

**DEVELOPMENT OF A CUSTOMIZED MIS SOFTWARE FOR CREDIT
RISK GRADING(CRG) TO ASSESS LOAN PORTFOLIO.**

by

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**A Project work submitted in partial fulfillment of the requirements for the
degree of Master of Engineering in Advanced Engineering Management**



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SEPTEMBER, 2012

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It is hereby declared that this thesis or any part of it has not been submitted elsewhere for the award of any degree or diploma

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This thesis is dedicated to the homeless people of Bangladesh

ACKNOWLEDGEMENT

At the very beginning I would like to express my sincere gratitude to the Almighty whose blessings made me capable of accomplishing this thesis work.

I am greatly indebted to my supervisor Dr. Abdullahil Azeem, Professor, Department of Industrial and Production Engineering, BUET for his constant guidance, cordial suggestion, help and care for the completion of the thesis work. Without his continuous attention and care it would never been possible.

I would like to express my gratitude to Dr. M. Ahsan Akhtar Hasin , Professor, Department of Industrial and Production Engineering, BUET, Dhaka and Dr. A.K.M. Masud, Professor, Department of Industrial and Production Engineering, BUET, Dhaka for their constructive remarks and kind evaluation of the thesis work.

I would like to express my gratitude to my wife Mrs. Samira Sultana for continuous encouragement and sacrificing her time.. I am also grateful to my ex-colleagues of Uttara Bank Limited for cooperating me in various respects.

ABSTRACT

Risk is inherent in all aspects of a commercial operation, however for Banks and financial institutions, credit risk is an essential factor that needs to be managed. Credit risk is the possibility that a borrower or counter party will fail to meet its obligations in accordance with agreed terms. Credit risk, therefore, arises from the bank's dealings with or lending to corporate, individuals, and other banks or financial institutions. Credit risk management needs to be a robust process that enables banks to proactively manage loan portfolios in order to minimize losses and earn an acceptable level of return for shareholders. Central to this is a comprehensive IT system, which should have the ability to capture all key customer data, risk management and transaction information.

Currently almost all Banks in Bangladesh are computerized. Online banking system has been implemented in almost all the banks. In the field of assessing credit risk, no complete tool has been developed so far. Bankers uses spread sheet to calculate credit risk grading, which involves wastage of time, accurate grading may not be obtained and there is no way to store the credit risk record of a loan party. Banks should use a database management system to store party's information from which Credit Risk Grading can be automatically calculated. Researches have been done to evolve Credit Risk Grading Model. Most popular Methods are external ratings approaches, financial statement analysis models, the Merton / KMV structural model, and the transition based models. Bangladesh has her own model prescribed by Bangladesh Bank. Research has been done in BUET in the area of principle, policies and guideline for sustainable credit risk management in Bangladesh. In today's environment of intense competitive pressures, volatile economic conditions, rising bankruptcies and defaults, and increasing levels of consumer & commercial debt, an organization's ability to effectively monitor & manage its credit risk could mean the difference between success and survival. Implementing the proposed system, advantage of a DBMS over file system can be achieved and access to information will be more user friendly.

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CHAPTER 1

INTRODUCTION

1.1 Background

1.1.1 The Business of Making Money

The first thing to understand about banks is that they exist to make money. Banks are businesses. However, instead of providing manufactured products, or offering some of the professional services we expect when we think of business, banks buy and sell money. Of course, some banks do provide other services related to finances, including selling insurance and sometimes offering access to securities[1].

Banks buy money from depositors. Then, they can lend that money out, selling it to borrowers. Banks often pay interest on deposit accounts. This is especially true of savings accounts, certificates of deposit and money market accounts. Banks may also pay interest on checking accounts. Banks want to attract more depositors to the institution. This way, there is more money available for banks to lend out. And this is where a bank makes its money[1].

Loans made to other bank customers and sometimes to other banks provide a bank with a way to earn more money. A bank may pay interest on a deposit, but the interest a bank receives on a loan is much higher. If someone put Tk.1,000 in a high yield savings account,he/she might only earn around 1.35%. The bank, though, might be able to loan Tk.900 of that money out at an interest rate that is much higher. Auto loans might garner a rate of at least 5% for banks, and mortgage are in that neighborhood as well. Other types of loans can provide in excess of 14% interest especially credit cards. The difference between the amount of money a bank pays out in interest, and the money it earns from loans, can make it a rather profitable business[2].

The way that banks earn money illustrates one of the reasons that banks compete for depositors. The more depositors a bank has, the more money it can loan to others for better returns. It is worth noting, though, that banks can't always lend out all of the money it has in deposits. The central bank requires that depository institutions hold a

certain percentage of their funds in reserve. That percentage differs from country to country. It is the central bank which define the amount to be kept in the reserve[2].

1.1.2 Interest Rates

Banks decide on interest rates by using a number of different factors. A bank takes into account the following factors as it sets its rates:

Number of people who want to borrow money plays a vital role in setting interest rate. The demand for loans can affect the sorts of rates a bank will charge. If a bank in a certain area is having trouble finding borrowers, it might lower rates to entice them[2].

Amount of money the bank has available to loan out is another parameter which sets interest rate. If banks don't have much money to lend out, they might adjust rates to reflect that. A bank might increase the interest it pays on CDs and savings accounts in order to encourage depositors to keep their money with the bank so that the money supply available to the bank for loans increases[2].

Funds rate is the rate that banks charge each other for short-term loans. The target funds rate is set by the central Bank, and it is usually fairly affordable for banks. Banks often use short-term loans from each other in order meet the reserve requirements the Fed imposes. Of course, if a bank borrows money in order to meet its short-term obligations, the loans it makes will need to have higher interest rates so that a profit can be made[1].

Banks also set interest rates on loans with help from individual customers' credit situations. When a bank loans out money, there is a risk that the borrower won't repay it. This means that the bank is out the original amount of money it loaned and it won't make money on interest. In some cases, a borrower may pay back part of the loan, and then default on the rest. In order to ensure that the bank gets as much of its money back as possible before a default, those who appear to be higher credit risks are often charged higher interest rates [1,2].

1.1.3 Banking and the Economy

Our economy relies a great deal on keeping the cycle of money moving. Banking helps this happen by taking money and then loaning it out. Indeed, if someone thinks about

this works, it becomes apparent that the amount money represented in the economy is much larger than what is actually there. This reality is enhanced by the electronic nature of many of our transactions. Consider how Tk.1,000 seems to multiply, even if all the banks in the system have a 10% reserve requirement [1,2].

Someone puts Tk.1,000 in the bank, and Tk.900 of that can be loaned out. So, that Tk.900 goes into the economy and is spend on something. A car, groceries or some other item. The recipient of that Tk.900 then puts it in the bank. The new bank can loan out Tk.810 of that money. It's not new money, though: It's still part of the original Tk.1,000 someone put in. And, of course, the cycle continues, since that Tk.810 is loaned out and spent, and then put into a bank by the recipient. The bank can then loan out Tk.729 of that money. But, at each stage, money is being spent, and someone is receiving it and putting it bank into the bank. And all the time, banks are earning interest as loans are repaid. But that same Tk.1,000 can be recycled over and over again.

As long as the system keeps working, the economy keeps growing. But, with the credit crunch and the recent financial crisis, once the money stops going ground, things get a little dicey for our economy in its current form [1,2].

1.2 Loan Recovery Crisis

Now the problem is recovery of loans. Banks buy money from the depositors, keeps some portion of that money to the central banks fund and lend the rest to the borrowers. Banks buy money from depositors at a lower rate of interest and lends to the borrower at a higher rate of interest. The difference between the rates of interest is banks profit. For example, a bank gives 5% interest on deposit and takes 14% interest on loan. Now if a depositor deposits Tk.100 then it will cost the bank Tk.5. On the other hand the bank will keep Tk.10 to the central Banks fund and lend Tk.90 at 14% interest to a borrower. In this way the bank will earn Tk.12.6 from the loan. Now $Tk.12.6 - 5 = Tk.7.6$ is banks profit. The calculation in simple view is nice. But problem takes place when loans become bad i.e sometimes some borrower becomes defaulter. Some borrower sometimes don't repay the loan and the interest. In this case total business become a loss project. Because the bank has to pay Tk.5 for Tk.100 to the depositor but the bank is getting nothing from the borrower. Thus we can conclude that loan recovery is vital to the banking system [3].

1.3 Bangladesh Context

The issue of nonperforming loans in Bangladesh is not a new phenomenon. Infact, the seeds were cultivated during the early stage of the liberation period 1972-1981,by the government's expansion of credit policies on the one hand and a feeble and infirm banking infrastructure combined with an unskilled work force on the other argue that the expansion of credit policy during the early stage of liberation, which was directed to disbursement of credit on relatively easier terms, did actually expand credit in the economy on nominal terms. However, it also generated a large number of willful defaulters in the background who, later on, diminished the financial health of banks through the sick industry syndrome [3].

Despite the liberalizing and privatizing of the banking sectors in the 1980s with a view to increasing efficiency and competition, the robustness of the credit environment deteriorated further because of the lack of effective lenders recourse on borrowers. Government direction towards nationalized commercial banks to lend to unprofitable state owned enterprises, limited policy guidelines banks were allowed to classify their assets at their own judgments regarding loan classification and provisioning, and the use of accrual policies of accounting for recording interest income of NPLs resulted in alignment of the credit discipline of the country till the end of 1989 [3].

In the 1990s, however, a broad based financial measure was undertaken in the name of FSRP, enlisting the help of World Bank to restore financial discipline to the country. Since then, the banking sector has adopted prudential norms for loan classification and provisioning. Other laws, regulations and instruments such as loan ledger account, lending risk analysis manual, performance planning system, interest rate deregulation, the Money Loan Court Act 1990 have also been enacted to promote sound, robust and resilient banking practice. Surprisingly, even after so many measures, the banking system of Bangladesh is yet to free itself from the grip of the NPL debacle [3].

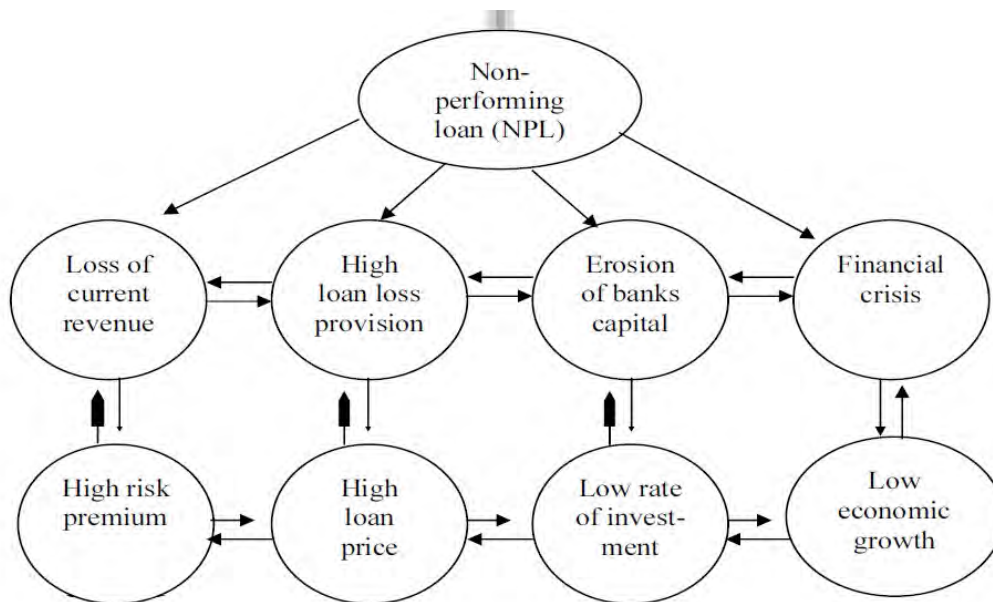


Fig:1.1 Economic and financial implication of NPL's

1.4 Reasons of the Crisis

Bankers and financial analysts have identified some reasons of bad loans. Among the reasons the first one is improper assessment of the loan party. Before disbursing a loan a bank assesses the loan party. That is, it considers the party's loan recovery capability. Strength of the business, value of the mortgaged property, value of collateral security, age of business, solvency of the party, the prospect of this endeavour for which the bank is financing. According to Bangladesh bank's prescription Bangladeshi banks consider the following point prior to disburse a loan [3].

1.5 Quantitative Factors: The factors which can be measured are called quantitative factors

1.5.1 Capital Adequacy:

Capital adequacy ratio CAR, also called Capital to Risk Weighted Assets Ratio CRAR, is a ratio of a bank's capital to its risk. National regulators track a bank's CAR to ensure that it can absorb a reasonable amount of loss and complies with statutory Capital requirements [1,6].

Capital adequacy ratios CAR are a measure of the amount of a bank's core capital expressed as a percentage of its risk-weighted asset. Capital adequacy ratio is defined as

$$CAR = \frac{\text{Tier 1 capital} + \text{Tier 2 capital}}{\text{Risk weighted assets}}$$

Tier 1 capital - paid up capital + statutory reserves + disclosed free reserves - equity investments in subsidiary + intangible assets + current & b/f losses

Tier 2 capital - A Undisclosed Reserves, B General Loss reserves, C hybrid debt capital instruments and subordinated debts

where Risk can either be weighted assets a or the respective national regulator's minimum total capital requirement. If using risk weighted assets,

$$CAR = \frac{T_1 + T_2}{a} \cdot 10\%.$$

The percent threshold varies from bank to bank 10% in this case, a common requirement for regulators conforming to the Basel Accords is set by the national banking regulator of different countries.

Two types of capital are measured: tier one capital T_1 above, which can absorb losses without a bank being required to cease trading, and tier two capital T_2 above, which can absorb losses in the event of a winding-up and so provides a lesser degree of protection to depositors [1].

1.5.2 Asset Quality:

Asset quality is related to the left-hand side of the bank balance sheet. Bank managers are concerned with the quality of their loans since that provides earnings for the bank. Loan quality and asset quality are two terms with basically the same meaning [1].

Government bonds and T-bills are considered as good quality loans whereas junk bonds, corporate credits to low credit score firms etc. are bad quality loans. A bad quality loan has a higher probability of becoming a non-performing loan with no return [1,6].

1.5.3 Earnings Quality:

A condition describing how earnings are recognized. Earnings of high quality are attributable to conservative accounting standards and/or strong cash flows. Low quality earnings come from artificial sources, such as inflation or aggressive accounting. For example, a publicly-traded company may claim strong earnings and consequently have a high stock price. However, the company may have low cash flow from operations and the strong earnings may come mainly from the accounting structures it uses. Therefore, its stock is overvalued. Quality of earnings ratings is subjective, but it does take into account matters such as corporate governance, inventory to sales ratios, and other factors [1,6].

1.5.4 Liquidity and Capacity of External Fund Mobilization:

The degree to which an asset or security can be bought or sold in the market without affecting the asset's price. Liquidity is characterized by a high level of trading activity. Assets that can be easily bought or sold are known as liquid assets. The ability to convert an asset to cash quickly. Also known as marketability. There is no specific liquidity formula; however, liquidity is often calculated by using liquidity ratios [2,6].

1.5.5 Size of the Bank & Market Presence:

Size of the bank means the asset size of the bank and market presence means market share of the bank among all banking products [6].

1.6 Qualitative Factor: Those factor which can not be measured by number.

1.6.1 Management status:

Management in all business and organizational activities is the act of getting people together to accomplish desired goals and objectives using available resources efficiently and effectively. Management comprises planning, organizing, staffing, leading or directing, and controlling an organization a group of one or more people or entities or effort for the purpose of accomplishing a goal. Resourcing encompasses the deployment and manipulation of human resources, financial resources, technological resources and natural resources [2].

Since organizations can be viewed as systems, management can also be defined as human action, including design, to facilitate the production of useful outcomes from a system. This view opens the opportunity to manage oneself, a pre-requisite to attempting to manage others [2,6].

1.6.2 Regulatory Environment & Compliance:

In general, compliance means conforming to a rule, such as a specification, policy, standard or law. Regulatory compliance describes the goal that corporations or public agencies aspire to in their efforts to ensure that personnel are aware of and take steps to comply with relevant laws and regulations.

Due to the increasing number of regulations and need for operational transparency, organizations are increasingly adopting the use of consolidated and harmonized sets of compliance controls. This approach is used to ensure that all necessary governance requirements can be met without the unnecessary duplication of effort and activity from resources [6].

1.6.3 Risk Management:

Risk management is the identification, assessment, and prioritization of risks defined in ISO 31000 as the effect of uncertainty on objectives, whether positive or negative followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of unfortunate events or to maximize the realization of opportunities. Risks can come from uncertainty in financial markets, project failures at any phase in design, development, production, or sustainment life-cycles, legal liabilities, credit risk, accidents, natural causes and disasters as well as deliberate attack from an adversary, or events of uncertain or unpredictable root-cause. Several risk management standards have been developed including the Project Management Institute, the National Institute of Standards and Technology, actuarial societies, and ISO standards. Methods, definitions and goals vary widely according to whether the risk management method is in the context of project management, security, engineering, industrial processes, financial portfolios, actuarial assessments, or public health and safety [4,8].

The strategies to manage risk typically include transferring the risk to another party, avoiding the risk, reducing the negative effect or probability of the risk, or even accepting some or all of the potential or actual consequences of a particular risk.

Certain aspects of many of the risk management standards have come under criticism for having no measurable improvement on risk, whether the confidence in estimates and decisions seem to increase [4].

1.6.4 Sensitivity to Market Risk:

Market risk is the risk of losses in positions arising from movements in market prices. Some market risks include: Equity risk, the risk that stock or stock indexes e.g. Euro Stoxx 50, etc. prices and/or their implied volatility will change. Interest rate risk, the risk that interest rates e.g. Libor, Euribor, etc. and/or their implied volatility will change. Currency risk, the risk that foreign exchange rates e.g. EUR/USD, EUR/GBP, etc. and/or their implied volatility will change. Commodity risk, the risk that commodity prices e.g. corn, copper, crude oil, etc. and/or their implied volatility will change [4,6].

1.6.5 Ownership Share holding pattern & Corporate Governance:

Ownership of property may be private, collective, or common and the property may be objects, land or real estate or intellectual property. Determining ownership in law involves determining who has certain rights and duties over the property. These rights and duties, sometimes called a bundle of rights, can be separated and held by different parties.

The question of ownership reaches back to the ancient philosophers, Plato and Aristotle, who held different opinions on the subject. Plato 428/427BC-348/347BC thought private property created divisive inequalities, while Aristotle 384BC-322BC thought private property enabled people to receive the full benefit of their labor. Private property also circumvents what is now referred to as the tragedy of the commons problem, where people tend to degrade common property more than they do private property. While Aristotle justified the existence of private ownership, he left open point about 1. to allocate property between what is private and common and 2. to allocate the private property within society [2,6].

Over the millennia, and across cultures what can be property and how it is regarded culturally have varied widely. Ownership is the basis for many other concepts that form the foundations of ancient and modern societies such as money, trade, debt, bankruptcy, the criminality of theft and private vs. public property. Ownership is the key building block in the development of the capitalist socio-economic system. Adam Smith stated that one of the sacred laws of justice was to guard a person's property and possessions.

The process and mechanics of ownership are fairly complex. one can gain, transfer and lose ownership of property in a number of ways. To acquire property one can purchase it with money, trade it for other property, receive it as a gift, steal it, find it, make it or homestead it. One can transfer or lose ownership of property by selling it for money, exchanging it for other property, giving it as a gift, being robbed of it, misplacing it, or having it stripped from one's ownership through legal means such as eviction, foreclosure, seizure or taking. Ownership is self-propagating in that the owner of any property will also own the economic benefits of that property [2].

Corporate governance is the system by which companies are directed and controlled. It involves regulatory and market mechanisms, and the roles and relationships between a company's management, its board, its shareholders and other stakeholders, and the goals for which the corporation is governed. In contemporary business corporations, the main external stakeholder groups are shareholders, debt holders, trade creditors, suppliers, customers and communities affected by the corporation's activities. Internal stakeholders are the board of directors, executives, and other employees.

Much of the contemporary interest in corporate governance is concerned with mitigation of the conflicts of interests between stakeholders. Ways of mitigating or preventing these conflicts of interests include the processes, customs, policies, laws, and institutions which have impact on the way a company is controlled. An important theme of corporate governance is the nature and extent of accountability of people in the business [1,2].

A related but separate thread of discussions focuses on the impact of a corporate governance system on economic efficiency, with a strong emphasis on shareholders' welfare. In large firms where there is a separation of ownership and management and no controlling shareholder, the principal-agent issue arises between upper-management the

agent which may have very different interests, and by definition considerably more information, than shareholders the principals. The danger arises that rather than overseeing management on behalf of shareholders, the board of directors may become insulated from shareholders and beholden to management. This aspect is particularly present in contemporary public debates and developments in regulatory policy.

There has been renewed interest in the corporate governance practices of modern corporations, particularly in relation to accountability, since the high-profile collapses of a number of large corporations during 2001-2002, most of which involved accounting fraud. Corporate scandals of various forms have maintained public and political interest in the regulation of corporate governance. In the U.S., these include Enron Corporation and MCI Inc. formerly WorldCom. Their demise is associated with the U.S. federal government passing the Sarbanes-Oxley Act in 2002, intending to restore public confidence in corporate governance. Comparable failures in Australia HIH, One.Tel are associated with the eventual passage of the CLERP 9 reforms. Similar corporate failures in other countries stimulated increased regulatory interest e.g., Parmalat in Italy [2].

1.6.6 Accounting Quality:

The objective of financial reporting is to provide information about financial position, performance and changes in financial position of an entity that is useful in making economic decisions for a wide range of users, such as investors, employees, lenders, suppliers, customers, government and the public in general.

The quality of financial reporting has been receiving greater attention, especially after recent accounting scandals. Despite the increased attention, the term accounting quality is vague and difficult to define [1,6].

1.6.7 Franchise Value :

The economic theory of franchise value is quite simple. All of its elements are explained quite clearly in any freshman course. They are: revenue, cost ,barriers to entry.

A valuable franchise must have a sizable revenue base. This could come from selling something in low volume at a high price. Bloomberg terminals are an example. Bloomberg leases proprietary computer terminals with information that is important to

financial market participants, particularly bond traders. These users have large budgets and a strong need for the service, so that even though it is not a mass market, Bloomberg can charge high prices and earn tremendous revenue.

However, most of the other large revenue opportunities that come to mind are mass-market opportunities, often with low dollars per consumer [1,2,6]. The Microsoft Windows operating system, for example. Another element that a valuable franchise needs is low marginal cost. The ability to sell to the next consumer at low marginal cost is critical. That is why most computer programmers who want to get really rich would rather work for a products company than for a services company. A firm that develops web sites for other businesses can only serve new customers by adding staff. On the other hand, a company that markets software can add new customers at little or no marginal cost [1].

A few of the companies whose stocks have taken off in the Internet boom are web development consulting firms. Like other Internet firms, they tend to show losses. But unlike most other Internet companies, these web-consulting outfits cannot tell a story that as the Internet grows they can grow their revenue while keeping costs low [2] .

By and large, however, most of the Internet high-flyers have good revenue potential and low marginal cost. The controversy over franchise value is likely to revolve around the third factor, barriers to entry [1,2].

If barriers to entry are low, then according to the textbooks a profitable firm is likely to face many competitors, leading to erosion of franchise value. Only if barriers to entry are high will the firm be able to earn monopoly rents for a long time [1].

In Bangladesh , in some cases this calculation fails. If this calculation is not done properly then the loan may become bad. In Bangladesh some criminal loan party ,showing false assesement takes loan and does not pay back the money. Another cause is Credit extended without approval of competent authority or without any logical basis under pressure.Incomplete documentation may cause bad loans. The loan was disbursed by properly assessing the party with approval from proper authority, but the legal documents were not tight enough. In such cases loans become bad. Insufficient security

or drastic fall in the value of security is one of the major phenomenon of bad loans. Sometimes loans are given against insufficient security i.e some bankers deliberately gives such loans with dishonest intention. On the other hand sometimes the value of the security becomes lower than that of the loan. In this case the borrower shows no interest to repay the loan. Sometimes borrower sustains heavy loss in capital due to natural calamity or business condition which results bad loan. Frequent overdraw of limit is another reason of bad loan. Sometimes rescheduling terms are not maintained properly which leads to bad loan. Borrower cannot be traced or death of the borrower may cause bad loan. Filing a suit against the borrower for recovery of credit causes bad loan [3].

1.7 Probable Solution

To overcome loan recovery problem the first thing to be done is the assessment of the borrower. In terms of finance this is called credit risk grading CRG. Before disbursing a loan a bank should calculate the CRG of the borrower so that loan cannot become bad. Credit should be extended with approval from competent authority and should not be disbursed under pressure. Security against which the loan was disbursed should be sufficient enough to recover the loan as long as the interest. Before disbursing a loan a banker should consider whether it is possible to decrease the value of the security, if it is possible, then loan should not be given. If there any risk of having drastic loss in business then no loan should be disbursed. Overdraw should not be given. Rescheduling terms should be maintained properly. Filing suit against the borrower should be considered as the last option [6].

1.8 Problem Definition

Risk is inherent in all aspects of a commercial operation, however for Banks and financial institutions, credit risk is an essential factor that needs to be managed. Credit risk is the possibility that a borrower or counter party will fail to meet its obligations in accordance with agreed terms. Credit risk, therefore, arises from the bank's dealings with or lending to corporate, individuals, and other banks or financial institutions [4].

The goal of credit risk management is to minimize a bank's risk-adjusted rate of return by maintaining credit risk exposure within risk inherent in the entire portfolio as well as the risk in individual credits or transactions [4].

Credit risk management needs to be a robust process that enables banks to proactively manage loan portfolios in order to minimize losses and earn an acceptable level of return for shareholders. Central to this is a comprehensive IT system, which should have the ability to capture all key customer data, risk management and transaction information including trade & Forex [5].

Currently almost all Banks in Bangladesh are computerized. Online banking system have taken place. In the field of assessing credit risk there is no complete tool. Bankers uses spread sheet to calculate credit risk grading, which involves wastage of time, accurate grading may not be obtained and there is no way to store the credit risk record of a loan party. Banks should use a database management system to store party's information from which Credit Risk Grading can be automatically calculated [6].

Commercial software are there to calculate Credit Risk Grading in India, USA and other developed countries according to their Credit Risk grading Model. Research have been done to evolve Credit Risk Grading Model. Most popular Methods are external ratings approaches, financial statement analysis models, the Merton / KMV structural model, and the transition based models [7]. Bangladesh has her own model prescribed by Bangladesh Bank. Research has been done in BUET in the area of principle, policies and guideline for sustainable credit risk management in Bangladesh [8]. In today's environment of intense competitive pressures, volatile economic conditions, rising bankruptcies and defaults, and increasing levels of consumer & commercial debt, an organization's ability to effectively monitor & manage its credit risk could mean the difference between success and survival[9].Currently bankers use spread sheet to calculate party's CRG. In this case individual spread sheet is maintained against each party i.e-an ordinary file system is used. If the proposed system i.e a DBMS is deployed , advantage of a DBMS over file system can be achieved like-There will be no data redundancy and inconsistency. Access to information will be more user friendly. Data about all will be kept in one database which will lead easy development of other related application and customized report. There will be no integrity problem Atomicity problem will be eliminated. There will be no concurrent access anomalies. Storage will be much more secured than that of file system [16].

1.9 Rationale, Objective and Scope of the study

1.9.1 Rationale

Bangladesh faces a many problem in the banking sector. Among them bankruptcy is one of the major problem. A common phenomena to commit bankruptcy is to get loan by giving false accounts statement of the business to the bank. Some criminal borrower gives false financial statement while submitting loan proposal. Those false statement produces false assessment about the party. Sometimes some corrupt banker helps those borrowers. Sometimes manual calculation of credit risk grading of the borrower produces wrong decision. So depending on the wrong grading bank gives loans and that loan becomes default. In manual calculation of credit risk grading there is no scope for storage of the previous credit risk grading of the party.

1.9.2 Objective

The broad objective of the study is to develop customized MIS software for auto generation of reports to assess loan portfolio whether proceed or not. In line with the Terms of Reference and the broad objective, the specific objectives of the study were:

- To design and develop a database for Loan portfolios.
- To generate various report needed by Credit department.

1.9.3 Possible Outcome

A customized software to asses loan port folio which generates various report and analyses various trends regarding loan party's business.

1.9.4 Scope

The scope of the project included i analysis of background of the problem on the basis of basic data available, ii an initial sector assessment, including the estimation of risk grading requirements and risk grading model characteristics, iii determination of risk grading requirement, iv determination of problems associated with current system and v implementation of software.

1.10 Methodology

The first step of designing appropriate methodology is to analyze the data of ongoing Loan Proposals of Uttara Bank Limited. The key feature of methodology are given below:

- Designing a Database Management System based on collected data.
- Design and implement programs of moderate length using the Visual Basic for Application programming language
- Developing the MIS using MS Access and MS Visual Basic for Application.
- Present completed reports in a language comfortable for end-users to take decision whether to disburse loans or not.
- Implementation of the developed system in generation of project reports.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Credit Risk Grading is an important tool for credit risk management as it helps a Bank to understand various dimensions of risk involved in different credit transactions. The credit risk grading system is vital to take decisions both at the pre-sanction stage as well as post-sanction stage. At the pre-sanction stage, credit grading helps the sanctioning authority to decide whether to lend or not to lend, what should be the pricing for a particular exposure, what should be the extent of exposure, what should be the appropriate credit facility and the various risk mitigation tools[6].

At the post-sanction stage, the bank can decide about the depth of the review or renewal, frequency of review, periodicity of the grading, and other precautions to be taken. Having considered the significance and necessity of credit risk grading for a Bank, it becomes imperative to develop a credit risk grading model which meets the objective outlined above. CRG describes in detail the process required to spread and analyze the financial statement of a bank, identify the critical risk elements, mitigate these risk and provide appropriate weightage and marking to the risk element and thereby arrive at a systematic risk grading for an effective credit decision [6].

2.2 Definition Of Credit Risk Grading CRG

The Credit Risk Grading CRG is a collective definition based on the pre-specified scale and reflects the underlying credit-risk for a given exposure. A Credit Risk Grading deploys a number/ alphabet/ symbol as a primary summary indicator of risks associated with a credit exposure. Credit Risk Grading is the basic module for developing a Credit Risk Management system [6].

2.3 Functions Of Credit Risk Grading

Well-managed credit risk grading systems promote bank safety and soundness by facilitating informed decision-making. Grading systems measure credit risk and differentiate individual credits and groups of credits by the risk they pose. This allows

bank management and examiners to monitor changes and trends in risk levels. The process also allows bank management to manage risk to optimize returns [6].

2.4 Use Of Credit Risk Grading

The Credit Risk Grading matrix allows application of uniform standards to credits to ensure a common standardized approach to assess the quality of an individual obligor and the credit portfolio as a whole. As evident, the CRG outputs would be relevant for credit selection, wherein either a borrower or a particular exposure/facility is rated. The other decisions would be related to pricing credit spread and specific features of the credit facility. Risk grading would also be relevant for surveillance and monitoring, internal MIS and assessing the aggregate risk profile. It is also relevant for portfolio level analysis [6].

2.5 Number and Short Name Of Grades Used In The CRG

The proposed CRG scale for the banks consists of 8 categories with Short names and Numbers are provided as follows:[6]

Table 2.1: Number and Short Name Of Grades

Grading	Short Name	Number
Superior	SUP	1
Good	GD	2
Acceptable	ACCPT	3
Marginal/Watchlist	MG/WL	4
Special Mention	SM	5
Sub standard	SS	6
Doubtful	DF	7
Bad & Loss	BL	8

2.6 Credit Risk Models

Credit risk models are specification of how credit risk to be calculated. There are various Credit risk models in practice. Some of those are elaborated below-

2.6.1. The Jarrow–Turnbull credit risk model

The Jarrow–Turnbull credit risk model was published by Robert A. Jarrow of Kamakura

Corporation and Cornell University and Stuart Turnbull, currently at the University of Houston. Many experts in financial theory label the Jarrow–Turnbull model as the first reduced-form credit model. Reduced-form models are an approach to credit risk modeling that contrasts sharply with the structural credit models[10]. The structural or Merton credit models are single-period models which derive the default probability from the random variation in the unobservable value of the firms assets. Two years after the development of the structural credit model, Robert Merton modeled bankruptcy as a continuous probability of default. Upon the random occurrence of default, the stock price of the defaulting company is assumed to go to zero. Merton derived the value of options for a company that can default. This was in fact the first reduced form model where bankruptcy is modeled as a statistical process, rather than as a microeconomic model of the firms capital structure[12].

2.6.2. The Merton model

This model proposed by Robert C. Merton in 1974 for assessing the credit risk of a company by characterizing the companys equity as a call option on its assets. Put-call parity is then used to price the value of a put and this is treated as an analogous representation of the firms credit risk[12].

This model assumes that a company has a certain amount of zero-coupon debt that will become due at a future time T . The company defaults if the value of its assets is less than the promised debt repayment at time T . The equity of the company is a European call option on the assets of the company with maturity T and a strike price equal to the face value of the debt. The model can be used to estimate either the risk-neutral probability that the company will default or the credit spread on the debt[10,12].

The model takes three company specific inputs: the equity spot price, the equity volatility which is transformed into asset volatility, and the debt/share. The model also takes two inputs which should be calibrated to market quoted CDS spreads: the default barrier, and the volatility of the default barrier. These inputs are used to specify a diffusion process for the asset value. The entity is deemed to have defaulted when the asset value drops below the barrier. The barrier itself is stochastic, which has the effect of incorporating jump-to-default risk into the model. The Merton model evolves asset value movements through a

diffusion process and a fundamental purpose of the default barrier volatility is to provide a jump-like process which can capture short term default probabilities. To calibrate model parameters, select a sample of credit spreads and iteratively adjust the model parameters to best match the market observed credit spreads using least-squared-error minimization. Credit Grades performed a calibration test in 2002 which determined the default barrier to be 0.5 and the default barrier vol to be 0.3 on an empirical market wide average basis. However, this study was performed during bull market conditions and may not represent the current state of the market nor a specific industrial sector. Subsequently, it is important to calibrate the model with respect to your industrial sector and the tenor of CDS spreads you wish to obtain[12].

2.6.3 Credit Metrics model

Credit Metrics was publicized in 1997 by JP Morgan. Its methodology is based on probability of moving from one credit quality to another within a given time horizon credit migration analysis. The estimation of the portfolio Value-at-Risk due to Credit Credit-VaR through Credit Metrics is summarized by Fig. 1.

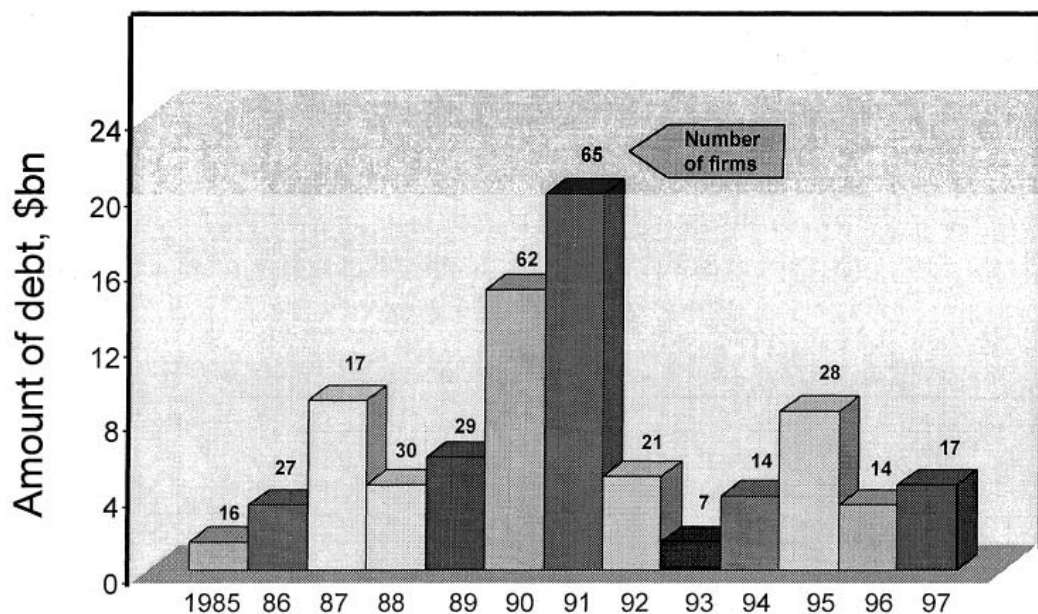


Fig 2.1: Corporate defaults World wide[11].

A rating system with probabilities of migrating from one credit quality to another over a given time horizon transition matrix is the key component of the credit-VaR proposed by JP Morgan. The specified credit risk horizon is usually one year.[11]

A transition matrix published by credit rating agencies should be carefully interpreted since it usually represents average statistics across different industries, and over several business cycle. The next step is to specify the forward pricing model. The bond valuation is derived from the curve corresponding to the rating of the issuer. Thus 7 forward curves on table 2.2 for each credit rating[14].

Table 2.2: Average cumulative default rates (%) [14].

Average cumulative default rates (%) ^a								
Term	1	2	3	4	5...	7...	10...	15
AAA	0.00	0.00	0.07	0.15	0.24...	0.66...	1.40...	1.40
AA	0.00	0.02	0.12	0.25	0.43...	0.89...	1.29...	1.48
A	0.06	0.16	0.27	0.44	0.67...	1.12...	2.17...	3.00
BBB	0.18	0.44	0.72	1.27	1.78...	2.99...	4.34...	4.70
BB	1.06	3.48	6.12	8.68	10.97...	14.46...	17.73...	19.91
B	5.20	11.00	15.95	19.40	21.88...	25.14...	29.02...	30.65
CCC	19.79	26.92	31.63	35.97	40.15...	42.64...	45.10...	45.10

^a Source: Standard & Poor's CreditWeek (April 15, 1996).

The 1-year forward price of a BBB rated bond maturing in 5 years and paying a annual coupon of 6% will be: This forward price of the bond was calculated considering the obligor staying as BBB. If replication of it for each rating category have the following values: someone can combine tables 2.3 and 2.4 to view the distribution of changes in the BBB rated bond value, at the 1-year horizon[11].

Table 2.3: Transition matrix: probabilities of credit rating migration from one quality to another[11].

Initial rating	Rating at year-end (%)							
	AAA	AA	A	BBB	BB	B	CCC	Default
AAA	90.81	8.33	0.68	0.06	0.12	0	0	0
AA	0.70	90.65	7.79	0.64	0.06	0.14	0.02	0
A	0.09	2.27	91.05	5.52	0.74	0.26	0.01	0.06
BBB	0.02	0.33	5.95	86.93	5.30	1.17	1.12	0.18
BB	0.03	0.14	0.67	7.73	80.53	8.84	1.00	1.06
B	0	0.11	0.24	0.43	6.48	83.46	4.07	5.20
CCC	0.22	0	0.22	1.30	2.38	11.24	64.86	19.79

^a Source: Standard & Poor's CreditWeek (April 15, 1996).

Table 2.4: One year default rates by rating[11].

Credit rating	One-year default rate	
	Average (%)	Standard deviation (%)
Aaa	0.00	0.0
Aa	0.03	0.1
A	0.01	0.0
Baa	0.13	0.3
Ba	1.42	1.3
B	7.62	5.1

^a Source: Carty and Lieberman (1996).

The first percentile of the distribution of DV, which corresponds to credit-VaR at the 99% confidence level is -57.46. Assumption of a normal distribution for DV, the credit-VaR at the same confidence level is -12.05. Given the Credit-VaR for a security, someone can calculate it for a portfolio. Considering 2 bonds with an initial rating of BBB and A, respectively, and assuming no correlation between changes in their issuers credit quality, the following joint migration probabilities exists: the joint probability that both bonds stay in the same rating class is $76.53\% \times 82.67\% = 63.27\%$. Although it is easy to calculate, someone should considerate a correlation between the changes in credit quality, and usually have to calculate the credit-VaR for a portfolio composed of more than two bonds[11].

Correlations between the changes in credit quality usually depend on industry, region and the state of the economy. Credit Metrics assumes the equity price as a proxy for the asset value of the firms. The correlations between the equity returns of various obligors are directly inferred to expected correlations between changes in credit quality.

The normalized returns on two different assets follow a joint normal distribution:

a = point corresponding to cumulative probability for bond a

b = point corresponding to cumulative probability for bond b

r = correlation between asset rates of return from - 1 to 1

It can be used for portfolios with only 2 bonds. Credit Metrics implements a Monte Carlo simulation to generate a distribution to a larger portfolio. Credit Metrics model can also isolate individual marginal risk contribution of each asset to the portfolio [14].

Credit Metrics/Credit VaR I are methodologies based on the estimation of the forward distribution of the changes in value of a portfolio of loan and bond type products at a

given time horizon, usually 1 year. The changes in value are related to the eventual migrations in credit quality of the obligor, both up and downgrades, as well as default. In comparison to market-VaR, credit-VaR poses two new challenging difficulties. First, the portfolio distribution is far from being normal, and second, measuring the portfolio effect due to credit diversification is much more complex than for market risk. While it was legitimate to assume normality of the portfolio changes due to market risk, it is no longer the case for credit returns which are by nature highly skewed and fat-tailed as shown in fig 2.2 and 2.3..

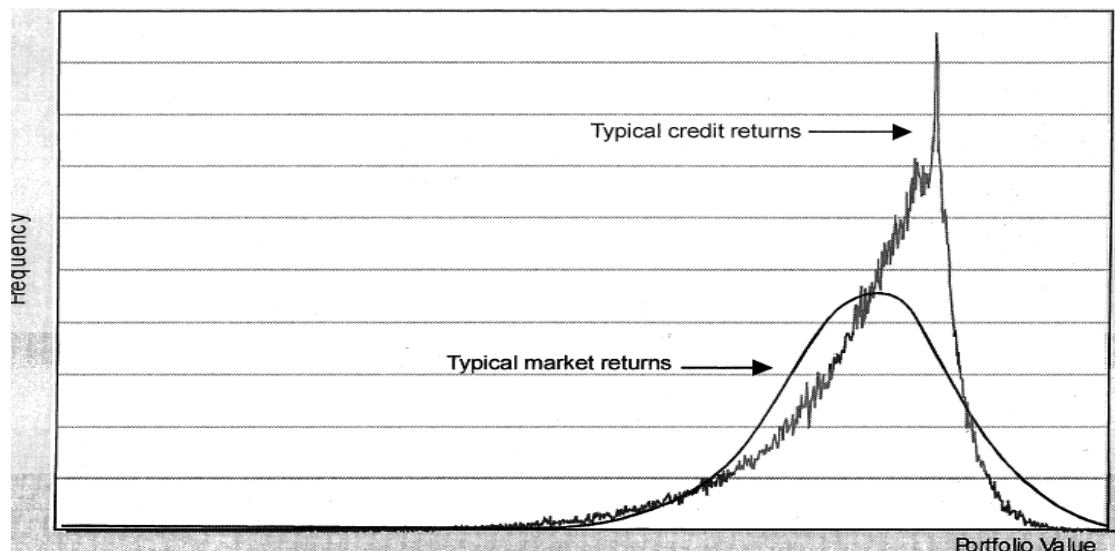


Fig 2.2: Comparison of the distributions of credit returns and market returns[11].

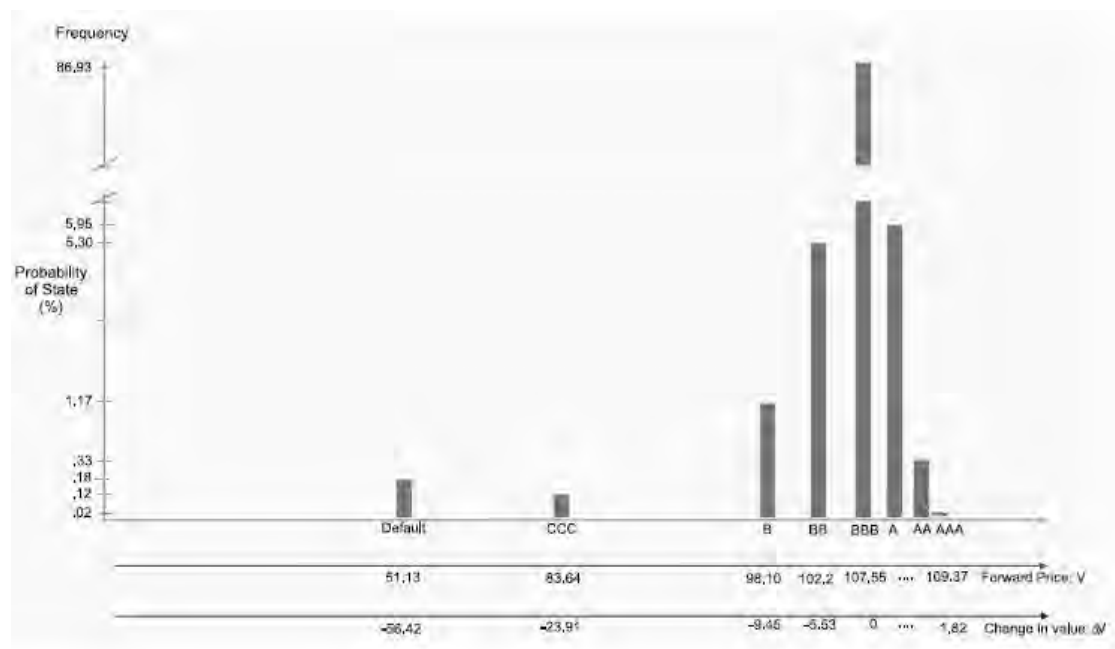


Fig 2.3: Histogram of 1 year forward prices and changes in value of a BBB bond[11].

Indeed, there is limited upside to be expected from any improvement in credit quality, while there is substantial downside consecutive to downgrading and default. The percentile levels of the distribution cannot be any longer estimated from the mean and variance only [11]. The calculation of VaR for credit risk requires simulating the full distribution of the changes in portfolio value. To measure the effect of portfolio diversification some one need to estimate the correlations in credit quality changes for all pairs of obligors. But, these correlations are not directly observable. Credit Metrics/Credit VaR I base their evaluation on the joint probability of asset returns, which itself results from strong simplifying assumptions on the capital structure of the obligor, and on the generating process for equity returns[14]. This is clearly a key feature of Credit Metrics/Credit VaR I. Finally, Credit Metrics/Credit VaR I, assumes no market risk since forward values and exposures are simply derived from deterministic forward curves. The only uncertainty in Credit Metrics/Credit VaR I relates to credit migration, i.e. the process of moving up or down the credit spectrum. In other words, credit risk is analyzed independently of market risk, which is another limitation of this approach[11].

2.6.4 KMV 15 model

The major weakness of Credit Metrics/Credit VaR I is not the methodology, which is rather appealing, but the reliance on transition probabilities based on average historical frequencies of defaults and credit migration. The accuracy of Credit Metrics/Credit VaR I calculations relies upon two critical assumptions: First, all firms within the same rating class have the same default rate, and second, the actual default rate is equal to the historical average default rate[7]. The same assumptions also apply to the other transition probabilities. In other words, credit rating changes and credit quality changes are identical, and credit rating and default rates are synonymous, i.e. the rating changes when the default rate is adjusted, and vice versa. This view has been strongly challenged by KMV. Indeed, this cannot be true since default rates are continuous, while ratings are adjusted in a discrete fashion, simply because rating agencies take time to upgrade or downgrade companies whose default risk have changed. KMV has shown through a simulation exercise that the historical average default rate and transition probabilities can deviate significantly from the actual rates[11]. In addition, KMV has demonstrated that substantial differences in default rates may exist within the same bond rating class, and the overlap in default probability ranges may be quite large with, for instance, some BBB

and AA rated bonds having the same probability of default. KMV has replicated 50 000 times, through a Monte Carlo simulation, Moodys study of default over a 25-year period. For each rating they have assumed a fixed number of obligors which is approximately the same as in Moodys study. For each rating they have assumed that the true probability of default is equal to the reported Moodys average default rate over the 25-year period. KMV has also run the simulation for several levels of correlation among the asset returns, ranging from 15% to 45%. A typical result is illustrated in Fig. 2.4 for a BBB obligor. Given an exact default probability of 13 bp, the 25-year average historical default rate ranges between 4 and 27 bp at the 95% confidence level, for an asset correlation of 15%. The distribution is quite skewed so that the mean default rate usually exceeds the typical median default rate for each credit class[4]. Thus the average historical default probability overstates the default rate for a typical obligor.

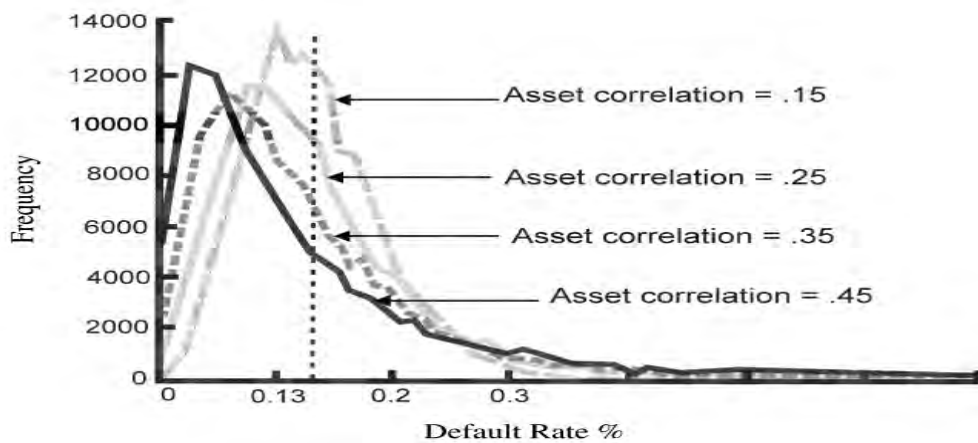


Fig.2.4: Monte carlo simulated distribution of average default rate for a BBB bond with a true default of 0.13%[11].

Unlike Credit Metrics/Credit VaR I, KMV does not use Moodys or Standard & Poors statistical data to assign a probability of default which only depends on the rating of the obligor. Instead, KMV derives the actual probability of default, the Expected Default Frequency EDF, for each obligor based on a Merton 1974s type model of the firm. The probability of default is thus a function of the firms capital structure, the volatility of the asset returns and the current asset value. The EDF is firm-specific, and can be mapped into any rating system to derive the equivalent rating of the obligor[11]. EDFs can be viewed as a cardinal ranking of obligors relative to default risk, instead of the more conventional ordinal ranking proposed by rating agencies and which This can lead to adverse selection of corporate customers in banks. Indeed, if the pricing of loans is based

on this average historical default rate, then a typical customer will be overcharged and may have an incentive to leave, while the worst obligors in the class will benefit from an advantageous pricing with regard to their actual credit risk relies on letters like AAA, AA, etc. Contrary to Credit Metrics/Credit VaR I, KMVs model does not make any explicit reference to the transition probabilities which, in KMVs methodology, are already imbedded in the EDFs. Indeed, each value of the EDF is associated with a spread curve and an implied credit rating[7].

As for Credit Metrics/Credit VaR I, KMVs model is also based on the option pricing approach to credit risk as originated by Merton 1974. Thus, credit risk is essentially driven by the dynamics of the asset value of the issuer. Given the current capital structure of the firm, i.e. the composition of its liabilities: equity, short-term and long-term debt, convertible bonds, etc., once the stochastic process for the asset value has been specified, then the actual probability of default for any time horizon, 1 year, 2 years, etc. can be derived. Fig.2.5 in the previous section depicts how the probability of default relates to the distribution of asset returns and the capital structure of the firm, in the simple case where the firm is financed by equity and a zero-coupon bond. KMV best applies to publicly traded companies for which the value of equity is market determined. The information contained in the firms stock price and balance sheet can then be translated into an implied risk of default as shown in the next section[11].

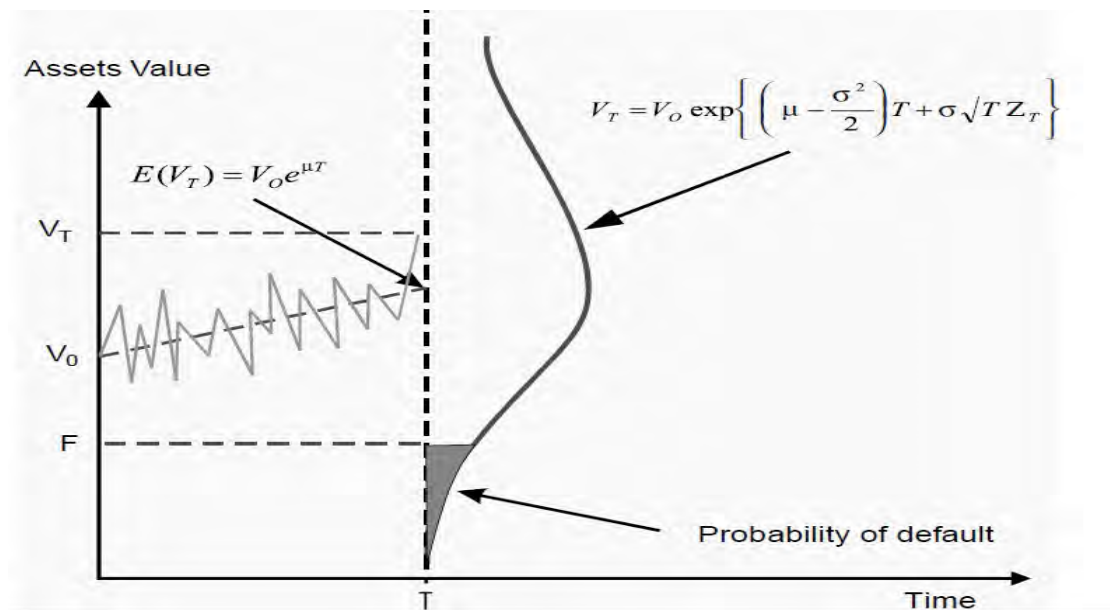


Fig 2.5: Distribution of the firms asset value at maturity of the debt obligation.[11]

2.6.5 Credit Risk+ model

Credit Risk+[13] applies an actuarial science framework to the derivation of the loss distribution of a bond/loan portfolio. Only default risk is modeled, not downgrade risk. Contrary to KMV, default risk is not related to the capital structure of the firm. In Credit Risk+ no assumption is made about the causes of default: an obligor A is either in default with probability P_A , or it is not in default with probability $1 - P_A$. It is assumed that for a loan, the probability of default in a given period, say 1 month, is the same for any other month for a large number of obligors, the probability of default by any particular obligor is small, and the number of defaults that occur in any given period is independent of the number of defaults that occur in any other period[13].

Under those circumstances, the probability distribution for the number of defaults, during a given period of time say 1 year is well represented by a Poisson distribution:

$$P(n \text{ defaults}) = \mu^n e^{-\mu} / n! \text{ for } n = 0; 1; 2; \dots; 30.$$

where

μ = average number of defaults per year;

$\mu = \sum P_A$; where P_A denotes the probability of default for obligor A:

The annual number of defaults, n , is a stochastic variable with mean μ , and standard deviation $\cdot \mu$. The Poisson distribution presents the nice property to be fully specified by only one parameter μ . For example, if assume $\mu=3$ then the probability of no default in the next year is

$$P(0 \text{ defaults}) = 3^0 e^{-3} / 0!$$

and the probability of exactly 3 defaults is

$$P(3 \text{ defaults}) = 3^3 e^{-3} / 3! = 0.224 = 22.40\%[11]$$

CHAPTER 3

CREDIT RISK GRADING SYSTEM IN BANGLADESH

3.1 Credit Risk Grading Definitions

A clear definition of the different categories of Credit Risk Grading is given as follows:

3.1.1 Features of Grading Superior - (SUP) – 1

- Strongest Bank
- Excellent Financials
- Healthy and productive franchises
- Excellent operating environment
- Exceptionally strong capabilities for timely payment of financial commitments
- Highly unlikely to be adversely affected by foreseeable events
- Credit facilities, which are fully secured i.e. fully cash covered or near cash.
- Credit facilities fully covered by government guarantee.
- Credit facilities fully covered by the guarantee of a top tier international Bank.
- Aggregate Score of 85-100 based on the Risk Grade Score Sheet[6,8].

3.1.2 Features of Grading Good - (GD) – 2

- Strong Bank
- Very good Financials
- Healthy and productive franchises
- Excellent operating environment
- Strong capability for timely payment of financial commitments
- Very low probability to be adversely affected by foreseeable events
- Excellent liquidity and low leverage.
- Well established cliental base and strong market share.
- Very good management skill & expertise.
- Credit facilities fully covered by the guarantee of a top tier local Bank.
- Aggregate Score of 75-84 based on the Risk Grade Score Sheet[8].

3.1.3 Features of Grading Acceptable - (ACCPT) – 3

- Solid Bank
- Good Financials
- Valuable and operating business franchises
- Stable operating environment
- Above average capacity for timely payment of financial commitments
- Low probability to be adversely affected by foreseeable events
- Not as strong as GOOD Grade banks but still demonstrate consistent earnings and have a good track record.
- Adequate liquidity and earnings.
- Acceptable management
- Aggregate Score of 65-74 based on the Risk Grade Score Sheet[6].

3.1.4 Features of Grading Marginal/Watchlist - (MG/WL) – 4

- Average Bank
- Average Financials
- Valuable and defensible business franchises
- Average operating environment
- Average capability for timely payment of financial commitments
- Financial commitments although being met but continuity of this may be contingent upon a sustained, favorable business and economic environment
- This grade warrants greater attention due to conditions affecting the borrower, the industry or the economic environment.
- These borrowers have an above average risk due to strained liquidity, higher than normal leverage and/or inconsistent earnings.
- Weaker business credit & early warning signals of emerging business credit detected.
- The bank incurs a loss
- Aggregate Score of 55-64 based on the Risk Grade Score Sheet [6,8].

3.1.5 Features of Grading Special Mention - (SM) – 5

- Weak financial strength
- Weak financial fundamentals

- Vulnerable business franchises
- Unstable operating environment
- Financial commitments although being met but continuity of this may be in question
- This grade has potential weaknesses that deserve close attention. If left uncorrected, these weaknesses may result in a deterioration of the repayment prospects of the borrower.
- Severe management problems exist.
- Facilities should be downgraded to this grade if sustained deterioration in financial condition is noted (consecutive losses, negative net worth, excessive leverage),
- An Aggregate Score of 45-54 based on the Risk Grade Score Sheet[8].

3.2 Regulatory Credit Grading Of The Banks

Irrespective of credit score obtained by a particular bank and irrespective of credit risk rating assigned to a particular Bank in line with this Manual, grading of any banks by the Bangladesh Bank inferior to this rating shall be mandatory and all banks should adjust its credit rating in line with Bangladesh Bank rating (if any). This means that if a credit rating by Bangladesh Bank is inferior then the credit rating as arrived as per this Manual then the Bangladesh Bank credit rating for the banks shall prevail and the lender Bank has to adjust its credit rating accordingly. Grading of the classified names should be in line with Bangladesh Bank guidelines on classified accounts[8].

3.2.1 Features of Grading Substandard - (SS) – 6

- Very weak intrinsic financial strength.
- Severe management problems exist.
- Requiring periodic outside support.
- Capacity or inclination to repay is in doubt.
- These weaknesses jeopardize the full settlement of loans.
- Bangladesh Bank criteria for Sub-Standard credit shall apply.
- An Aggregate Score of 35-44 based on the Risk Grade Score Sheet[6,8].

3.2.2 Features of Grading Doubtful - (DF) – 7

- Financial fundamentals are seriously deficient.
- Highly unstable operating environment.

- Default is a real possibility.
- However, due to specifically identifiable pending factors, such as litigation, liquidation procedures or capital injection, the asset is not yet classified as Bad & Loss.
- Bangladesh Bank criteria for Doubtful credit shall apply.
- An Aggregate Score of 25-34 based on the Risk Grade Score Sheet[8].

3.2.3 Features of Grading Bad & Loss - (BL) – 8

- Credit of this grade has long outstanding with no progress in obtaining repayment or on the verge of wind up/liquidation.
- Prospect of recovery is poor and legal options have been pursued.
- Proceeds expected from the liquidation or realization of security may be awaited.
- Bangladesh Bank guidelines for timely write off of bad loans must be adhered to.
- Bangladesh Bank criteria for Bad & Loss credit shall apply.
- An Aggregate Score of less than 24 based on the Risk Grade Score Sheet[6].

3.3 Credit Risk Grading Computation Of a Bank

The following step-wise activities outline the detail process for arriving at credit risk grading[8].

3.3.1 Identify all the Principal Risk Components (Quantitative & Qualitative)

Credit risk for counterparty may be broadly categories under Quantitative and Qualitative factors which arise from an aggregation of the following:

3.3.1.1 Quantitative Factor

- Capital Adequacy
- Asset Quality
- Earnings Quality
- Liquidity and Capacity of External Fund Mobilization
- Size of the Bank & Market Presence[6].

3.3.1.2 Qualitative Factor

- Management status
- Regulatory Environment & Compliance
- Risk Management
- Sensitivity to Market Risk
- Ownership (Share holding pattern) & Corporate Governance
- Accounting Quality
- Franchise Value[6].

3.3.2 Allocate weightages to Principal Risk Components

According to the importance of risk profile, the following weightages are proposed for corresponding principal risks components (Quantitative and Qualitative factors).

Table 3.1: Principal Risk Component and weight

Principal Risk Components:	Weight:
Quantitative Factor:	60%
• Capital Adequacy	15%
• Asset Quality	15%
• Earnings Quality	15%
• Liquidity and Capacity of External Fund Mobilization	10%
• Size of the Bank & Market Presence	5%
Qualitative Factor:	40%
• Management	10%
• Regulatory Environment & Compliance	10%
• Risk Management	5%
• Sensitivity to Market Risk	5%
• Ownership (Share holding pattern) & Corporate Governance	5%
• Accounting Quality	3%
• Franchise Value	2%

The flow chart shown below also reflects the weightage provided for the Principal Risk Components(PRC):

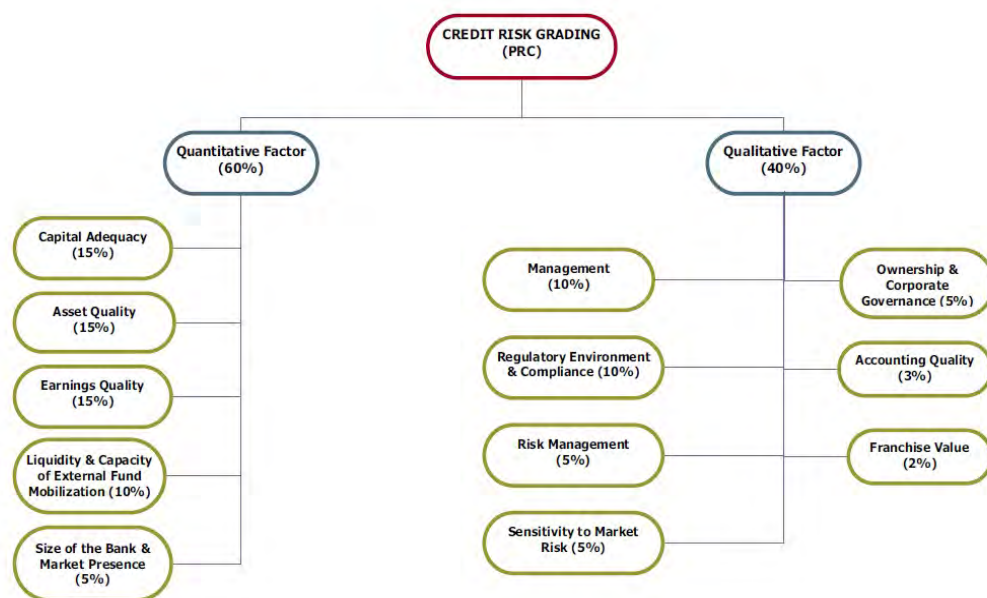


Fig 3.1: Flow chart of weightage provided for the principal risk component

3.3.3 Establish the key Parameters

Once weightage are allocated to the Principal Risk Components (Quantitative and Qualitative Factors) the next task is to arrive at key parameters corresponding to the Principal Risk Components[8].

3.3.3.1 Key Parameters of Principal Risk Components of Quantitative Factors

Key parameters corresponding to the Principal Risk Components of Quantitative Factors are detailed as follows. Each of the key parameters mentioned below shall be evaluated, analyzed and reviewed in order to conclude on the credit risk grading of a banking company and which are as follows:

3.3.3.1.1 Key Parameters for Capital Adequacy

- Bank's plan to raise equity to support its growth (Internal Capital Generation)
- Minimum Capital Adequacy Requirement (CAR) set by Bangladesh Bank
- Leverage ratio of the bank is satisfactory
- Dividend policy of the Bank[6].

3.3.3.1.2 Key Parameters for Asset Quality

- Risk Management includes exhaustive pre-approval and post - approval activities

- Portfolio Management System
- Level of non performing loans
- Amount of largest exposure to a single client/group, who are these and how many are nonperforming
- Sector from where the gross NPL are coming from
- Are classified loans being followed regularly with clear action plan for recovery?
- Have Credit Risk Grading of clients are in place and effective.
- Portfolio Diversity (Industry wise breakdown of loans) & sectoral Concentration
- Nature of security/collateral and the frequency of valuation
- Quality of non-industrial lending[8].

3.3.3.1.3 Key Parameters for Earnings Quality

- Level of earnings
- Diversity of earnings
- Return on Assets (ROA)
- Return on Equity (ROE)
- Interest Rate Management, Interest rate policy (extent of change in lending and deposit rates and how this is likely to affect margins and profitability)
- Non funded business prospects and its contribution towards earnings
- Average cost of fund,
- Average lending rate
- Average net spread
- Net Interest Income Margin (NIIM) trend is satisfactory
- Yield per taka staff cost[6,8].

3.3.3.1.4 Key Parameters for Liquidity and Capacity of External Fund Mobilization

- Statutory Liquidity Reserve (SLR), Cash Reserve Requirement (CRR) and Loan Deposit Ratio compliance
- Asset liability maturity structure
- Bank's liquidity ratio is satisfactory
- Core asset funded by core liabilities
- Impact on interest rate volatility on deposit and its trend

- Ability to raise fund through stable sources in cost effective manner
- Credibility of funding sources in distress situation[8].

3.3.3.1.5 Key Parameters for Size of the Bank & Market Presence

- Number of branch network and employees
- Level of automation
- Products and services offered are regularly reviewed[6].

3.3.3.2 Key Parameters of Principal Risk Components of Qualitative Factors

Key parameters corresponding to the Principal Risk Components of Qualitative Factors are detailed as follows. Each of the key parameters mentioned below shall be evaluated, analyzed and reviewed in order to conclude on the credit risk grading of a banking company and which are as follows:

3.3.3.2.1 Key Parameters for Management

- Human resource based institutions
- Quality of Management (details of Senior Management, background of MD and other top executives)
- Experience and educational background of the senior, mid level and junior management
- Management Philosophy (Vision & Mission)
- Human resource development plans
- Quality of training being offered
- Management operating efficiency calculated on the basis of earning
- Emphasis placed on system & process based banking
- Staff turnover
- Emphasis to Information Technology and staff knowledge in this area[6,8].

3.3.3.2.2 Key Parameters for Regulatory Environment & Compliance

- Policy on loan classification and provisioning
- Policy on large loans
- Loan against Shares, Debentures etc.
- Disclosure requirement for banks

- Delegation of power at operating level
- Instructions for compliance of provisions of Money Laundering Prevention Act, 2002
- Company has been operating satisfactorily in complying to the regulations of SEC and related bodies
- Internal Control and Compliance mechanism
- Status on Basel II compliance[8].

3.3.3.2.3 Key Parameters for Risk Management

- Implementation of risk management in the areas of Credit Risk,
- Implementation of risk management in the areas of Operational Risk
- Implementation of risk management in the areas of and Market Risk[8].

3.3.3.2.4.Key Parameters for Sensitivity to Market Risk

- Degree to which changes in interest rates can adversely affect company's earnings
- Degree to which changes in foreign exchange rates can adversely affect company's earnings
- Degree to which changes in commodity prices can adversely affect company's business[6,8].

3.3.3.2.5 Key Parameters for Ownership (Share holding Pattern) & Corporate Governance

- Ownership pattern & composition of Board (current shareholding with names of promoters)
- Conflict of interest issues in the operational management
- Personal policy and employee satisfaction
- Application of information technology in the system[8].

3.3.3.2.6 Key Parameters for Accounting Quality

- Policies for income recognition
- Provisioning and valuation of investment are examined
- Quality of Auditors[6].

3.3.3.2.7 Key Parameters for Franchise Value

- Joint venture partner or Strategic Alliance
- Management contract or Technical collaboration
- Alliance/arrangement [8].

3.3.3.3 Financial Spread Sheet (FSS)

Before evaluation of the risk element of key parameters it is required to obtain Audited Financial Statement of a bank for at least 3 years period and should be spread in the Financial Spread Sheet which will help to properly analyze the financial trend of a particular bank on whom exposures are being taken. A Financial Spread Sheet (FSS) has been developed which may be used for analyzing the credit risk elements of a banking company from financial point of view. The FSS is well designed and programmed software having two parts. Input and Output Sheets. The financial numbers of banks need to be inputted in the Input Sheets, which will then automatically generate the Output Sheets [8].

3.3.4 Assign weightages to each of the key parameters

Once the above mentioned key risk parameters are evaluated, analyzed and reviewed properly the next step will be to further assign weightage against each key parameter depending on its strength and merits. The weightage assigned to the Principal Risk Components and its corresponding key parameters. Once the above mentioned key risk parameters are identified the next step will be to assign points to each key parameter depending on their importance and standing.[6]

3.3.5 Input data to arrive at the score on the key parameters

After the risk identification & weightage assignment process as mentioned above, the next steps will be to input actual score obtained by the Bank under review process against the key parameters in the score sheet to arrive at the total scores obtained.

This manual also provides a well programmed MS Excel based credit risk scoring sheet to arrive at a total score on each bank being reviewed. The excel program requires inputting data accurately in particular cells for input and will automatically calculate the risk grade for a particular obligor based on the total score obtained. The following steps are to be followed while using the MS Excel program.

- a) Open the MS XL file named, CRG - Score Sheet - Bank
- b) The entire XL sheet named, CRG is protected except the particular cells to input data.
- c) Input data accurately in the cells which are colored light blue.
- d) All the cells provided for input must be filled in order to arrive at accurate risk grade [6].

3.3.6 Arrive at the Credit Risk Grading based on total score obtained

The following is the proposed Credit Risk Grade matrix based on the total score obtained by an obligor (i.e. a Bank).

Table 3.2: Risk grading, short name and score

Number	Risk Grading	Short Name	Score
1	Superior	SUP	• 85 - 100 • Credit facilities fully cash covered (100%) or near cash. • Government guarantee • International Bank guarantee
2	Good	GD	75 – 84
3	Acceptable	ACCPT	65 – 74
4	Marginal/Watchlist	MG/WL	55 – 64
5	Special Mention	SM	45 – 54
6	Sub standard	SS	35 – 44
7	Doubtful	DF	25 – 34
8	Bad & Loss	BL	< 25

3.3.6.1 Credit Risk Grading Process

Credit Risk Grading should be completed by a Bank for its counterparty bank for facilities extended to them. If any credit facilities are extended to a Bank against 100% cash covered or near cash covered securities or covered by Government Guarantee or Guarantee by a top tier International Bank then the Credit Risk Grading should be Superior - 1(SUP-1) and in that case the CRG score sheet is not required. Credit risk grading matrix would be useful in analyzing credit proposal, new

or renewal for regular limits or specific transactions, if basic information on a borrowing client to determine the degree of each factor is a) readily available, b) current, c) dependable, and d) parameters/risk factors are assessed judiciously and objectively. The Relationship Manager as per Data Collection Checklist should collect required information[6,8].

Relationship manager should ensure to correctly fill up the Limit Utilization Form in order to arrive at a realistic earning status for the borrower. Key Risk Parameters are to be evaluated and weighted very carefully, on the basis of most up-to-date and reliable data and complete objectivity must be ensured to assign the correct grading. Credit risk grading exercise should be originated by Relationship Manager and should be an on-going and continuous process. Relationship Manager shall complete the Credit Risk Grading Score Sheet and shall arrive at a risk grading and document it as per Credit Risk Grading Form which shall then be concurred by a Credit Officer[8].

All credit proposals whether new, renewal or specific facility should consist of a) Financial Spread Sheet (FSS), b) Data Collection Checklist, c) Limit Utilization Form d) Credit Risk Grading Score Sheet, and e) Credit Risk Grading Form. The credit officers then would pass the approved Credit Risk Grading Form to Credit Administration Department and Corporate Banking/Line of Business/Recovery Unit for updating their MIS/record. The appropriate approving authority through the same Credit Risk Grading Form shall approve any subsequent change/revision i.e. upgrade or downgrade in credit risk grade[6].

3.3.6.2 Early Warning Signals (EWS)

Early Warning Signals (EWS) indicate risks or potential weaknesses of an exposure requiring monitoring, supervision, or close attention by management. If these weaknesses are left uncorrected, they may result in deterioration of the repayment prospects in the Bank's assets at some future date with a likely prospect of being downgraded to classified assets. Early identification, prompt reporting and proactive management of Early Warning Accounts are prime credit responsibilities of all Relationship Managers and must be undertaken on a continuous basis[8].

Despite a prudent credit approval process, loans may still become troubled. Therefore, it is essential that early identification and prompt reporting of deteriorating credit signs be done to ensure swift action to protect the Bank's interest. The symptoms of early warning signals as mentioned below are by no means exhaustive and hence, if there are other concerns, like breach of loan covenants or adverse market rumors that warrant additional caution, a Credit Risk Grading Form should be presented[6].

Irrespective of credit score obtained by any obligor i.e. a Bank as per the proposed risk grade score sheet, the grading of the account highlighted as Early Warning Signals (EWS) accounts shall have the following risk symptoms[6].

3.3.6.2.1 Marginal/Watchlist (MG/WL - 4)

- Any loan is past due/overdue for 60 days and above but less than 90 days.
- Frequent drop in security value or shortfall in drawing power exists if credit facilities are based entirely on cash covered or near cash covered basis[8].

3.3.6.2.2 Special Mention (SM - 5)

- Any loan is past due/overdue for 90 days and above but less than 180 days
- Major document deficiency prevails.
- A significant petition or claim is lodged against the obligor i.e. a Bank.

The Credit Risk Grading Form of accounts having Early Warning Signals should be completed by the Relationship Manager and sent to the approving authority in Credit Risk Management Department. The Credit Risk Grading should be updated as soon as possible and no delay should be there in referring Early Warning Signal accounts or any problem accounts to the Credit Risk Management Department for their early involvement and assistance in recovery[6].

CHAPTER 4

PROBLEM AND SOLUTION

4.1 Introduction

Currently CRG calculation is done using an excel spread sheet prescribed by Bangladesh Bank. That spread sheet file contains six sheets. Which are programmed.

The first two pages are input pages First page receives information about income statement of the party[3].Income statement contains the following information:[6]

Table 4.1: input of income statement

XYZ Banak Ltd	Figures are in Thousand Taka						
Auditor	Audited	%	Audited	%	Audited	%	VAR
Analyst							
Period	31-Dec-03	G.I nc.	31-Dec-04	G.I nc.	31-Dec-05	G. In c.	97/96
B/(W)							
Interest Income	1,487,707	68	1,721,378	67	1,712,616	67	(1)
Less Interest Expense	853,809	39	971,684	38	971,684	38	0
Net Interest Income	633,898	29	749,694	29	740,932	29	(1)
Fees/Comm & Exg .Earnings	376,093	17	478,711	19	478,711	19	0
Income From Investment	225,309	10	242,857	10	241,839	10	(0)
Other Operating Income	107,211	5	109,185	4	109,185	4	0
Total Operating Income	1,342,511	61	1,580,447	62	1,570,66	62	(1)
Salaries and benefit	416,235	19	502,619	20	502,619	20	0
Depre./Repaire/Maint.Offixadas sets	47,006	2	52,750	2	52,750	2	0
Other Operating Expenses	174,574	8	167,856	7	167,856	7	0
Profit Before Prov.Agst Loan	704,696	32	857,222	34	847,442	33	(1)
Provision For Loan Losses	287,929	13	231,154	9	455,872	18	97
Other Income	0	0	0	0	0	0	0
Other Expese	0	0	0	0	0	0	0
Profit Before Taxes	416,767	19	626,068	25	391,570	15	(37)
Tax Provisions	187,546	9	457,717	18	457,717	18	0
Net Profit Afetr Tax	229,221	10	168,351	7	(66,147)	(3)	(139)
Add Prev Year Profit Br.Fwd	115,079	5	186,428	7	186,428	7	0
Net Earnings	344,300	16	354,779	14	120,281	5	(66)
Less:Divident	0	0	0	0	0	0	0
Less:Proposed Dividend	0	0	0	0	0	0	0
Less:Transfer To Stat Reserve	83,353	4	125,214	5	125,214	5	0
Less:Gneral Reserve	74,519	3	0	0	0	0	0
Less:Dividend Equilisation Fund	0	0	0	0	0	0	0
Retained Earnings	186,428	8	229,565	9	(4,933)	(0)	(102)

The second page receives information about profit and loss of the party. The profit sheet looks like the following chart-

Table 4.2: input of asset

XYZ Banak Ltd	Figures are in Thousand Taka						
Auditor	Audited	%	Audited	%	Audited	%	VA R
Analyst							
Period	31-Dec-03	TBS	31-Dec-04	TBS	31-Dec-05	TBS	%V ar
Quick Assets							
Cash Items	1,668,051	7	1,842,873	7	1,842,873	8	0
Corres(Bal.Other Banks)	479,635	2	3,185,477	13	3,185,478	13	0
Call Money	2,265,000	10	780,000	3	780,000	3	0
Bills Discounetd & Purchased	1,276,516	6	1,657,344	7	1,657,344	7	0
Investment-at cost	3,021,670	13	3,019,690	12	2,481,465	10	(18)
Treasury Bills	0	0	0	0	0	0	0
Investment (Shares)	0	0	0	0	0	0	0
0							
Total Quick Assets	8,710,872	38	10,485,384	42	9,947,160	41	(5)
Loans&Advances	13,119,924	58	13,727,351	55	13,727,351	56	0
Advanced income tax	0	0	0	0	0	0	0
Branch Adjustment	0	0	0	0	0	0	0
Advanced Deposit & advanced rent	0	0	0	0	0	0	0
Suspense Account	0	0	0	0	0	0	0
Investments	0	0	0	0	0	0	0
Lease Finance	0	0	0	0	0	0	0
Other Assets	690,134	3	571,418	2	570,439	2	(0)
Total Quick and Secondary Assets	22,520,930	99	24,784,153	99	24,244,950	99	(2)
Loans-Long Term	0	0	0	0	0	0	0
Lease Hold	0	0	0	0	0	0	0
Bank Premises Furniture & Fixture	275,957	1	274,588	1	274,588	1	0
Sundries	0	0	0	0	0	0	0
0	00	0	0	0	0	0	
Fixed Assets	275,957	2	274,588	1	274,588	1	0
Total Assets	22,796,887	100	25,058,741	100	24,519,538	100	(2)

The third page contains information about liabilities and will look like the following chart-

Table 4.3: input of liability

XYZ Bank Ltd.	Figures are in Thousand Taka						
Auditor	Audited	%	Audited	%	Audited	%	VA R
Analyst							
Current Liabilities							
Deposits	16,946,751	74	20,603,772	82	20,603,731	84	(0)
Call Loans	0	0	0	0	0	0	0
Borrowings	71,499	0	73,828	0	73,828	0	0
Bills Payable	466,587	2	366,580	1	366,580	1	0
BLC	0		0	0	0	0	0
Un Earned Income	0	0	0	0	0	0	0
Tax Payable	0	0	0	0	0	0	0
Dividend payable	0	0	0	0	0	0	0
Other Liabilities	4,237,517	19	2,771,677	11	2,467,012	10	(11)
Total Current Liabilities	21,722,354	95	23,815,857	95	23,511,151	96	(1)
Pension & other Funds	0	0	0	0	0	0	0
Unearned Income(TBILL)	0	0	0	0	0	0	0
Sundries	0	0	0	0	0	0	0
0	00	0	0	0	0	0	
0	00	0	0	0	0	0	
0							
Total Liabilities	21,722,354	95	23,815,857	95	23,511,151	96	(1)
Capital Paid in	230,158	1	230,158	1	230,158	1	0
Statutory Reserves	391,195	2	516,408	2	516,408	2	0
Investment Loss of set res	0	0	0	0	0	0	0
General Reserve	266,752	1	266,753	1	266,754	1	0
Retained Earnings	186,428	1	229,565	1	(4,933)	(0)	(102)
Asset Revaluation	0	0	0	0	0	0	0
Preference Shares	0	0	0	0	0	0	0
Subordinated Loans	0	0	0	0	0	0	0
0	0	0	0	0	0	0	
Total Capital Funds	1,074,533	5	1,242,884	5	1,008,387	4	(19)
Total Liabilities & Capital Funds	22,796,887	100	25,058,741	100	24,519,538	100	(2)
Contingent Liabilities	5,630,743	19	10,525,986	12	10,525,986	10	0

4.2 Output Sheets

These are the input spreadsheets. Various information like the income statement of the party, asset and liability statement etc are input to these sheets. The values entered into these sheets produces three output sheet called-

1. output of asset and liabilities
2. output of profit and loss
3. output ratios
4. output cash flow

4.2.1 Output of asset and liabilities

This sheet sums up total current asset. Firstly it adds Cash/Bank Balances,L/C margin,Fixed Deposits/Marketable Securities,Acc. Receivables-Trade,Accounts Receivable – Others,Goods-in-transit,Inventory,Due from Affiliates – Current. These produces Total current Assets. Gross Fixed Assets Less: Depreciation produces Total Fixed Asset. Addition of Due from Principal, Emp & Affiliate,Advance Income Tax,Deferred Charges,Pre-pymts & Adv produces Total non current asset. Now the values of Total Current Assets,Total Fixed Asset and total non current assets are added which produces total asset[6].

Addition of Short Term Bank Borrowings,Current Funded Portion of Term Debt (CMLTD),Account Payable – Trade,Accrued Items,Provision for Income Tax/Def. I/T Liabilities,Advance Payment,Dividends Payable produces total current liability. Long term loan is added with total current liability producing total liability. Addition of Paid up Capital,Directors Loan(subordinated),Retained Earnings,Reserves yields networth. The values of total liability and the networth produces Total liability and net worth which is equal to the total asset.The spread sheet looks like the following[8].

Table 4.4: output of asset and liability

Auditor	Non audited	%	Non audited	%
Analyst	0	TBS	0	TBS
Financial year	Dec,08		Dec,09	
Period	12 Mths		12 Mths	
Amount	in (000) Taka		in (000) Taka	
Detailed Financial Report				
Current Assets				
Cash/Bank Balances	120	3	150	3

L/C margin	0	0	0	0
Fixed Deposits/Marketable Securities	0	0	0	0
Acc. Receivables-Trade	380	10	600	13
Accounts Receivable – Others	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Goods-in-transit	0	0	0	0
Inventory	1,000	25	1,300	29
				0
Total Inventory	1,000	25	1,300	29
0	0	0	0	0
Due from Affiliates – Current	0	0	0	0
Total Current Assets	1,500	38	2,050	45
Fixed Assets		0		0
Gross Fixed Assets	2,500	63	2,500	55
Less: Depreciation	0	0	0	0
Net Fixed Assets	2,500	63	2,500	55
Non- Current Assets		0		0
Due from Principal, Emp & Affiliate	0	0	0	0
Advance Income Tax	0	0	0	0
Deferred Charges,Pre-pymts & Adv.	0	0	0	0
0	0	0	0	0
Total Non- Current Assets	2,500	63	2,500	55
				0
Total Assets	4,000	100	4,550	100
Short Term Bank Borrowings	0	0	0	0
Current Funded Portion of Term Debt (CMLTD)	0	0	0	0
Account Payable – Trade	110	3	105	2
Accrued Items	0	0	0	0
Provision for Income Tax/Def. I/T Liabilities	0	0	0	0
Advance Payment	0	0	0	0
Dividends Payable	0	0	0	0
Total Current Liabilities	110	3	105	2
Long Term Liabilities		0		0
Term Loan	0	0	0	0
0	0	0	0	0
Total Liabilities	110	3	105	2
Net Worth		0		0
Paid up Capital	3,000	75	3,500	77

Directors Loan(subordinated)	0	0	0	0
Retained Earnings	890	22	945	21
Reserves	0	0	0	0
Net Worth	3,890	97	4,445	98
Total Liabilities & Net Worth	4,000	100	4,550	100

4.2.2 Output of Profit and Loss

This page contains information about profit and loss of the business of the borrower. Firstly it deducts VAT from Gross Sales yielding net sales. Addition of Other Operating Income produces total sales revenue. Deduction of costs of goods sold yields total operating profit. Depreciation and Interest Expense are deducted from total operating profit which produces profit before tax and extra income. Adding other income and deducting income tax produces net profit. Cash withdrawal/dividend is then deducted from net profit yielding total changes in retained earnings. This sheet looks like the following:[6]

Table 4.5: Output of Profit

Auditor	Non Audited	%	Non Audited
Analyst	0	Sales	0
Financial Year	DEC,08		DEC,09
Period	12 Mths		12 Mths
Amount	in (000) Taka		in (000) Taka
Income Statement			
Gross Sales	3,700	100	3,400
Less:VAT	0	0	0
Net Sales	3,700	100	3,400
Add: Other Operating Income	0	0	0
Total Sales Revenue	3,700	100	3,400
Less :Cost of Goods Sold	2,585	70	2,180
Gross Profit/Revenue	1,115	30	1,220
Less: Selling. Gen. & Admin. Expenses	140	4	175
Total Operating Profit (EBITDA)	975	26	1,045
Less: Depreciation	15	0	15
Less: Interest Expense	71	2	85
Profit Before Taxes & Extr Item	889	24	945
Add: Other Income	0	0	0
Income Taxes	20	1	20
Net Profit	869	23	925
Cash Withdrawals/Dividend	0	0	0
Total Changes In Retained Earnings	869	23	925

4.2.3 Output Ratios

This page produces different accounting ratio calculated from the input sheets. The ratio which are vital for the calculation of credit risk grading are grouped into six groups. Like-

1. Growth ratio
2. Profitability ratio
3. Coverage ratio
4. Activity ratio
5. Liquidity ratio
6. Leverage ratio

Table 4.6: Output ratio

Growth ratio	Profitability ratio																	
<table><tr><td>Sales Growth, Sales%</td></tr><tr><td>Net Sales Growth, Composite %</td></tr><tr><td>Net Income Growth, %</td></tr><tr><td>Total Assets Growth, %</td></tr><tr><td>Total Liabilities Growth, %</td></tr><tr><td>Net Worth Growth, %</td></tr></table>	Sales Growth, Sales%	Net Sales Growth, Composite %	Net Income Growth, %	Total Assets Growth, %	Total Liabilities Growth, %	Net Worth Growth, %	<table><tr><td>Gross Margin, Composite %</td></tr><tr><td>SG & A, %</td></tr><tr><td>Cushion (Gross Margin - SG&A), %</td></tr><tr><td>Depreciation, Amortization, %</td></tr><tr><td>Operating Profit Margin, %</td></tr><tr><td>Interest Expense, %</td></tr><tr><td>Operating Margin, %</td></tr><tr><td>Net Margin, %</td></tr><tr><td>Return on Assets, %</td></tr><tr><td>Return on Equity, %</td></tr><tr><td>Cash Withdrawal/Dividend Payout Rate, %</td></tr></table>	Gross Margin, Composite %	SG & A, %	Cushion (Gross Margin - SG&A), %	Depreciation, Amortization, %	Operating Profit Margin, %	Interest Expense, %	Operating Margin, %	Net Margin, %	Return on Assets, %	Return on Equity, %	Cash Withdrawal/Dividend Payout Rate, %
Sales Growth, Sales%																		
Net Sales Growth, Composite %																		
Net Income Growth, %																		
Total Assets Growth, %																		
Total Liabilities Growth, %																		
Net Worth Growth, %																		
Gross Margin, Composite %																		
SG & A, %																		
Cushion (Gross Margin - SG&A), %																		
Depreciation, Amortization, %																		
Operating Profit Margin, %																		
Interest Expense, %																		
Operating Margin, %																		
Net Margin, %																		
Return on Assets, %																		
Return on Equity, %																		
Cash Withdrawal/Dividend Payout Rate, %																		
Coverage ratio	Activity ratio																	
<table><tr><td>Interest Coverage (EBIT/Total Interest)</td></tr><tr><td>Debt Ser.Coverage(EBITDA/Total Interest+CMLTD)</td></tr></table>	Interest Coverage (EBIT/Total Interest)	Debt Ser.Coverage(EBITDA/Total Interest+CMLTD)	<table><tr><td>Receivables in Days</td></tr><tr><td>Payables in Days</td></tr><tr><td>Inventory in Days</td></tr><tr><td>Sales/Total Assets (X)</td></tr></table>	Receivables in Days	Payables in Days	Inventory in Days	Sales/Total Assets (X)											
Interest Coverage (EBIT/Total Interest)																		
Debt Ser.Coverage(EBITDA/Total Interest+CMLTD)																		
Receivables in Days																		
Payables in Days																		
Inventory in Days																		
Sales/Total Assets (X)																		
Liquidity ratio	Leverage ratio																	
<table><tr><td>Working Capital</td></tr><tr><td>Quick Ratio (X)</td></tr><tr><td>Current Ratio (X)</td></tr><tr><td>Sales/ Net Working Capital (X)</td></tr></table>	Working Capital	Quick Ratio (X)	Current Ratio (X)	Sales/ Net Working Capital (X)	<table><tr><td>Total Liabilities/ Net Worth (X)</td></tr><tr><td>Affiliate Exposure/Net Worth (%)</td></tr><tr><td>Total Liabilities/(Net Worth-Affiliates) (X)</td></tr></table>	Total Liabilities/ Net Worth (X)	Affiliate Exposure/Net Worth (%)	Total Liabilities/(Net Worth-Affiliates) (X)										
Working Capital																		
Quick Ratio (X)																		
Current Ratio (X)																		
Sales/ Net Working Capital (X)																		
Total Liabilities/ Net Worth (X)																		
Affiliate Exposure/Net Worth (%)																		
Total Liabilities/(Net Worth-Affiliates) (X)																		

4.3 Inconvenience of the Current System

Now there is another spread sheet called CRG. Various data are taken from the output sheets of the financial spread sheets and entered manually in to the CRG spread sheet

which produces the credit risk grading value of the borrower depending on which banks disburse loan. But since in this method everything is done in two separate spread sheet and output of one sheet is transferred to the other manually, this system has all the disadvantages of file processing system which are described below:[16]

4.3.1 Data Redundancy

Data Redundancy means same information is duplicated in several files. This makes data redundancy[16].

4.3.2 Data Inconsistency

Data Inconsistency means different copies of the same data are not matching. That means different versions of same basic data are existing. This occurs as the result of update operations that are not updating the same data stored at different places. Example: Address Information of a customer is recorded differently in different files[16].

4.3.3 Difficulty in Accessing Data

It is not easy to retrieve information using a conventional file processing system. Convenient and efficient information retrieval is almost impossible using conventional file processing system[16].

4.3.4. Data Isolation

Data are scattered in various files, and the files may be in different format, writing new application program to retrieve data is difficult[16].

4.3.5 Integrity

The data values may need to satisfy some integrity constraints. For example the balance field Value must be greater than 5000. One has to handle this through program code in file processing systems. But in database one can declare the integrity Constraints along with definition itself[16].

4.3.6 Atomicity Problem

It is difficult to ensure atomicity in file processing system. For example transferring Tk.100 from Account A to account B. If a failure occurs during execution there could be situation like Tk.100 is deducted from Account A and not credited in Account B[16].

4.3.7 Concurrent Access Anomalies

If multiple users are updating the same data simultaneously it will result in inconsistent data state. In file processing system it is very difficult to handle this using program code. This results in concurrent access anomalies[16].

4.3.8 Security Problems

Enforcing Security Constraints in file processing system is very difficult as the application programs are added to the system in an ad-hoc manner[16].

4.4 Advantages of the Proposed System

To avoid these problems implementation of Data Base Management System is the only solution. A spreadsheet has serious drawbacks when used for data storage, is cumbersome to retrieve data from any but the most simplistic queries, offers little or no data validation and little or no protection against data corruption from well-meaning but poorly trained user. Excel is better at a lot of things—displaying charts, showing PivotTables, displaying different types of data on the same worksheet. It's pretty simple in the current versions of Office to pull the data you need from any database into a spreadsheet, though. Store data in a database, work on it in a worksheet. You may hold out in Excel for a while, but several things may be conspiring against you, plotting your exile from Spreadsheetland, forcing you to create your first database[16].

A database is optimized for data storage and data retrieval. When you put data into a database table, the database table can be indexed in a variety of ways so that depending on what column or columns you are searching by, the data can always be found as quickly as possible. One of the ways that the databases do this, is by loading as much data into RAM as possible into what is called the buffer cache. This cache holds all the data that has been recently used within the database, so that it can be

found faster than by looking for it on the disk. As the data in the cache becomes unused it is marked to be flushed so that if new data needs to be loaded into cache the database can make room for it. Database servers also support multiple people reading and writing the data at the same time[15]. Databases allow for locks to be taken on specific rows, data pages, or entire tables depending on the need at the time, so that while one person is performing a transaction against the database other users can't update those records, pages, or tables until the first transaction has completed. Billions of dollars have been spent developing the major database platforms out there. They have been made to be extremely flexible and extremely fast so long as the database has been designed and tuned correctly [18].

CHAPTER 5

THE SOFTWARE PROJECT

5.1 Introduction

The software is developed using Microsoft Access 2003 at the back end and Visual Basic for application at the front end.[12] From the user's point of view the software is divided into two parts-Input part and Output part

From a technical perspective it has also two parts namely Front end and Back end[15].

5.2 Input Part

In the menu bar of the program there are two tags named input and parameter for inputting data. When a user clicks on the input tag a sub menu opens containing the options as follows:

Party information: This is used to input various information regarding the borrower, like party name, proprietor name, address, phone number, mobile number, year, business size, business age, business outlook, industry growth, market competition, entry/ exit to the business, experience of the party, team work, primary security, collateral security, guarantee, account conduct, compliance, personal deposits etc.

Income Statement: This interface is used to input the income statement of the party. Year of the income statement, gross sales, other operating income, other income, VAT, cost of goods sold, SGA expense, interest expense, depreciation, income tax, cash withdrawal etc are the inputs of this form.

Asset liability: This form is used to input data regarding asset and liability of the borrower like cash/ bank balance, I/C margin, FDR/ marketable security, Accounts receivable-trade, accounts receivable- others, goods in transit, inventory, due from affiliates, gross fixed assets, depreciation, due from principle, advanced income tax, deferred charges, short term bank borrowing, CMLTD, accrued items, provision, advance payment, dividend payable, paid up capital, retained earnings, directors loan, reserves etc.

Parameter: When a user clicks on the input tag a sub menu opens containing fourteen options as follows:

Business size Parameter Settings: Banladesh bank has divided business into six categories and assigned different weight. This weightage may change time to time. If it is changed, it can be change using this form. Current weightage is as follows:

Table 5.1: Business Size Parameter

If the business is	Business Size	
	Parameter	Score
	<2.50 lac taka	0
	>60.00 l ac taka	5
	10-29.99 l ac taka	3
	2.5-4.99 l ac taka	1
	30-60 l ac taka	4
	5-9.99 ac taka	2

Business Age Parameter Settings: Business are categorized into four groups according to Bangladesh and have weight as follows:

Table 5.2: Business Age Parameter

If the business age is	Business Age	
	Parameter	Score
	< 2 years	0
	>10 Years	3
	2-5 Years	1
	6-10 Years	2

Business outlook parameter settings: Business outlook has the following four types of criteria and weight.

Table 5.3: Business Outlook Parameter

If the business is	Business Outlook	
	Cause for Concern	0
	Favorable	3
	Highly Uncertain	1
	Stable	2

Industry growth Parameter Settings: Industry growth has following parameter and weight-

Table 5.4: Industry Growth Parameter

Industry Growth		
If the industry is	Parameter	Score
	Good(6-10%)	2
	Moderate(1-5%)	1
	No Growth(<1%)	0
	Strong(10%+)	3

Market Competition Parameter Settings: Business are divided into following groups according to market competition, and each group has the following weight

Table 5.5: Market Competition Parameter

Market Competition		
If the market is	Parameter	Score
	Dominant Player	2
	Highly Competitive	0
	Moderately Competitive	1

Entry/Exit Parameter Settings: This are parameters indicating how easy or difficult it is to enter into the business. Businesses are divided into four category depending on this criteria.

Table 5.6: Entry/Exit Parameter

If entry to the market is	Entry/Exit	
	Parameter	Score
	Average	1
	Difficult	2
	Easy	0

Experience Parameter Settings: Experience of the party is categorized into four category. The categories and the weights are listed bellow-

Table 5.7: Experience Parameter

Experience Parameter		
If experience is	Parameter	Score
	>10 Years	5
	1-5 Years	3
	6-10 Years	2
	No Experience	0

Team work parameter settings: Business is a team work. If the team is weak the output will be weak. So emphasis has been given on the team work of the business and businesses are divided in to five type according to the team work quality and each type has following weight-

Table 5.8: Team Work Parameter

Team Work		
If the team work of the business is	Parameter	Score
	Moderate	5
	Poor	3
	Regular Conflict	0
	Very Good	7

Primary Security Parameter Setting: Primary security means the security against which the loan is given i.e if the loan defaults the bank will sell this security to reimburse the loan. Primary security is divided into the following classes according to Bangladesh Bank and each class has the following weight-

Table 5.9: Primary Security Parameter

Primary Security		
If the Primary security is	Parameter	Score
	Fully Pledge	4
	Inferior Charge	2
	Negative Lien	1
	No Security	0
	Regd. Mortgage	4
	Regd.Hypothecation	3
	Second Charge	2
	Simple hypothecation	1
	Substantially Cash Covered	4

Collateral Security Parameter Settings: Banks often desire extra security beyond the primary security so that if the value of the primary security falls the bank can reimburse the loan selling the collateral security. Collateral securities are of the following types and each type has the following weight-

Table 5.10: Collateral Security Parameter

Collateral Security		
If the collateral Security is	Parameter	Score
	Equitable Mortgage	2
	Machinery as Collateral	2
	Negative Lien on Collateral	1
	No Collateral	0
	Regd.Mortgage(City Area)	4
	Regd.Mortgage(Town Area)	3

Guarantee Parameter Settings: Beyond the primary and collateral security Banks take guarantee from some reputed persons mentioning that if the borrower fails I will reimburse the loan. Bangladesh Bank have classified these guarantees into following groups and each groups has the following weight-

Table 5.11: Guarantee Parameter

Guarantee		
If the gurantee is	Parameter	Score
	Corporate Guarantee(Average Strength)	1
	No Guarantee	0
	Personal Guarantee(Average Strength)	1
	Personal Guarantee(High NetWorth)	2
	Strong Corporate Guarantee	2

Account Conduct Parameter Settings: Emphasis is given on account conduct while disbursing loans to a borrower. Borrowers are of the following types depending on account conduct and each type has the following weight-

Table 5.12: Account Conduct Parameter

Accout conduct		
If account conduct is	Parameter	Score
	<3 years faultless	4
	>3 Years Faultless	5
	Frequent Irregularities	0
	Satisfactory (Having some Late Payment)	2

Compliance Parameter Settings: Compliance means whether the loan proposal complies banks all rules and regulations or not. According to compliance borrowers are of four types and each type has the following weight-

Table 5.13: Compliance Parameter

Compliance		
If the parameter is	Parameter	Score
	Full Compliance	4
	No Compliance	0
	Some Non Compliance	3

Personal Deposit Parameter Settings: Personal deposit means the deposit of the borrower. Borrower may have deposit with the bank.

Table 5.14: Personal Deposit Parameter

Personal Deposit		
If personal deposit is	Parameter	Score
	No Depository Relationship	0
	Strong Depository Relationship	1

5.3 Output Part

In the menu bar of the program there are three tags named analysis, trend report and CRG which produces different outputs..

5.3.1 Analysis

When an user clicks on the analysis tag a sub menu opens containing five option as follows:

5.3.1.1Income Statement Analysis

Clicking this tag will open an in put box which will ask for the party name. the user is to select the party name from the dropdown menu and click on open report. It produce a report containing the party's year to year income statement.

5.3.1.2 Balance Sheet Analysis

This tag will open a form asking the party name. the user is to select the party name from the dropdown menu and click on open report. It produces a report containing party's year to year balance sheet statement.

5.3.1.3 Growth ratio

Clicking this tag will open a form which will ask for the party name. the user is to select the party name from the dropdown menu and click on open report .It will produce a report containing the concern party's different growth ratio, like sales growth, net sales growth, income growth, asset growth, liability growth, networth growth etc. the report looks like following:

PartyName	KaysarSoft
Year	2009
GROWTH RATIO	
SalesGrowth	5.3194953195
NetSalesGrowth	5.3304556746
IncomeGrowth	-30.13820511
AssetGrowth	53.2792005
LiabilityGrowth	0
NetWorthGrowth	0

Fig 5.1: Growth Ratio Report

5.3.1.4 Profitability ratio

This tag will open a form asking the party name. the user is to select the party name from the dropdown menu and click on open report. It produces a report containing party's various profitability ratio like gross margin,SGA percentage, cushion%, Depreciation %, Operating profit margin, interest expense, net margin, return on asset, return on equity, cash withdrawal etc. The report will look like the following-

PartyName	Bangla Printing & Packag
Year	2008
PROFITABILITY RATIO	
GrossMargin	30.2294197031
SGAPercentage	3.77867746289
Cushion%	26.4507422402
Depriciation%	0.4048582996
OperatingProfitMargin	26.4507422402
Interest Expense %	1.91632928475
Operating Marqin	24.1295546559
Net Marqin	23.5897435897
Return On Asset	29.1333333333
Return On Equity	22.4678663239
CashWithdrawal %	0

Fig 5.2: Profitability Ratio

5.3.1.5 Other ratio

clicking this tag will open a form which will ask for the party name. The user is to select the party name from the dropdown menu and click on open report .It will produce a report containing the concern party's other different ratio,coverage ratio(interest coverage, debt ser.coverage), activity ratio (receivable in days, payable in days,inventory in days, sales/total assets),liquidity ratio (working cpital ratio, quick ratio, current ratio,sales/ net working capital), leverage ratio (total liabilities/netwoth, affiliate exposer/networth, total liabilities/ networth-affiliate) etc. the report looks like following:

PartyName **KaysarSoft**
Year **2008**

COVERAGE RATIOS

Interest Coverage (EBIT/Total Interest)	121.076388888889
Debt Ser.Coverage(EBITDA/Total Interest+CMLTD)	6.93825799338479

ACTIVITY RATIOS

Receivables in Days	8.87466061514771
Payables in Days	16.69247389269
Inventory in Days	3.40195323580662
Sales/Total Assets (X)	5.13783052259005

LIQUIDITY RATIOS

Working Capital	-1352
Quick Ratio (X)	0.490525942978573
Current Ratio (X)	0.760580839383744
Sales/ Net Working Capital (X)	2.61077020736352

LEVERAGE RATIOS

Total Liabilities/ Net Worth (X)	12.8249452954048
Affiliate Exposure/Net Worth (%)	250.109409190372
Total Liabilities/(Net Worth-Affiliates) (X)	-8.54373177842566

Fig 5.3: Other Ratio

5.4 Trend Analysis

When an user clicks on this tag a sub menu opens having six options like

- 1.Sales trend
- 2.Net sales trend
- 3.Net profit trend
- 4.Net asset trend
- 5.Liability trend
- 6.Net worth trend

5.4.1 Sales trend

Clicking this tag opens a form asking for the party name. user is to select the party name and click on open report. It produces graph of sales trend having year in the x-axis and sale in the y-axis like the following-

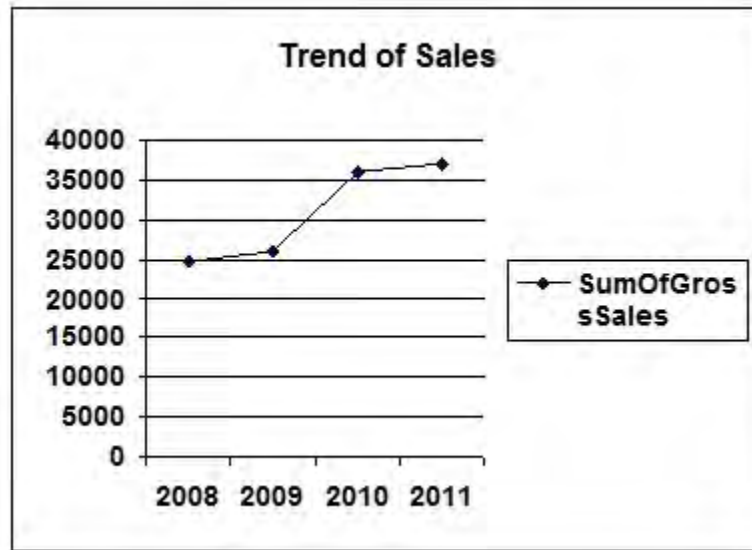


Fig 5.4: Sales Trend Analysis Chart

5.4.2 Net Sales trend

Clicking this tag opens a form asking for the party name. user is to select the party name and click on open report. It produces graph of net sales trend having year in the x-axis and net sale in the y-axis like the following-

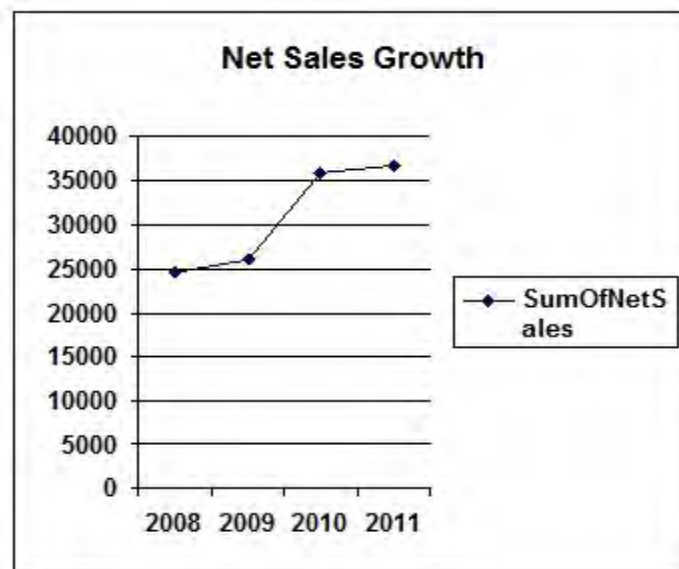


Fig 5.5: Net Sales Growth Chart

5.4.3 Net profit trend

Clicking this tag opens a form asking for the party name. user is to select the party name and click on open report. It produces graph of profit trend having year in the x-axis and profit in the y-axis like the following-

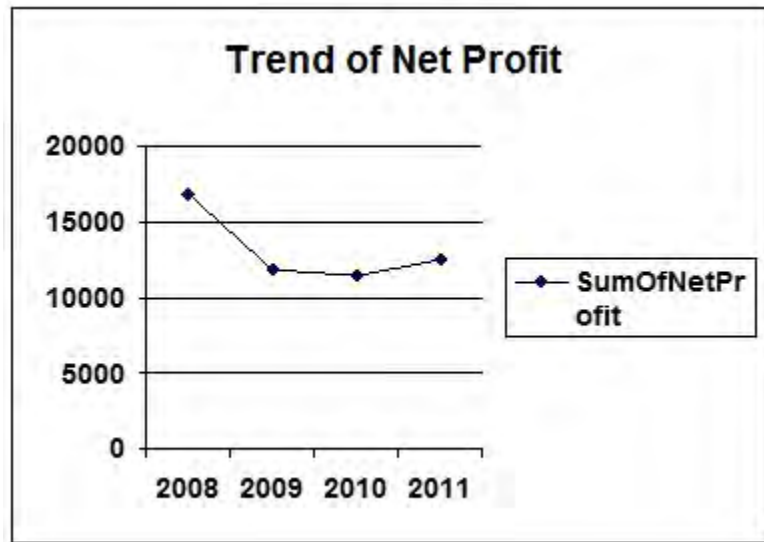


Fig 5.6: Trend of Net Profit

5.4.4 Net asset trend

Clicking this tag opens a form asking for the party name. user is to select the party name and click on open report. It produces graph of net asset trend having year in the x-axis and net asset in the y-axis like the following-

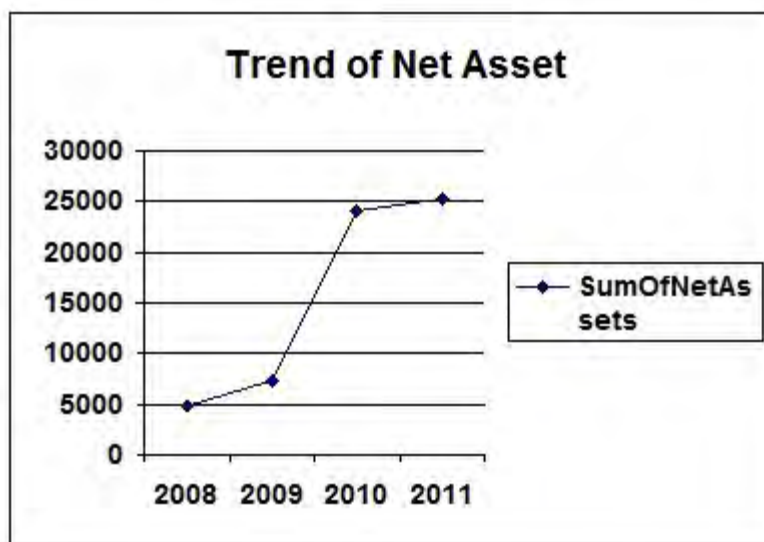


Fig 5.7: Trend of Net Asset

5.4.5 Liability trend

Clicking this tag opens a form asking for the party name. user is to select the party name and click on open report. It produces graph of liability trend having year in the x-axis and liability in the y-axis like the following-

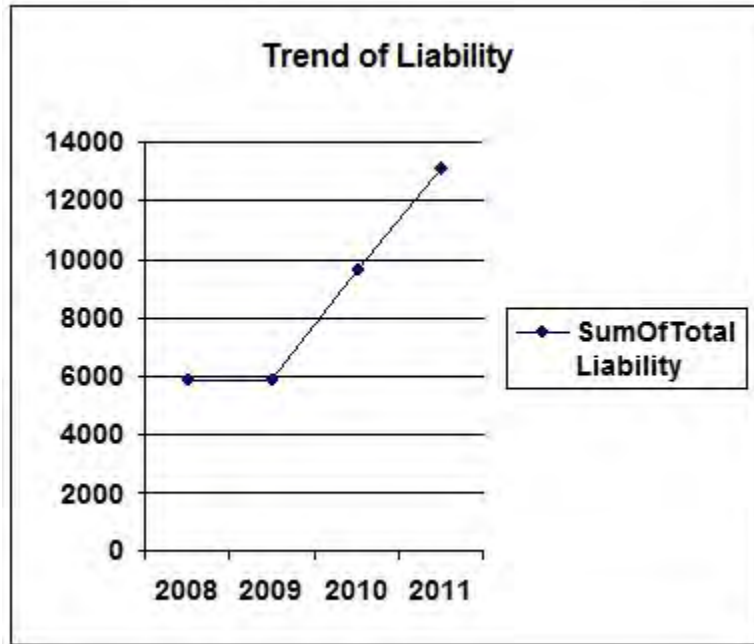


Fig 5.8: Trend of Liability

5.4.6 Networth trend

Clicking this tag opens a form asking for the party name. user is to select the party name and click on open report. It produces graph of net worth trend having year in the x-axis and net worth in the y-axis like the following-

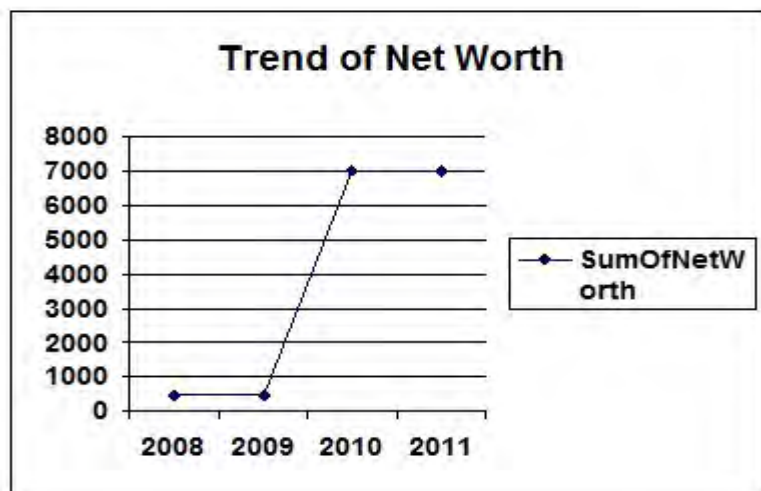


Fig 5.9: Trend of Net Worth

5.5 Technical aspect

The software comprises of 36 forms,33 tables,39 queries,13 reports,63 macroes. Forms are used mainly for inputting data. Some forms are used for retrieving data and report. Tables are used mainly for storing user and system data. Among 39 tables 17 are used to store used input and others are used to store other procedure generated data. Queries are used to append data to different tables, retrieve data from different tables. Macroes are used to open query, report, etc. Spiral model[14] of software development is used . The spiral model is a software development process combining elements of both design and prototyping-in-stages, in an effort to combine advantages of top-down and bottom-up concepts. Also known as the spiral lifecycle model (or spiral development), it is a systems development method (SDM) used in information technology (IT).

5.6 Systeme Development Life Cycle[15]

5.6.1 Preliminary Analysis

The objective of phase 1 is to conduct a preliminary analysis, propose alternative solutions, describe costs and benefits and submit a preliminary plan with recommendations. Conduct the preliminary analysis: in this step, foundout the objectives and the nature and scope of the problem under study [15].

5.6.2 Propose alternative solutions

In digging into the objectives and specific problems, there were some other solutions. Listing of the alternative solutions were done in this stage. Consideration of costs and benefits[15].

5.6.3 Systems analysis, requirements definition

In this stage requirements is set, i.e what is the input and output of the software. In this phase it is prevailed that the input is party's income statement and asset liability statement[15].

5.6.4 Systems design

In this stage desired features and operations in detail, including screen layouts, business rules, process diagrams, pseudocode and other documentation etc are prepared[18].

5.6.5 Development: The real code is written here[15].

5.6.6 Integration and testing

All the pieces together into a special testing environment, then checking for errors, bugs and interoperability etc have been done in this stage[15].

5.6.7 Acceptance, installation, deployment

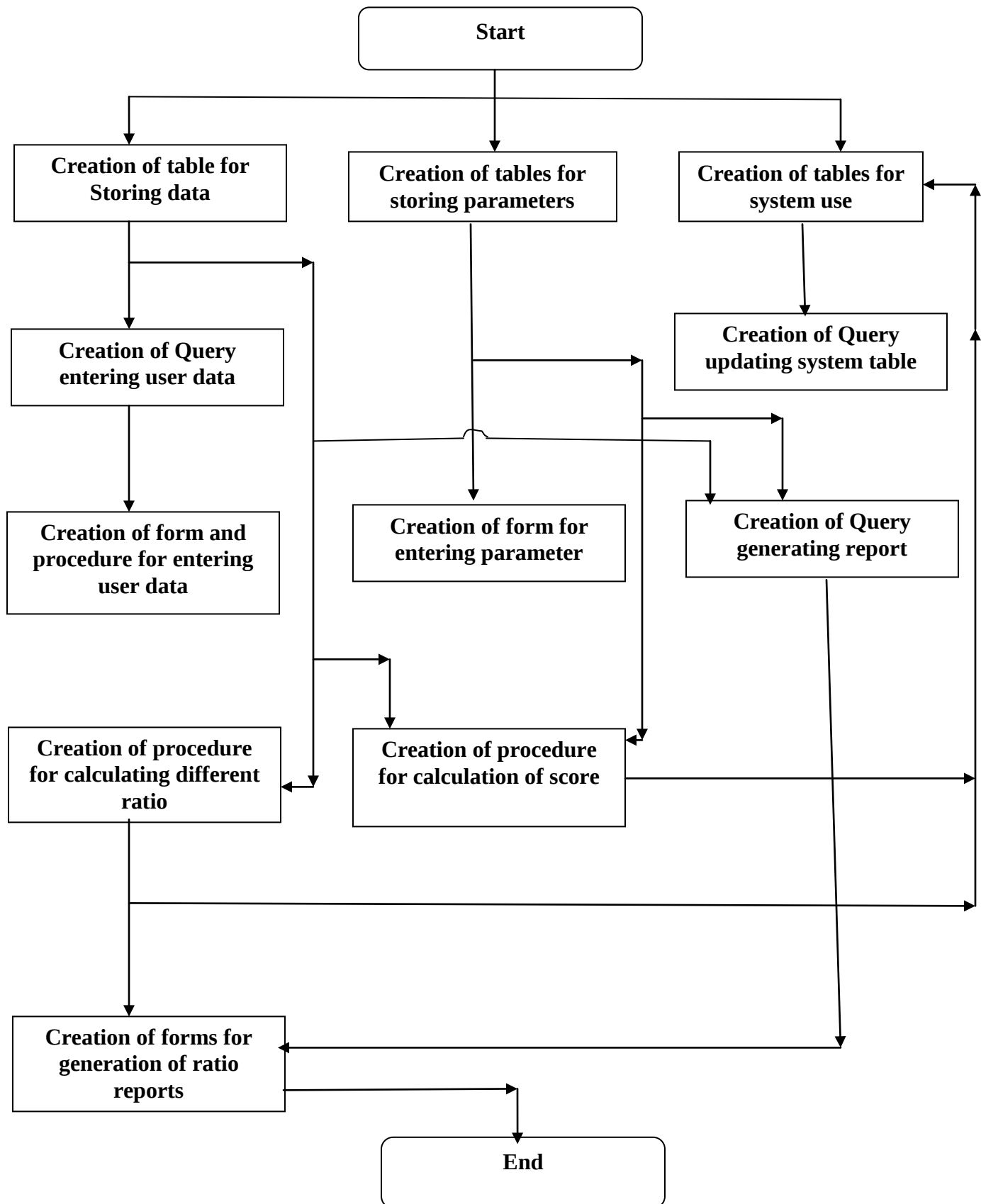
The final stage of initial development, where the software is put into production and runs actual business. Since this is a research project the software have not yet been installed to any bank.

5.6.8 Maintenance

What happens during the rest of the software's life: changes, correction, additions, moves to a different computing platform and more. This is often the longest of the stages[18].

5.7 Flow chart of the Software

Firstly tables for storing input data were created. Then some tables for storing parameter and system data are also created. Some queries using Structured Query Language(SQL) were created to enter user data to the data base. Three forms called party information, Asset liability and profit and loss were created using Visual Basic for Application Language. Those queries were called through click event of a command button on each forms to enter user data. Once the data about borrower is entered, some parameter value is to be entered . After that the software is Ready to produce CRG. Some queries are created to update various system table. Some procedure are written to generate various ratio. These ratio are used to produce ratio reports and stored at system tables to be used to calculate CRG. Using stored data, different ratio and parameter some procedures produces CRG score. These scores are then stored at system tables . Queyries are generated to produce CRG using those scores. Using the query CRG report is then produced.



CHAPTER 6

CONCLUSIONS & RECOMMENDATIONS

6.1 Conclusions

Different models are available for credit risk assessment like, Jorow-Turnbull Model, Metron Model, KVM Model, Risk Metrics+ etc. Bangladesh has her own model defined by Bangladesh Bank. The software is developed according to Bangladesh Banks prescribed model.

The software enables the user to analyse the borrowers income statement, asset and liability statement. Sales growth, net sales growth, income growth, asset growth, liability growth, networth growth etc helps managers to assess loan party's business growth.

Report on different profitability ratio like gross margin, SGA percentage, Cushion, depreciation, operating profit margin, interest expense, operating margin, net margin, return on asset, return on equity etc helps to take decision regarding party's business condition.

Reports on trend analysis helps managers to have clear idea about the party's sales trend, net sales trend, net asset trends, liquidity trends and networth trends etc. and finally report on CRG gives the decision whether to disburse the loan or not.

The reports generated by the software will help the bankers to take proper decision regarding disbursement of loan. As a result tendency of bankruptcy will decrease and the economy of the country will run smoothly.

6.2 Recommendations

To implement the project more successfully and to calculate Credit Risk more accurately the following recommendations are made:

- A module of the software can be developed using Jorow-Turnbull model, Metron model, Credit Metrics+ model which will ensure more accurate credit risk grading.
- Freeware database can be used to develop the software. Freeware data base is free of cost. So there will be no legal barrier and cost concern.
- Use of MySQL at the back end and java script at the front end can ensure more secured software.
- Visual Basic .net can be used to produce the software with more user friendly mode.
- Reports may be made more attractive by using crystal report to generate report.

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