manufacturing sector have problem of repaying their debt as scheduled.

Table 4.8: Summary of sector against Loan Status

Loan status	**Sector**		
	Agriculture	**Manufacturing**	**Others**
Delinquent	35.71%	43.40%	-
NPL	42.86%	24.52%	-
Pass	21.43%	32.08%	100%
Total	100	100	100%

Source: Own Computation 2020

II. Loan Type: when the loan type of sample borrowers is analysed, 61% of them have taken project loan, while 39% took import substitution loan. The percentage of project loan in the NPL category, delinquent and pass category were 42.11% 64.28% and 73.92% respectively. Meanwhile, the proportion of import substitution loan type in the three category borrowers were 57.89% in NPL, 35.72% in delinquent and 26.08% in the pass category. The results show that import substitute loan borrowers' share in the category of NPL and delinquent category is higher than in the pass category. This can be attributed to

the lower repayment period that import substitute loan borrowers have compared to project loan borrowers. In contrary to the hypothesis set in favour of import substitute loan borrowers to have better repayment performance, project loan borrowers have shown better repayment performance.

Table 4.9 Summary of Loan Type against Loan Status

Loan status	**Loan Type**			
	Project Loan	**Import Substitute**	**Total (%)**	**Freq.**
Delinquent	64.28%	35.72%	100	28
NPL	42.11%	57.89%	100	19
Pass	73.92%	26%	100	23
			Total	70

Source: Own Computation 2020

Table 4.10 Summary of loan type against loan tenure

Loan type	Loan tenure	Std.Dev.	Freq.
Project Loan	10.67	5.8177	43
Import Substitute	8.90	4.3742	27
Total	9.5857	5.0144	70

III. Nationality of Borrowers: The study result shows that from the total sample of 70 borrowers, 52 or74.29% of them were domestic investor who are Ethiopian by nationality while the remaining 18 or 25.71% were foreign investors. In addition, when the payment status category of the borrowers with respect to nationality is evaluated, 53.63% of borrowers in NPL 78.57% in the delinquent and 86.96% in pass were Ethiopian while 47.77% in the NPL, 21.43% in delinquent and 13.04% were foreigners. As clearly seen, the proportion of foreign investors in the delinquent and NPL categories is much higher than in the pass category. This indicates borrowers from foreign countries have poor repayment performance than domestic investors. The reason for poor repayment performance of foreign investors compared to their domestic counterpart could be attributed to the difficulties in conducting due diligence and KYC analysis on prospective foreign borrowers since their background information is not easily accessible than their domestic counter parts.

Though the repayment performance of domestic borrowers is better than foreign borrowers, still the percentage of domestic borrowers in the category of borrowers with repayment problem is very high. As the bank credit policy state domestic borrowers not housed in industrial park are required only 25% equity contribution that may create moral hazard in the proper utilization of the fund and resulting in poor repayment performance.

Table 4.11: Summary of Borrowers' Nationality against Loan Status

Loan status	**Nationality**			
	Ethiopian	**Foreign**	**Total (%)**	**Freq.**
Delinquent	78.57	21.43	100	28
NPL	53.63	47.37%	100	19
Pass	86.96	13.04%	100	23
Total				70

Source: Own Computation 2020

IV. Business Form: Based on social unit or form of business ownership, the composition of sample borrowers falls in three categories of sole-proprietorship, private company and public enterprise. The percentage of business owned by individual, private company and public enterprises are 18.57%, 77% and 4.28% respectively. The proportion of individual business in the NPL , delinquent and pass borrowers category were also 21.05%, 21.43% and 13.04 respectively. The share of private company in the NPL, delinquent and pass categories were 78.95%, 71.43% and 82.61% respectively. Further, it was only in the delinquent and pass status that public enterprises fall with proportion of 4.35% in pass and 7.14% delinquent. Relative to the two categories, the percentage of private companies in the NPL category is very high indicating low repayment performance. For the poor repayment performance one reason could be lack of corporate governance compared to public enterprise or lack of flexibility to adjust to dynamic business environment when compared to individual businesses. Moreover, the number of individual businesses in the category of borrowers without repayment performance problem is very small relative to the number of businesses in the other two categories of NPL and delinquent. This indicates the existence of poor repayment performance among individual business borrowers. This could be attributed to poor business performance and financial management since all business decisions are made by one person.

Table 4.12: Summary of Business form against loan status

Loan status	Business Form				
	Individual	**Private**	**Public**	**Total (%)**	**Freq.**
Delinquent	21.43	71.43	7.14	100	28
NPL	21.05	78.95	-	100	19
Pass	13.04	82.61	4.35	100	23
Total					70

Source: Own Computation 2020

4.4. Analysis of Regression Results

Econometric analysis was carried out in order to identify factors that affect loan repayment performance of borrowers at DBE H.O. As explained in the methodology part, multinomial logit model was employed to estimate the effect of independent or explanatory variables on the loan repayment performance of borrowers. Out of nine variables hypothesised to affect loan repayment performance of borrowers, three variables were found to be statistically significant for pass and two variables for delinquent. The maximum likelihood estimates of multinomial logistic regression model showed that variables nationality and business experience of the borrowers are significant in affecting repayment performance of borrowers in the delinquent borrowers category. Moreover, variable that included loan size, business experience and loan tenure were found significant to affect repayment performance of borrowers in pass status.

On the other hand, regression estimation result shows that RRR of four explanatory variables namely, loan size, loan tenure, business experience, and nationality of the borrowers were significant in explaining variation in loan repayment performance of delinquent and pass status borrowers compared to borrowers in default category. Whereas five variables collateral, project distance from the capital city, sector, and business form were found to be weak in explaining repayment performance borrowers. To analyze factors affecting the loan repayment performance of condominium loan borrowers, multinomial logit model was estimated using Stata version 14.2 statistical package.

Table 4.13: Regression outcomes of the multinomial model on delinquent when NPL set as a base outcome

Variables	Coef	Std. Err.	P>|z|
loansize	-6.56e-10	1.85	0.722
collateral	4.82	3.73	0.197
businessexp	.3244	0.1381762	0.019 *
project dist.from capital	-.0009594	0.0018275	0.60
loantenure	.1522304	0.0998329	0.127
sector	-.2749448	.9934391	0.782
loantype	1.339386	.9576125	0.162
nationality	-1.758573	1.092711	0.105***
businessform	-.2670529	.5423499	.662
_cons	-3.292215	3.474363	.343

Log likelihood =	-40.612019
Number of obs =	70
Prob> chi2 =	0.0000
LR chi2(20) =	70.84
Pseudo R2 =	0.4659

Note: ***, ** and * represents significance level at 1%, 5% and 10% level of significance.

Source: Own computation using STATA 14.2

Table 4.14: Regression outcomes of the multinomial model on Pass when NPL as a base outcome.

Variables	Coef	Std. Err,	P>|z|
loansize	-3.08e-08	1.35	.022**
collateral	3.71	4.57	.417
businessexp	.379011	0.1425825	0.008 *
project dist.from capital	-.0005474	0.0020454	0.789
loantenure	.2934867	0.1251313	0.019*
sector	1.178931	1.117765	0.349

loantype	1.559525	.9576125	0.162
nationality	-1.013877	1.375963	0.461
businessform	-.754966	0.6826757	0.461
_cons	-7.229521	4.462071	0.105 ***

Log likelihood = -40.612019

Number of obs = 70

Prob> chi2 = 0.0000

LR chi2(20) = 70.84

Pseudo R2 = 0.4659

Note: ***, ** and * represents significance level at 1%, 5% and 10% level of significance.

Source: Own computation using STATA 14.2

A. Model summary

- Lnπi2/πi1= = -3.29 +4.82collav + 0.15Tenure +0.32Bexp + 1.75Nati +-0.26Forg -6.56Lsize + -27.49sec + -.00095dis+ 1.33Ltype
- Lnπi3/πi1= -7.22 +3.71collav + .29Tenure +.38Bexp + -1.01Nati + -1.01Forg+ -3.08Lsize +1.17sec + -00054dis+ 1.55Ltype

The study has used 70 observations, from the borrowers, in the estimation of multinomial logistic regression. The statistics -40.612019 is the log likelihood of the fitted model which was used in the Likelihood Ratio Chi-Square test of whether coefficients of all explanatory variables in the model were simultaneously zero. The log likelihood (-40.612019) can be used in comparisons of nested models. Furthermore, Prob>chi2 indicates the probability of getting a LR test statistic. In other words, this was the probability of obtaining the chi-square statistic (70.84) if there was no effect of the predictor variables. Further, the p-value was compared to a specified alpha level, our willingness to accept a type I error, which was typically set at 1%, 5% or 10%. This would lead us to conclude that at least one of the regression coefficients in the model was not equal to zero and hence, the model as a whole fits significantly better than an empty model. In addition, the McFadden's pseudo R-squared of the multinomial logistic regression was 46.59%. The higher McFadden's pseudo R-squared indicated that the best fit of the multinomial logit model.

A. Interpretation of RRR of pass and delinquents relative to clients with default loan status

In this section, the multinomial logistic regression was interpreted in terms of relative risk ratios and hence can be obtained by exponentiating the multinomial logit coefficients (e^{coeff}). As it has been described, the outcome categories in the estimation were borrowers who are paying their loan labeled as "pass", late payers or "delinquents " and default customers or "NPL". Thus, the entire analysis focused on the relationship of these outcome categories with a number of independent variables. To do so, this study chose the NPL group as a base category, as choosing any category as a base group have only the coefficients will differ because they have different interpretations, but the predicted probabilities for loan status= 1, 2, and 3 will still be the same i.e overall no effect (Hamilton, 1993).

Table 4.15: Regression outcomes of the multinomial model on Delinquent when NPL as a base outcome with RRR

Variables	RRR	Std. Err,	P>|z|
loansize	1	1.85	0.722
collateral	1	3.73	0.197
businessexp	1.383265	.1911344	0.019*
projectdistance	.999041	0.0018258	0.600
loantenure	1.164428	0.1162482	0.127
sector	.7596141	0.7546303	0.782
loantype	3.816701	3.654921	0.162
nationality	.1722906	0.1882639	0.105**
businessform	.7656326	0.4152407	0.622
-cons	.0371714	.129147	0.343

Log likelihood =	-40.612019
Number of obs =	70
Prob> chi2 =	0.0000
LR chi2(20) =	70.84
Pseudo R2 =	0.4659

1. Interpretation of RRR of pass respondents relative to NPL

Table 4.15 above provides the odds ratios from the multinomial logit model (MNL). The first two columns in table 3 report relative risk ratio (RRR) and standard errors comparing

with delinquent to the NPL borrowers. Generally, Values above one indicate that higher values of the explanatory variable increase the predicted probability of delinquent to the NPL borrowers' category. Coefficients less than one indicate the higher values of the explanatory variable decrease the predicted probability of delinquent to the NPL borrowers.

a. Past Business Experience: As per table 4.3, the relative risk ratio is 1.383265. Other variables remain constant, when borrowers past business experience increase by one year, the relative risk ratio being in the delinquent category would be 1.383265 times more likely as compared to NPL category. More generally, when past business experience increases by one year borrowers in the delinquent category would be expected to stay in the status as compared to NPL category with 5% level of significance. The result imply that increase or decrease in business experience of borrower affects the repayment status of borrowers in that the increase experience, the risk of falling in NPL category will decrease. The possible reason for this could be the increase in the past business experience of borrowers enable borrowers to apply their skill in the management of their business and improve performance in repaying their loan.

b. Nationality of Borrowers (Nationality): The risk ratio of 0.1722906 for nationality with Ethiopian indicates that the relative risk of choosing to delinquent as compared to being in the NPL category is 0.1722906 times less likely for those Ethiopian borrowers than those of foreign borrowers. The coefficient of the variable is significant at 10% level of significant. The result indicates that domestic borrowers prefer to continue paying their loan at least in late period time compared to foreign borrowers. This could be associated to fear of penalty on the side of the married borrowers' that the lenders may charge on delayed payments.

As we can see in the above table, variables like loan size, collateral, project distance from the capital, loan tenure, sector, loan type and business form were found to be statistically insignificant in affecting loan repayment performance of sample borrowers.

2. Interpretation of RRR for defaulters relative to clients with delinquents

Table 4.16: Regression outcomes of the multinomial model on pass when NPL as a base outcome with RRR

Variables	RRR	Std. Err,	P>|z|
loansize	1	1.35	0.022*
collateral	1	4.57	0.417
businessexp	1.460839	.2082901	0.008*

projectdistance	.9994527	0.0020443	0.789
loan tenure	1.341091	.1678125	0.019*
sector	3.250896	4.095231	0.349
loantype	4.756562	5.316721	0.163
nationality	.3628095	0.4992125	0.461
businessform	.4700266	0.3208757	0.269
-cons	.0007249	.0032344	0.105***

Log likelihood = -40.612019
Number of obs = 70
Prob> chi2 = 0.0000
LR chi2(20) = 70.84
Pseudo R2 = 0.4659

i. Loan size: As shown in the above table, the relative risk ratio for this specific variable is 1.00. This means, when loan size increased by one birr, the relative risk ratio being in the pass group would be equal to NPL group. More generally, when loan size increase they would be expected to stay in the pass category or fall into defaulter category in equal probability with 5% level of significance. In other word, keeping all other variables constant, if loan size of the borrowers increased by one birr the respondents would remain in pass category compared to the NPL category

ii. Past Business Experience: From the regression table above, the relative risk ratio for this variable is 1.460839. Other variables remain constant, when borrowers past business experience increase by one year, the relative risk ratio being in the pass category would be 1.460839 times more likely as compared to NPL category. More generally, when past business experience increases by one year borrowers in the pass category would be expected to stay in the status as compared to NPL category with 10% level of significance. The result imply that increase or decrease in business experience of borrower affects the repayment status of borrowers in that the increase experience, the risk of falling in NPL category will decrease. The possible reason for this could be the increase in the pass business experience of borrowers enable borrowers to apply their skill in the management of their business and improve performance in repaying their loan.

iii. Loan tenure: the relative risk ratio of variable loan tenure is 1.341091. the figure indicate that a one year increase the relative risk being in pass group would be 1.341091 times more likely compared to NPL group. The increase in loan tenure could be one factor to reduce cash shortage or loan tenure and payment amount is highly related the repaying capacity of the borrowers could be improved since additional time give relief. The variable is significant at 5% level of significance.

Other variable like collateral, project distance, loan type, nationality, sector and business form were found to be insignificant.

B. Post estimation tests of multinomial logit model

Multinomial logistic regression does have different post estimation tests to robust the overall significance of the regression analysis. These tests are test of independent variables, test of independent irrelevant alternatives (IIA), test for combining dependent categories, test of multicollinearity and tests for model fit. When such tests of multinomial logit analysis are not met, the analysis may have problems and these problems may lead to invalid statistical inferences. Therefore, before and after the use the model it needs to be checked by these tests.

Tests of independent variables

To conduct this test, the study has used likelihood-ratio tests using the STATA command (mlogtest, lr)

Table 4.17 Test of independent variables using LR test

```
**** Likelihood-ratio tests for independent variables

 Ho: All coefficients associated with given variable(s) are 0.

loanstatus|     chi2    df   P>chi2
---------+--------------------------
loansize |     17.424    2    0.000
collateral|     4.920    2    0.085
businessexp|   13.748    2    0.001
projectdistance|    0.298    20.862
loantenure|     6.423    2    0.040
  sector |      2.632    2    0.268
loantype |      2.510    2    0.285
nationality|    2.867    2    0.239
businessform|    1.380    2   0.502
-----------------------------------
```

As per the likelihood-ratio tests the above table 4.4.5 show that a number of the variables are significant at 1%, 5% and 10% significance level.

Tests for combining dependent categories.

If none of the independent variables significantly affects the odds of outcome M versus outcome N, we say that m and n are indistinguishable with respect to the variables in the model. If two outcomes are indistinguishable with respect to the variables in the model, you can obtain more efficient estimates by combining them. To conduct this test the study used LR

Table 4.18: Tests for combining dependent categories using LR

```
**** LR tests for combining outcome categories

 Ho: All coefficients except intercepts associated with given pair
     of outcomes are 0 (i.e., categories can be collapsed).

Categories tested |      chi2   df   P>chi2
------------------+-----------------------
Delinque-     NPL |    30.469    9    0.000
Delinque-    Pass |    30.471    9    0.000
     NPL-    Pass |    56.400    9    0.000
-------------------------------------------
```

As the test result shows in the above table 4.4.7 we can conclude that no categories should be combined since the test for the chi2 value is less than 1%.

Multicollinearity Test

Multicolinearity problem arises when at least one of the independent variables is a linear combination of the others. The existence of multicolinearity might cause the estimated regression coefficients to have the wrong signs and smaller t-ratios that might lead to wrong conclusions.There are two measures that are often suggested to test the presence of multicolinearity. These are variance inflation factor (VIF) for association among the continuous explanatory variables and correlation matrix among all explanatory variable. This study is conducted both types of tests and presented in the following table.

Table 4.19: MulticollinarityTest

. vif

Variable	VIF	1/VIF
loansize	1.69	0.590485
collateral	1.48	0.674099
loantenure	1.41	0.706857
nationality	1.38	0.724892
projectdis~e	1.34	0.743820
businessexp	1.24	0.808421
loantype	1.16	0.858973
businessform	1.15	0.866434
sector	1.14	0.878142
Mean VIF	1.33	

. corr loansize collateral businessexp projectdistance loantenure sector loantype nationality businessform
(obs=70)

	loansize	collat~l	busine~p	projec~e	loante~e	sector	loantype	nation~y	busine~m
loansize	1.0000								
collateral	0.5160	1.0000							
businessexp	-0.1774	0.0949	1.0000						
projectdis~e	-0.0703	0.0537	-0.0906	1.0000					
loantenure	0.2530	0.0233	-0.0758	-0.4368	1.0000				
sector	0.0938	0.1244	0.1528	-0.0119	-0.0186	1.0000			
loantype	-0.0881	0.0218	0.2380	0.0512	-0.1900	0.2361	1.0000		
nationality	0.3055	0.1689	-0.2027	-0.1594	0.0205	-0.1520	-0.0038	1.0000	
businessform	-0.0076	0.0197	-0.0348	0.0816	0.0864	0.0998	0.0444	-0.3110	1.0000

As per table 4.9 above the mean inflated factor or (VIF) test result is far less than 10, which is 1.33 therefore, indicating there is no high multicollinarity problem in this model. From the correlation matrix the correlation between the continuous is low further indicating absence of high multicollinarity problem.

Tests for the Mlogit model fit

Table 4.20: Test for the mlogit model fit

```
. fitstat

Measures of Fit for mlogit of loanstatus

Log-Lik Intercept Only:      -76.032     Log-Lik Full Model:         -40.612
D(40):                        81.224     LR(18):                      70.840
                                         Prob > LR:                    0.000
McFadden's R2:                 0.466     McFadden's Adj R2:            0.071
Maximum Likelihood R2:         0.637     Cragg & Uhler's R2:           0.718
Count R2:                      0.571     Adj Count R2:                 0.286
AIC:                           2.017     AIC*n:                      141.224
BIC:                         -88.716     BIC':                         5.632
```

Based on table 4.12 the overall mlogit model is fit and evidenced from maximum likelihood ratio McFadden's R2 and the AIC and BIC

CHAPTER FIVE

CONCLUSIONS, RECOMMENDATIONS AND FUTURE RESEARCH AREA

5.1. Summary

In this study, efforts geared toward identifications of factors that affect repayment performance of borrowers at DBE-Head office were made by grouping nine explanatory variables into socio-demographic, economic and environmental categories. To measure repayment performance of borrowers there was a need to categorize the dependent variable into 'Pass', 'Delinquent' and 'NPL' groups/strata based on borrowers' repayment status. As to the research approach and research design quantitative research approach and descriptive research design were employed respectively. Concerning sampling method, both, systematic random sampling and purposive sampling were used to include the appropriated respondents in the sample. Moreover, a sample of 70 borrowers, 23 from pass stratum, 28 and 19 respondents from delinquent and NPL strata were selected from a total study population of 137. Secondary data sources for gathering of data pertaining to the research variables were utilised. Finally, descriptive and regression analysis were carried out using mean, ranges, standard deviation and frequencies and multinomial logit model.

5.2. Conclusions

From the descriptive and regression analysis carried out on the nine research variable a number of findings were identified and conclusions derived from these findings are stated in the sections below.

Analysis of descriptive statistics indicated that borrowers in the delinquent and NPL category have higher loan size compared to borrowers in the pass category. This shows that the loan size that bank borrower make a difference in the repayment performance of the borrowers.

It is also observed that the collateral value for borrowers in the pass and delinquent category to be higher compared to NPL category. Indicating maintaining higher value of property as a security improves repayment performance of borrowers. This might come from the commitment of the borrower not to expose the collateral for foreclosures. With regard repayment period, respondents with repayment problem were having relatively shorter repayment period or loan tenure than those of borrowers without repayment problem (or pass category). This indicates longer repayment period is comfortable to borrowers and gives better repayment performance since repayment period is highly associated with repayment amount set on borrowers. Borrowers' business experience has been identified to

have significant impact on repayment performance of borrowers. From descriptive analysis, it is realised that as the payment status worsened say from pass status to delinquent, from delinquent to NPL category, the average business experience figure gets smaller and smaller. This implies, higher experiences of borrowers are helping to manage their business and able to meet their financial obligations. With regard to sectoral repayment performance, major proportion of borrowers engaged in the agricultural sector was found in delinquent and NPL categories. For this, the exposure to climate change, inaccessibility of market and others factors could be some of the causes for poor repayment performance seen in the sector.

Finally, location of projects from the centre for borrowers in the delinquent and NPL categories measured in km were far compared to pass group. This implies projects located in the near distance have better repayment performance and far area projects have poor repayment performance. Among the reason for poor repayment performance, one could be inaccessibility for frequents visit by the lender and another lack of sufficient market for distribution and selling of products.

5.3. Recommendations

The study has indicated that repayment performance of sample borrowers is affected by a number of variables. In general, from the major findings, the following recommendations are given:

- Since the bigger loan size is associated with repayment performances of the borrowers, this might be related with fund diversion or inappropriate utilization of the loan. Therefore, it is very important to balance the loan release amount with the project work already executed and in each step of partial loan release assure the project's progress and capability to repay the loan
- It is also observe in the result analysis that shorter loan period or loan tenure is related with poor repayment performance. Therefore, the bank should consider rescheduling the loan or adjusting the repayment manner such as collecting the interest and principal in different scheme for borrowers of long term, short and medium term loans.
- As observed in the analysis part, project location is highly related with repayment performance and it is further identified that project located in the remote areas has poor repayment performance. The cause for this result might be associated with poor or rare visit by loan personnel on the operation of the projects. This call for

management intervention to assign the loan follow-up activities on these problem loans to a nearby districts/branches

- It is also important to consider other factors such as collateral value, past business experience of the borrower, and other factors in pre and post loan approval endeavours of the bank.

5.4. Future Research Area

In this study, broader demographic, environmental and economic factors such as marital status, family size, market orientation of the business, viability of project to the local society, impact of political instability on the performance of the projects, source of raw material and etc are not considered since data regarding these variables requires frequent travel, elongated interview and conversation which is impossible at this time of covid-19 global pandemic and local state emergencies. Therefore, these variables can be taken in future studies.

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