Project Dissertation Report on

Scorecard: An advancement of Credit system in Banking Sector

In Partial Accomplishment of the Master's Degree in Business Administration

in

Business Analytics

Submitted By

Apurva

2K20/BMBA/12

Dhananjay Madan

2K20/BMBA/15

Under the Guidance of

Ms. Sheetal Mavi

UNIVERSITY SCHOOL OF MANAGEMENT AND ENTREPRENEURSHIP

Delhi Technological University

Vivek Vihar Delhi 110095

ACKNOWLEDGEMENT

CERTIFICATE

This is to acknowledge that the following MBA Business Analytics IV semester students of Delhi Technological University successfully finished the Project Dissertation on "**Scorecard: An Advancement of Credit System in Banking Sector**" in 2022 under the supervision of Ms. SHEETAL MAVI (USME, DTU).

Name of the students: **Signature of faculty**

Apurva (Roll no (2K20/BMBA/12)

Dhananjay Madan (Roll no (2K20/BMBA/15)

DECLARATION

I, the undersigned, sincerely swear that the project work report entitled is based on my own work completed during my studies under the supervision of I assert that the assertions made and conclusions reached are a consequence of the project work.

I further certify that the project report does not contain any portion of any work that has been submitted for the award of any other degree, diploma, or certificate in this University or any other University, to the best of my knowledge and belief.

Name of the Candidate & Roll No:

Apurva (2K20/BMBA/12)

Dhananjay Madan (2K20/BMBA/15)

ABSTRACT

The role of a country's financial institutions in economic change is critical. The capacity of a bank to handle risks such as market risk, credit risk, and liquidity risk may be used to gauge its success over time. Many rising economies, including India, are undergoing financial sector transformations, particularly in the banking sector. The banking industry may help to stabilise the financial markets by developing a sound financial system. The developed market's product choice has increased as financial rules have been reduced. Credit cards, real estate, exits, and a variety of off-balance-sheet commodities are among the new goods launched. As a result of the new perspectives, additional banking resources have been developed, allowing traditional financial mediation to make bigger profits. Simultaneously, new risky regions are being opened up. The Indian banking industry has adapted to new competition, dangers, and uncertainties during the last decade. Customer failures, gap gaps, and unfavourable market movements are all potential sources of risk.

A few years ago, the Indian banking industry began the process of digital transformation. While the original goal may have been to combat competition from tech-savvy, new-age competitors, the COVID-19 situation may be a game changer, forcing banks to use digital technologies. It's critical to not only deal with COVID, but also to plan for recovery after the crisis. Banks might try to develop digitally in India since both urban and rural areas have significant cell phone penetration and data availability. Because of the current conditions, both vendors and buyers are more familiar with the usage of technology. To allow digital banking for their consumers, banks might partner with technology suppliers or build their own digital solutions. Banks, NBFCs, and other lending institutions have gathered a vast quantity of data on

their clients' default behaviour. The date of birth, gender, income, and job status of a borrower are examples of demographic information. Furthermore, with their credit products, agencies have collected a significant amount of business expertise. Credit risk analysis and decision-making for loan approval are two of the most important operations for financial institutions. A data-driven risk model is built that evaluates the chance of a borrower defaulting on a loan based on prior history.

For money lending organisations, credit scoring has evolved into a vital risk management tool. Statistical and classical machine learning models have been the most investigated risk management methods in the credit scoring literature throughout the years, but deep learning models have lately gotten a lot of attention. Despite the greater performance of deep learning models, a better understanding of how these models produce predictions is still required. Deep learning algorithms' lack of transparency has stymied their usage in credit rating. Automated choices created by non-transparent models must be explained, which is a requirement for lending institutions

TABLE OF CONTENTS

Contents	Pg. no

OBJECTIVES

The objectives of the current study are: -

- Defining Lending Business and Loan Life Cycle.

- Recognize the need for digitization and managing risk in the banking sector

- Case Study on Score Card

CHAPTER 1

INTRODUCTION

"It is not the strongest of the species that will survive, but the one that is most adaptable to change", so states Darwin's theory of evolution. Taking the financial services industry today as an example; it could be argued that the traditional banking institutions have long represented the "strongest of the species" in that they have historically dominated the lending marketplace. However, they are now facing significant competition from online lending specialists, digital-only banks and other alternate lending solutions offered by lean and agile financial technology firms. So, who will win out? Who will be the most adaptable to change?

So, what are these challengers offering to customers those banks are not able to replicate? Is it their digital presence, a differentiated experience, lower costs, faster decisions, more convenient servicing or something else? If it was just about digital presence, then perhaps adding a mobile app and an online platform could have leveled the scale. Well, many banks did start their digital journey with the understanding that "going digital means adding mobile and online channel" and ended up with expensive technology investments without gaining significant benefits. So, the differentiator in this case is certainly not about digital presence alone. Because digital is much more than mobile, and when the true essence of digital is not understood and implemented correctly, it becomes even more difficult to leverage new technologies such as Analytics, Artificial Intelligence, Machine Learning, Chatbots and Blockchain.

Perhaps delivering a truly "differentiated, unique customer experience" is the real differentiator. Little wonder then that Quicken Loans have named their mortgage product – "Rocket Mortgage". Clearly, they are stating upfront that they are focusing

on simplifying customer journey and offering speedy loan approvals. But there is more to it than speed. What is making bank customers welcome new lending players is their ability to anticipate customer needs, personalize the experience, simplify processes, think customer first and take fast decisions.

The Indian financial services industry is witnessing massive changes. Customer demands are increasing, economic instability is increasing, business margins are being squeezed, and the regulatory landscape is evolving. Established banks are

concentrating on smart/digital lending, and new services are being introduced to the market. The BANK industry, which is forecast to develop at a 45 percent annual rate over the next five years, will face more competition as a result of this increased competitiveness. BANKS are currently concentrating on automation and cloud-based technologies in order to further develop the market. BANKS, on the other hand, will need to come up with novel methods to expand their company reach, improve convenience, boost efficiency, and boost business agility in order to be successful. The key questions are- How can they use new, low-cost avenues to expand their business? How can delivering hassle-free, doorstep lending services help them acquire a competitive advantage? This is where cutting-edge technology can be of use.

1. Transformation History across Globe along with Nucleus

Since 1989, Nucleus Software has worked with some of the world's most forward-thinking financial services businesses. During that time span, product innovation, technology, increased customer sophistication, regulation, and economic development have all had a substantial impact on the financial industry. Our solutions have always evolved with the times, supporting our clients in addressing the ever-changing demands of their consumers. That knowledge and experience are now entrenched in the technology that enable the lending and transaction banking activities of over 175+ companies in 50 countries.

2. Transformation Results across Globe along with Nucleus

Every day, nearly 200,000 people in 51 countries use Nucleus' solutions to help millions of customers. Nucleus Software helps the world's most innovative companies achieve their goals every day. Our customers have witnessed instant results when it comes to managing growing loan portfolios, decreasing non-performing loan levels, minimizing loan approval delays, or releasing stuck cash across borders. Our customers have received prizes for our solutions, including model bank awards, technology implementation awards, and process excellence awards, all based on the solutions we provide.

Figure 1.1

The uptake for alternative lending channels is more prevalent within the Retail-CAS consumer segments such as personal loans, mortgages, student loans, etc. However, there is also an increasing trend of small and medium enterprises (SMEs), who struggle to get funding from banks, opting for alternative lending channels for their short-term capital requirements. While banks have responded to the new challengers, it has been through quick- fixes such as moving to internet banking and also providing basic mobile banking applications. However, very few banks have been able to address the critical aspect, the current bank lending model, which still involves a relatively complex documentation process intertwined with an even more complex regulatory requirement structure, relatively long application process, and a grueling risk assessment of borrowers. Unlike the dated yet functional lending model provided by the banking sector, digital lending technology offered by FinTech start-ups and technology companies provides a seamless digital experience with end-to-end digitization of the complete lending process. This growth in digital lending led by FinTech companies has forced the banks to re-evaluate their traditional lending model.

2.Who is Lender?

Lenders are companies and financial institutions that lend money with the purpose of repaying it. The lender is rewarded with interest as a cost of the loan. The risk of not being paid back increases the interest rate.

Lending to a company (particularly a new one) is risky, which is why banks demand higher interest rates and often refuse to give small business loans.

Lenders are not stockholders in a corporation, nor are they proprietors or partners in other forms of enterprises. To put it another way, a lender does not own your business.

Lenders face a different sort of risk than business owners/shareholders. In the event that a company fails to pay its debts or goes bankrupt, lenders take precedence over owners in terms of payment.

2.1 What are Different Types of Lenders?

Banks, credit unions, and other types of financial organizations are the most prevalent lenders. With the exponential expansion in the number of NBFCs and HFCs in India's lending sector, lending has taken on a new shape in recent years. These are non-banking financial enterprises that account for a large portion of the loan market and are continuing to expand.

2.2 Difference between Banks and NBFCs:

There are some notable differences regarding the functioning of the banks and NBFCs-

| Basis	NBFC's	Banks
Demand Deposits (DD)	Demand deposits are not accepted	All types of Deposits are accepted
Deposit insurance	No deposit insurance	Covered under the RBI's deposit insurance.
Settlement and Payment system of the RBI	The payment and settlement system cannot be availed	The Banks are supported by the Settlement and Payment System (RTGS, NEFT etc.,)
Foreign investment	Up to 100% is allowed	Up to 74% is allowed
Reserve Ratios	Not applicable	CRR, SLR is Applicable
Issue Cheques	Can't issue cheques drawn on itself.	Banks can issue cheques

2.3 What Are the Different Commercial Loans?

• Bank loans for start-up and working capital for small businesses

• Equipment and machinery finance, as well as business car financing

• Mortgages

• Financing with credit card

• Financing from the seller (through trade credit)

• Unsecured loans (personal)

• A variety of criteria affect the kind of lender for a company loan:

• **Loan amount**: The amount you want to borrow influences the type of lender you select. For bigger loans, you may need to combine different commercial loan types.

• **Pledged assets**: If you have corporate assets that can be used as collateral for the loan, you can get better terms than if it's an unsecured loan.

• **Asset type**: A mortgage is often used to finance the purchase of land and buildings, whereas an equipment loan is used to finance capital expenditures such as equipment.

• **Start-up or expansion**: Obtaining a startup loan is often more challenging than obtaining a loan to expand an existing firm. If you're a startup, you might need to check into some of the less common forms of lenders listed below.

• **Loan term**: How long do you anticipate needing the funds? You'll need a different lender for a short-term loan for a company starting than you would for a long-term loan for land and construction.

3.Loan life cycle:

The loan cycle is a five-step procedure that a borrower goes through to get a mortgage loan. The actions necessary to get and retain a loan are referred to as the loan cycle. When a potential Borrower inquiry about a residential mortgage loan, the mortgage loan cycle begins and finishes with the Borrower repaying the loan. Because we don't "service" the loans, AHMCC will walk you through the first four.

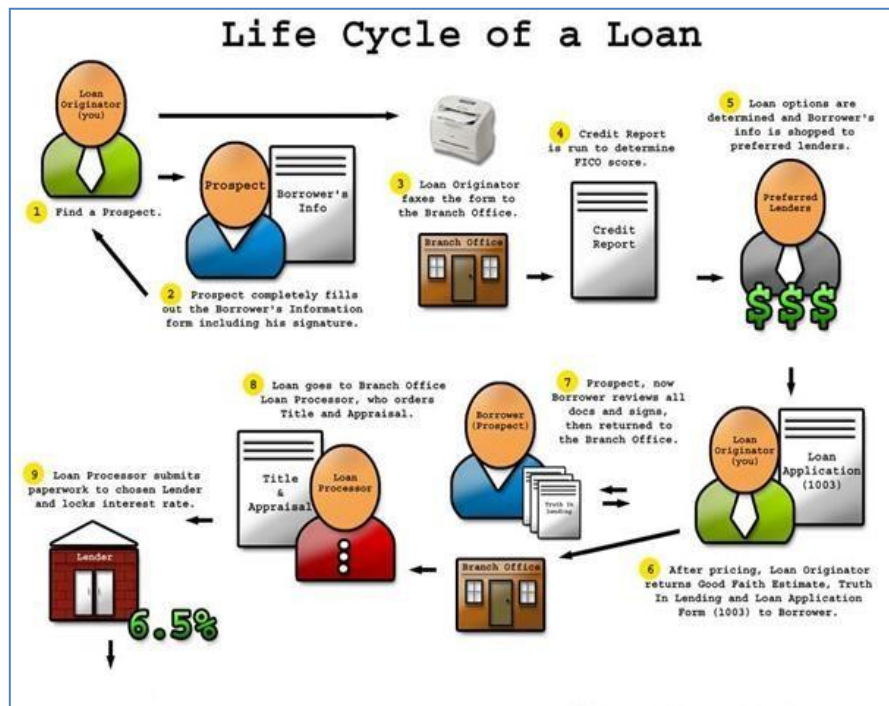Five primary stages make up the loan cycle:
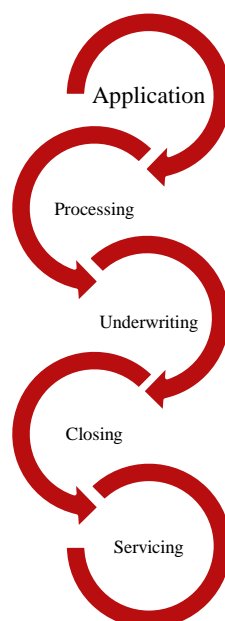
Figure 1.2

3.1 Application:

Several goals are served by the application process:

- Obtaining the basic information that the lender needs from the applicant/borrower in order to underwrite the loan in compliance with the lender's standards and make a decision on whether or not to issue the loan
- Assisting the borrower in selecting which loan programmes are most appropriate for them.
- Providing information on the mortgage loan programme to the applicant, including a detailed summary of all charges and fees - (see Understanding Your Good Faith Estimate)
- Determine the applicant's ability to repay a loan in order to pre-qualify him or her for one.
- Describe how to fill up a Purchase Contract and how to do it properly.

3.2 Loan Processing:

- The loan processing method includes gathering and verifying detailed information on the Borrower as well as the real estate transaction itself. The lender's primary considerations are the subject property and your financial situation (which includes your credit history.)

15

The information acquired throughout the procedure will be used to determine your ability to repay the loan and your desire to do so.

- Gather, organise, and double-check all of the information the underwriter will need to underwrite the loan.
- To begin, you must complete out the Loan Application and enter it into your computer.
- Investing (e.g., credit report fee, appraisal charge)
- Forms for Borrower Disclosure

- Work experience and credit history are both verified (the credit bureau will indicate how you managed previous debt and credit accounts). If there are any discrepancies on your credit report, you may be required to provide a written explanation.
- Look over the responses to the verification questions
- Analyze ratios
- The evaluation is finished and double-checked for completeness and correctness (a chargeable service). The market value of the home will be determined by a competent appraiser. Because the lender can only lend you a certain proportion of the property's worth, this information is essential (LTV)
- The Borrower's application for a loan is evaluated for appropriateness.
- Loan Tracker and/or phone calls to communicate with consumers are conducted as part of the pre-underwriting process.
- Stacking and duplication
- Loan Locks for Proofing Delivery/Courier
- Underwriters' submission

3.3 Loan Underwriting:

After that, the file for the mortgage loan goes through underwriting. Loan underwriting is the process of deciding whether or not a loan is a good risk for the lender.
During the underwriting stage, the major goal is to reduce the number of unnecessary risks.
The guidelines are used to analyse the loan application.
- Review of the Borrower
  - Review of the Property
  - Conditions
  - Follow-up
  - Review of the Conditions

Choosing whether or not to approve a Borrower's loan request is the most difficult component of making a loan.

Commitment Letter

• Approval

3.4 Loan Closing:

Once the loan is approved, the funding and loan closing steps of the mortgage loan formation process are finished. The completion of the final components of the loan transaction, as well as the release of loan funds, is referred to as loan close. The closing is usually handled by a title company or a closing attorney.

A title company/attorney issues a title company/opinion attorney's opinion on the property's title—its ownership—at the loan closing. This opinion of title is scrutinised in detail to guarantee that the seller is the lawful owner of the property and that there are no pending claims against it. The Borrower must also insure the property against hazard (and, in certain cases, flood) risks.

The loan closer then develops the loan's legal documentation and verifies that all other legal requirements are met, such as current real estate tax payments. The correctness and completeness of the mortgage loan file and legal documents are double-checked. Frequently, the Borrower will get federally mandated disclosures.

Lastly, the credit should be properly granted so that the Borrower is held accountable for repayment. The essential parties must get the right quantities in order to satisfy the legal requirements for the best.

The mortgage is made public, and the lender does a last quality control check on the loan file.

- The loan is now closed.

- Post-Funding Audit

3.5 Servicing of Loans:

- Loan servicing encompasses all procedures that take place between the moment a loan is closed and the time it is repaid. The lender's legal claim to the money is protected through servicing activities, which ensure that the loan is paid back on time.

- Ascertain that the loans are being paid in line with the contract's provisions.

- Identifying and following up on any overdue payments as quickly as feasible, whether by reminder messages, phone calls, or a visit to the delinquent Borrower's home.

- If everything else fails, a defaulting Borrower's capacity to recover the mortgaged property is limited by foreclosure, which is a legal process that precludes the Borrower from reclaiming the property. This practise is used to pay off a mortgage's outstanding balance, and it usually entails selling the property in a public or private sale.
- There are two items that must be paid: taxes and insurance.
- The servicer needs to guarantee that these taxes are paid since government tax claims may take precedence over a lender's claim on a property.
- If the property is destroyed or damaged by fire, wind, or other natural catastrophes without insurance, the loan is no longer insured.

4. ERA OF LENDING SYSTEM

4.1 SMART LENDING

While the digitalization of banking procedures is unavoidable, a bank's long-term performance is dependent on the creation and execution of its digital strategy. Several banks have made the error of choosing for a fast fix digital solution amid the frenzy of 'going digital' to compete with FinTech start-ups. Such strategies have ended up being just a facade and resulting in banks spending on digitization efforts with no real return on their investments. Though banks will see growth with the implementation of newer technologies, the question will always be asked "Is the overall digital lending transformation for banks sufficient enough to differentiate and leapfrog its competition in the market?" For an effectivedigitization strategy, banks must re-imagine the customer's banking experience and redesign processes to align a customers' evolving expectation. Below are some of the pitfalls and strategic imperatives for banks to consider when going down the digitization route:
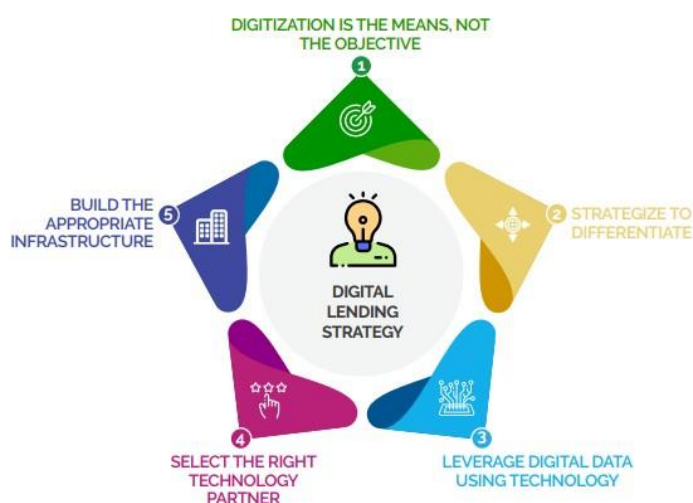

Figure 1.3

4.1.1   <u>Digitization is the means, not the objective:</u>

While digital transformation is on the top of the agenda for most banks, one of the biggest pitfalls is that banks jump hastily into the digitization mode without a proper strategy in place. Quite often the short-sighted strategy for banks is to invest in digital technology without settling on the end objective first. The objective should be to develop a sustainable and profitable business model that focuses of enhancing the user experience for a customer at every point of their interaction with the bank. A crucial factor to keep in mind is to understand its customer base; having a 'user-centric' approach for banking lenders to excel and be a leader in the digital lending landscape.

A well-engineered user-centric approach will be based on understanding the demographics of its customer base, and the very tools to be provided for complementing their digital lending journey. Along with the implementation of newer technologies, banks that incorporate engagement models for its customers and users' (banking employees) involvement will have an added advantage. Banks with a user-centric design will complement its lending experience by having a robust 'product offerings' for its customers; creating a niche; being flexible with its 'pricing' and fee structures and tailoring it as per user's historical lending data and eligibility requirements.

4.1.2   <u>Strategize to differentiate:</u>

For most banks, a large part of their technology investments in lending is typically spent to improve the customer-facing channel, with significantly less attention placed on digitizing the back office. Such cosmetic changes while improving the customer experience in the short- term will end up losing steam in the long term since such changes are easily replicated by the competition. The key differentiator lies in developing and executing a long-term 'digital value' for the bank. Bank lenders that will focus on designing the right operational lending process and then shifting this focus on automating it (complete front-end to back-end), will clearly have a distinct advantage over its competitors that simply implement newer technology to automate processes without removing the inefficiencies that were present in the traditional lending landscape.

Incorporating newer technologies such as Artificial Intelligence (AI) and Robotic Process Automation (RPA) in the front-end of a bank that is changing its application process from paper-based to digital will not be successful in the long run if the bank's mid- and back-office

processes are still using older technology and operational models. Banks need to be digital by design. This involves building internal capabilities across the organization and developing a complete front to back digitization strategy in order to realize the benefits of such an investment and also be prepared for future technology upgrades.

4.1.3   Leverage digital data using technology:

One of the biggest benefits of digitization is creation of large amounts of customer data. This is a goldmine of information which if analyzed properly can create new revenue streams for banks. Banks must address the challenge of integrating the overwhelming volume of data into strategic actionable events.

A data driven mind-set built into every design process of the lending cycle will open up new insights for banks to identify gaps in their products & segments. This data analysis and use, along with technologies like machine learning, natural language processing (NLP), and artificial intelligence (AI), will improve the whole loan lifecycle's data-driven decision-making skills and create a lending model that stands out from the competition.

4.1.4 Select the right technology partner:

One of the key elements to a successful digital strategy is choosing the right partner and building successful partnerships in the long term. Banks have to evaluate this right from the beginning by first evaluating its own internal capabilities and then clearly identify the missing pieces required to meet customer expectations. The next step is to evaluate the merits of adopting a third-party specialist lending solution, develop the software in-house or like in many cases co-develop the solution with a software provider. For each of these decisions, banks must consider the cost, speed of implementation, quality of the potential partner's solution and the ability to seamlessly integrate with the banks existing ecosystem.

4.1.5   <u>Build the appropriate infrastructure:</u>

The approach for banking digital lenders is to have flexible infrastructure, an agile IT development ideology and complete organizational agility. Every bank entering the FinTech competition will have comparable use of newer technology, but for a bank lender to succeed,

a more flexible system that can adapt and update in real-time is critical. For instance, a bank may have a complex end-to-end infrastructure and find it difficult to develop its own core banking and lending solution that can be updated on a regular basis. But it can focus its attention on buying specific tailored lending software that allows for seamless integration of individual and modular components into the existing core banking system. This modular design would permit flow of future enhancements and changes at an ease; also, completely optimizing the Open API architecture allowing for a seamless ecosystem to partner with banking lenders or FinTech firms.

Banks and other financial institutions have been obliged to deliver expanded services to clients in response to the competitive business climate, rising customer expectations, and shifting regulatory constraints. These institutions must guarantee that their profit margins are not impacted as a result of their actions. These worries have caused banks and financial institutions to think creatively and offer services that will assist them not only expand their market share but also manage their operations more cost effectively and efficiently.

Smart Lending is one such automated technology that can assist these financial institutions in significantly reducing loan processing time, paper work, and enabling speedier financing to expedite loan origination and client onboarding procedures. It aids in the creation of a consolidated operations centre that connects financial institutions with all of their channel partners and stakeholders. The lender can see and monitor all operations in real time, and automated solutions minimise the time it takes for procedures to complete while increasing their efficacy and efficiency. A paperless environment for a paper-intensive sector that facilitates automated decision-making via a STP-enabled process.

5. Activities for Loan Origination Life Cycle:

The process of a borrower applying for a new loan and a lender processing that application is known as loan origination. All of the procedures leading up to the disbursement of funds are considered to be part of the origination process. There is a distinct mortgage origination procedure.

5.1 Application Process:

The duration of the application process, from first application to financing, means that different businesses may employ different channels for consumer interactions throughout time. Loan applications can be divided into several categories in general:

5.1.1 <u>Detailed Data Entry:</u>

The initial of the applicants and application is captured. Following are the details captured at DDE stage:

- Applicant Information
- Personal Information
- Address Details
- Identification Details
- Family Details
- Education details
- Employment Details
- Communication Details
- Financial Details
- Bank/ Credit Card Details
- Loan Details
- Sourcing
- Receipt Details
- Documents
- References

- GST

- Domain Check

- Related/Controlling Person

5.2 KYC Check:

Know Your Customer (KYC) activity is performed during the loan processing to ascertain that the documents collected for client identification are complete and to check the existing loan/application details of the applicants.

5.3 Field Investigation (FI):

- **FI Initiation:** Field Investigation can be either auto initiated or can be manually initiated.
- **FI Verification:** On initiation of FI, auto allocation or manual allocation of FI to internal/external agencies is done. Agencies capture the FI verification details.
- **FI Completion:** At FI completion, the authorized user marks the FI verification results as positive, negative or neutral.

5.4 Credit Approval:

- It focuses on credit approver's role and shows relevant information condensed in a singlepage for easy decisions on the applications.
- A credit approver can approve, reject or forward the loan application.

5.5 Post Approval Activity:

- At post approval activity, a user can perform various post approval actions like post approval documents collection, special conditions tracking, instrument details capturing at post approval activity.
- Also, additional collateral details, charge details and receipt details can be captured.
- Applicant details, loan parameters and references can be viewed at post approval activity.

5.6 Disbursal Activity:

After undergoing through various processing steps, the sanctioned amount is disbursed to a customer or any business partner through the disbursal process as and when required.

6 <u>Digitized Automated Systems v/s Legacy Lending Systems</u>

New businesses are entering the market with the intention of upsetting the existing quo. They disrupt traditional organizations by bringing a fresh strategy to client acquisition and retention, as well as delivering goods and services in innovative and efficient ways. As a result, mature organizations seeking a digital response to these new dynamics have turned their attention to digital transformation.

However, legacy systems stand in the way of these mature enterprises. In fact, when asked in a poll by Nimbus Ninety, half of these companies said legacy systems were the biggest roadblock to adopting a digital transformation plan.

The second most popular business driver, according to Deloitte, is technical relevance. Legacy solutions lack flexibility and incur a large technological debt due to outdated technologies, libraries, and topologies, as well as a limited supply of programmers for their antiquated software. As a result, many companies are unable to advance and support analytics, real-time transactions, and a digital experience. Technology is a business driver for two-thirds of the firms questioned, according to the Deloitte research, coming in second after product strategy and objectives.

Unfortunately, many modern businesses are clinging to their legacy IT investments, which include the data needed to make decisions and deliver insights. Companies are deterred by the scope of such a project and, as a result, are stuck in antiquated systems.

The good news is that, in some cases, businesses do not need to completely overhaul their digital infrastructure in order to benefit from current technology. Without having to start from scratch, legacy systems can be adapted to fit the needs of today's corporate environment.
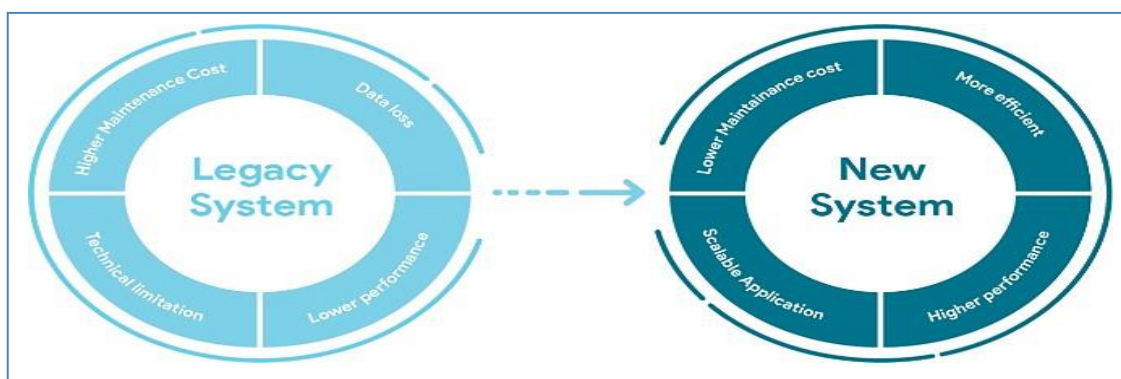

Figure 1.4

7.Is it better to call it a revolution or an evolution?

So, the big question on everyone's mind is whether we should throw everything out the window and start over with a "new and shiny" digital system, or try to improve what we have now. It's a puzzle for which there is no fast fix. To make matters worse, the technology industry adds to the confusion: move everything to the cloud, invest in platforms, replace legacy systems with SaaS software, start a legacy modernization programme, or construct next-generation architecture, and so on.

This advice has the flaw of prioritizing technology. It mixes the goal with the means, to put it frankly. Too frequently, businesses view digital transformation as a one-size-fits-all approach. However, in the digital era, an organization's accumulated value should be put to work, and complete replacement is not necessarily the best plan.

Some businesses see the value of contemporary systems' adaptability, but doing so all at once would put them in a financial bind.

Companies might sometimes be held back by a lack of time rather than a lack of funds. There isn't time for a system upgrade in fields with extremely fast operational tempos. Many legacy systems provide vital services, and transitioning to a new system might result in a loss of productivity and income, even if it eventually leads to increased efficiency.

Keeping the old legacy system, on the other hand, might be prohibitively costly. Vendor support, hardware upkeep, complexity, and finding specialists for old equipment continue to add to the annual expense and decision makers' reluctance.

7.1 Set the goal, then go for the means to achieve it

Optional integrations are available such as wrapping historical systems in wrappers so that the next generation platform may be layered on top of them. As a result, a hybrid system is created, allowing businesses to employ cutting-edge technologies while maintaining the functionality of their legacy system.

Because finding the middle ground is difficult, experts advise beginning with a thorough examination of the company's technology infrastructure.

Then, via Agile Digital Transformation, you'll need a strong, capable team of software developers that can take your vision and turn it into reality. Here is a benchmark case study on system integration for Europe's largest retailer.

Service layers, DALs, APIs, and other tools can help you extend your life by a few years. Many

firms have effectively leveraged the power of old systems in this way, and its content or processing power has been given to clients via new, modern interfaces or mobile applications. It's a method for companies to improve their client experience while still processing data through older systems. However, ultimately, it will be necessary to make the leap to a comprehensive digital transformation. It's worth mentioning that integrating with older systems isn't always a feasible option, since the answer is highly dependent on the circumstances.

Older systems are generally monolithic, despite the contemporary development paradigm's need for more flexible modular development. Some older systems are too complex or rigid to integrate with modern technology.

Customers need an instantaneous and flawless digital experience. As a result of the treatment they have got, customers have been pampered. They now expect all firms, due to behemoths like Amazon and Apple, to provide items and services swiftly and consistently.

Customers expect to be able to access their digital authority accounts and view real-time use data. They intend to obtain a phone from their service provider as soon as possible and get it activated and set up. They anticipate preapproval or approval of bank loans in minutes. They want all service providers to have automatic access to all of the information they previously gave, and they want them to stop asking the same questions over and over. They don't understand why a bank requires pay stubs as evidence of income when their company deposits their paychecks straight into their account every month.

Many well-established businesses are unable to meet their responsibilities. As a response, assailants emerging in the digital environment may surge in to destabilize the market by rapidly delivering digital products and services, deploying advanced algorithms, and getting complete data access.

Customers may not put it that way, but they are demanding a complete revamp of business processes from organizations across many industries. Customers have become accustomed to intuitive interfaces, 24 hours a day availability, real-time delivery, individualized service, worldwide uniformity, and zero faults. It's about more than just providing a better customer experience; when businesses do it right, they can provide more competitive rates thanks to lower expenses, improved control of operations, and lesser risk.

7.2 Customer gratification

Businesses must expedite their digitalization of corporate activities to fulfil these high customer expectations. They should, however, go far beyond digitizing a procedure. They must reimagine the whole business process, which includes lowering the number of steps, the quantity of paper used, automating decision-making, and dealing with regulatory and fraud challenges. To align with the

reinvented processes, operating models, skills, organizational structures, and responsibilities must all be rebuilt. To sound decision, performance monitoring, and consumer insights, data models should be changed and rebuilt. For example, teaching a merchandising manager how to create a pricing algorithm is an example of how digitalization necessitates the integration of old and new talents. Data scientist and customer experience architect are two new careers that may be in great demand.

The advantages are numerous: The digitization of knowledge jobs has the potential that would save up to 90percent on costs while simultaneously cutting turnaround timeframes through magnitudes. One bank's loan petition and judgement process was automated, lowering the price of a proposed credit by 70percent and reducing the time to tentative clearance by days just to 1 min. Customers may order and activate phones without having to contact the telecom firm's back office thanks to a pre - paid feature supplied by the company. A footwear business devised a method to monitor their in stock that permitted it to rapidly assess if a footwear as well as size were all in inventory, saving time for clients and staff.

Thanks to a computerized approach created by the Insurance Information Institute, a large amount of a corporation's insurance claims was evaluated automatically.

Furthermore, substituting traditional paper - based activities with digital enables firms to proactively gather data, which can subsequently be examined to understand better performance of the process, cost structure, and safety factors. Managers should address errors before events can grow severe via using factual data and analytics on virtual productivity. By analyzing customer buying behavior and comments, digital platforms, for example, may help detect and address supply-chain quality concerns more quickly. Prominent companies have recognized that data structures to transfer all present tasks to a digitized world take quite some time to accomplish and, under certain cases, collapse completely. Profitable businesses, by the contrary side, re-evaluate their processes, challenge anything within them, & reconstruct them using slashing modern tech. Instead of using technology to assist back-office personnel in entering client issues in its databases, top companies have developed self-service ways for customers that record their respective issues.

Such strategy is usually used in a collection of short deliveries, integrating conventional process redesigning methods such as lean-one with current agile-2 application engineering procedures.

8.Factors that influence your ability to succeed

The techniques implemented by successful organizations in this area can help firms in a wide range of industries.

8.1 Begin from the end and work your way back.

Due to digitalization, a process may frequently be significantly altered; Integrating computerized judgement with true self, for example, can reduce laborious operations. Efficient modernization efforts begin by conceptualizing the prospective scenario within every operation, regardless of limitations instance, reducing a company's cycle times somewhat from weeks to moments. Restrictions can be reintroduced if a persuasive prospective condition has just been demonstrated. Organizations should never be afraid to put any limitation to the trial. Some of those are commercial fallacies which might easily be debunked by talking to users or government authorities.

8.2 Take on the customer experience from beginning to end.

Even while automating some aspects of the user interaction may improve productivity in certain sections of the business and address several significant concerns raised, that'll never yield in a totally smooth transition, though as a response, this might miss out over substantial potential. To handle such edge process like client enrolment, procedure professionals will require help from each and every unit engaged in the user satisfaction. Every final consumer must be extensively involved, not least to bring common thinking into question. To accomplish this, several companies are forming bridge start-up departments that pull everything together employees engaged in the edge client service, especially Tech professionals. The goal of the bridge division is to effect change. Frequently, individuals have been placed together in groups in order to promote communication and maintain a positive working environment.

8.3 Build capabilities

Because digitalization skills are in short supply, effective efforts prioritise the development of internal competencies. The objective is to establish one hub with professionally trained personnel capable of digitization workflows swiftly. Even yet, firms frequently need to employ outsiders to fill emerging expertise areas and jobs, like analytics engineers or consumer engineers. Because of the significance of the change, the initial executives picked to head process must be deliberately handpicked, well respected inside the organisation, and willing to devote for a long term. It is quite crucial that the workforce does have the expertise and practice to create the required features and

capabilities in a comprehensive manner such that they'll be repurposed throughout procedures and magnitude of operations can also be gained.

8.4 Make rapid decisions.

Traditional IT-intensive projects pay money only after the project is completed, which might take years. However, modernizing edge procedures one at a particular span of time can offer better results in 3 to 5 months. Difficult Technical challenges, like as heritage business systems, take longer to handle, but there are strategies to mitigate the possibility of disruptions. An industry business, for example, employed poor overseas labour to selected respondents' data across networks, permitting a unique virtual user approach to be introduced for aircraft users whereas a stable Technological gateway was constructed simultaneously. The risk associated with the management concepts was minimised as a result of this strategy, and thus the reward was accelerated.

CHAPTER 2

REVIEW OF LITERATURE

Indian banking is one of the largest banking sectors in the world, with assets amounting to over US$ 2.6 trillion in 2017. The sector is a critical component of the Indian economy, with more than 80% of the banking sector's total assets and around 80% of the sector's total income coming from the domestic market. The banking sector in India is made up of government-owned banks and private sector banks. The government-owned banks include the State Bank of India (SBI), the Indian Bank, the Federal Bank, and the Dena Bank.

The banking sector has evolved from a more intermediator role to one of a supplier of speedy and cost-effective services. Financial services are difficult to evaluate before consumption due to their high level of credibility and experience qualities. Recent technological developments, as per Barnes and Corbett (2003), have enabled the introduction of innovative finance services accessing mechanisms. Despite continued attempts by major actors to promote mobile banking in India, a lack of public acceptability has slowed the development of mobile payments as a substitute payment method. Due to a lack of standards, Indian mobile banking consumers are particularly concerned about security concerns such as financial fraud, account misuse, and user friendliness difficulties. More research is needed.

Since the advent of the ATM in the 1990s, India's banking system has seen significant transformation. The ATM was a critical tool for unbanked and underbanked people to have access to financial services. The utilisation of technology and the advent of the internet has increasingly replaced the sluggish and costly practises of the past. The internet has altered the way individuals do business, as well as the banking industry's operations. The advent of numerous electronic ways of payment, mobile banking, and internet banking has resulted from India's banking sector's digitalization. The government has taken a number of steps to encourage the usage of digital banking methods. For example, the National Payments Corporation of India (NPCI) was founded in 2011 as a non-profit organisation to promote RuPay cards and other digital payment methods in India.

According to Barnes and Corbett (2003), recent innovations in telecommunications have enabled the launch of new access methods for banking services. According to S. Karnouskos (2004) despite ongoing efforts by key players such as banks, mobile network operators and mobile payment service providers, there has been a lag in the adoption of mobile payments. Sharma and Singh (2009) found that Indian mobile banking users are specially concern with financial frauds and account misuse.

According to Seema Malik written in her research in (2014) about the banking industry in India has a huge canvas of history, which covers the traditional banking practices from the time of Britishers to the reforms period, nationalization to privatization of banks and now increasing numbers of foreign banks in India. In the 1990s, the banking sector in India pronounced greater emphasis being placed on technology and innovation.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Application Scorecard

The primary significant measurable credit scoring approach is application scoring. The purpose of application scoring is to generate a credit score that reflects a customer's default risk at the time of loan application. This is an important scoring tool since it allows the moneylender to decide whether to approve or reject the credit application.

We will discuss the data that is taken into account when rating an application. The majority of this information comes from the Loan Application Form. Age, sex, conjugal status, pay, time at residence, employment tenure, time in industry, postal code, geographical location, residential status, employment status, lifestyle code, existing customer (Y/N), number of years as a client, number of products internally, total liabilities, total debt, total debt service ratio, gross debt service ratio, revolving debt/total debt, and number of credit cards are some examples. The bank has access to all of this information on the inside. They can be complemented by credit bureau information.

3.2 The Data

Our data comes from a file called "hmeq.csv" from Credit Risk Analytics. There are 5960 data observations and 13 characteristics in this dataset.

Home equity loan characteristics and delinquency statistics are reported in the HMEQ data collection. A home equity loan is a loan in which the borrower utilises the equity in his or her house as security.

Data Cleaning

To remove null values from our dataset, we have used Python

We have imported Panda library to have a clear view of the dataset.

```
In [1]: import pandas as pd

In [2]: data=pd.read_csv(r'C:\Users\DHANANJAY\Downloads\hmeq.csv')

In [3]: data.info()
        <class 'pandas.core.frame.DataFrame'>
        RangeIndex: 5960 entries, 0 to 5959
        Data columns (total 13 columns):
         #   Column    Non-Null Count   Dtype
        ---  ------    --------------   -----
         0   BAD       5960 non-null    int64
         1   LOAN      5960 non-null    int64
         2   MORTDUE   5442 non-null    float64
         3   VALUE     5848 non-null    float64
         4   REASON    5708 non-null    object
         5   JOB       5681 non-null    object
         6   YOJ       5445 non-null    float64
         7   DEROG     5252 non-null    float64
         8   DELINQ    5380 non-null    float64
         9   CLAGE     5652 non-null    float64
         10  NINQ      5450 non-null    float64
         11  CLNO      5738 non-null    float64
         12  DEBTINC   4693 non-null    float64
        dtypes: float64(9), int64(2), object(2)
        memory usage: 605.4+ KB

In [6]: df=data.dropna()

In [7]: df.to_csv(r'C:\Users\DHANANJAY\Downloads/Newhmeq.csv')
```

We have used function **data.dropna()** to remove null values from our dataset and saved the new file

in csv format.

33

DATASET DESCRIPTION

Variable	Type	Description
BAD	Qualitative - Dummy variable	1 = applicant defaulted on loan or seriously delinquent 0 = applicant paid loan
LOAN	Quantitative - Continuous	Amount of the loan request
MORTDUE	Quantitative - Continuous	Amount due on existing mortgage
VALUE	Quantitative - Continuous	Value of current property
REASON	Qualitative - Nominal	DebtCon = debt consolidation HomeImp = home improvement
JOB	Qualitative - Nominal	Occupational categories
YOJ	Quantitative - Discrete	Years at present job
DEROG	Quantitative - Discrete	Number of major derogatory reports
DELINQ	Quantitative - Discrete	Number of delinquent credit lines
CLAGE	Quantitative - Discrete	Age of oldest credit line in months
NINQ	Quantitative - Discrete	Number of recent credit inquiries
CLNO	Quantitative - Discrete	Number of credit lines
DEBTINC	Quantitative - Continuous	Debt-to-income ratio

CHAPTER 4

DATA ANALYSIS AND INTREPRETATION

## 4.1 Summary of variables- Descriptive Statistics

Loan amount

Descriptive Statistics	
Column1	Column2
Mean	18607.9698
Standard Error	145.1726681
Median	16300
Mode	15000
Standard Deviation	11207.48042
Sample Variance	125607617.3
Kurtosis	6.932589768
Skewness	2.023780712
Range	88800
Minimum	1100
Maximum	89900
Sum	110903500
Count	5960

The graph shows only few people apply for large amount of loans and those people lie in the range of (7700 to 20900).

Years at Job

| Column1	Descriptive Statistics
Mean	8.922268136
Standard Error	0.102642056
Median	7
Mode	0
Standard Deviation	7.573982249
Sample Variance	57.36520711
Kurtosis	0.372072479
Skewness	0.988460069
Range	41
Minimum	0
Maximum	41
Sum	48581.75
Count	5445
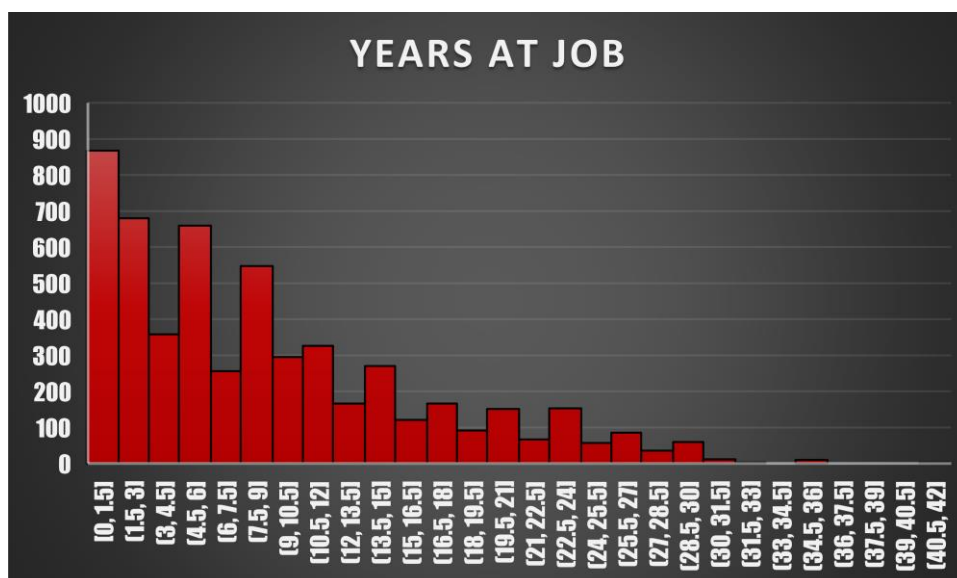
The graph depicts A few people have many years at job and Many people have few years at a job.

The longer time an individual spends working for a firm, the more he or she establishes a reputation and gains loyalty. The banks are able to assess their credit worthiness and develop a direct relationship as a result of this. As the number of years spent with the company grows, so does credit worthiness.

DELINQ (Number of delinquent credit lines)

DELINQ	Column1
Frequency Table	Freq
0	4179
2	250
3	129
4	78
5	38
6	27
7	13
8	5
9	
10	2
11	2
12	1
13	1
14	
15	1

Bar Chart of DELINQ
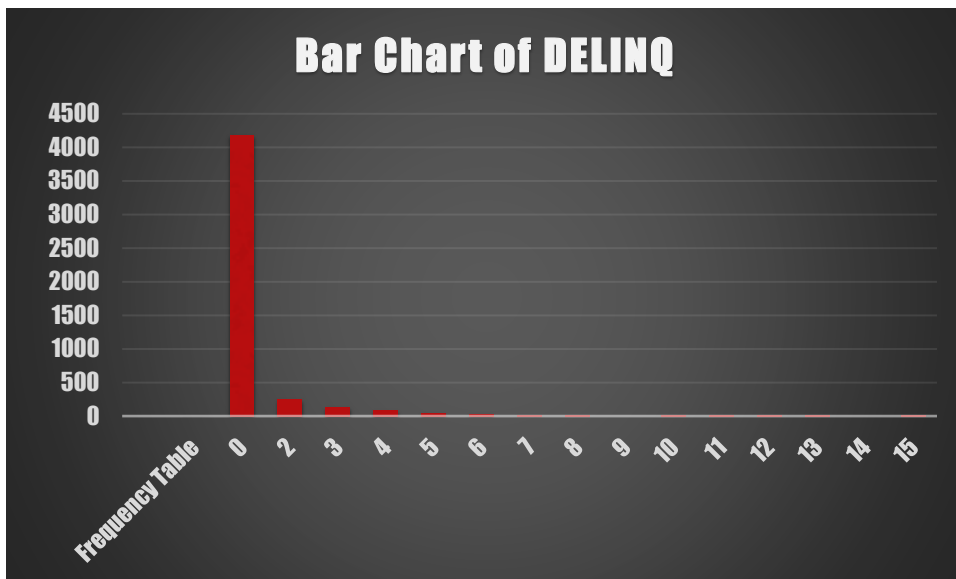
Most people do not have any delinquent credit lines.

Delinquent refers to debts that have missed payments. As a result, as the length/number of missed payments grows, an individual's credit worthiness drops.

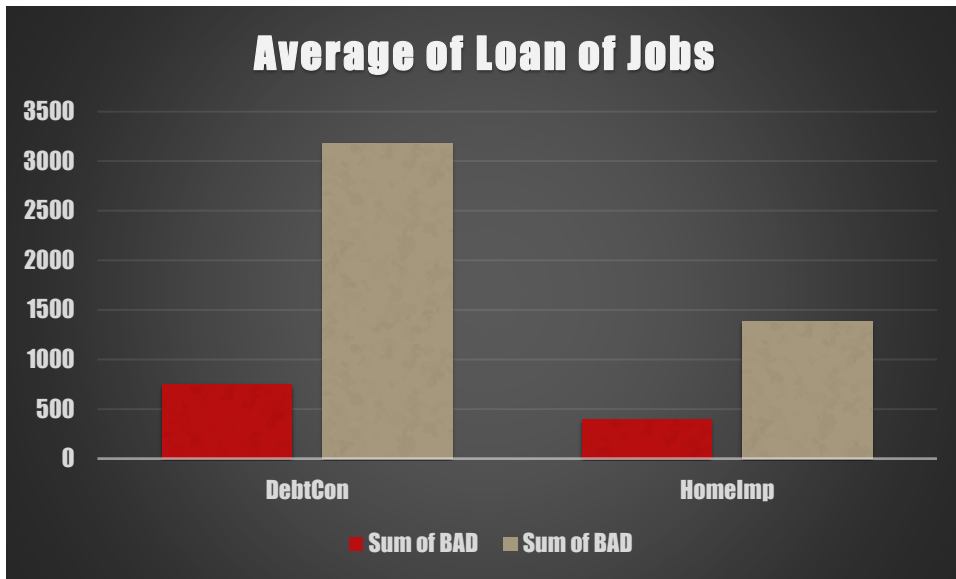**DEROG (Number of major derogatory lines)**
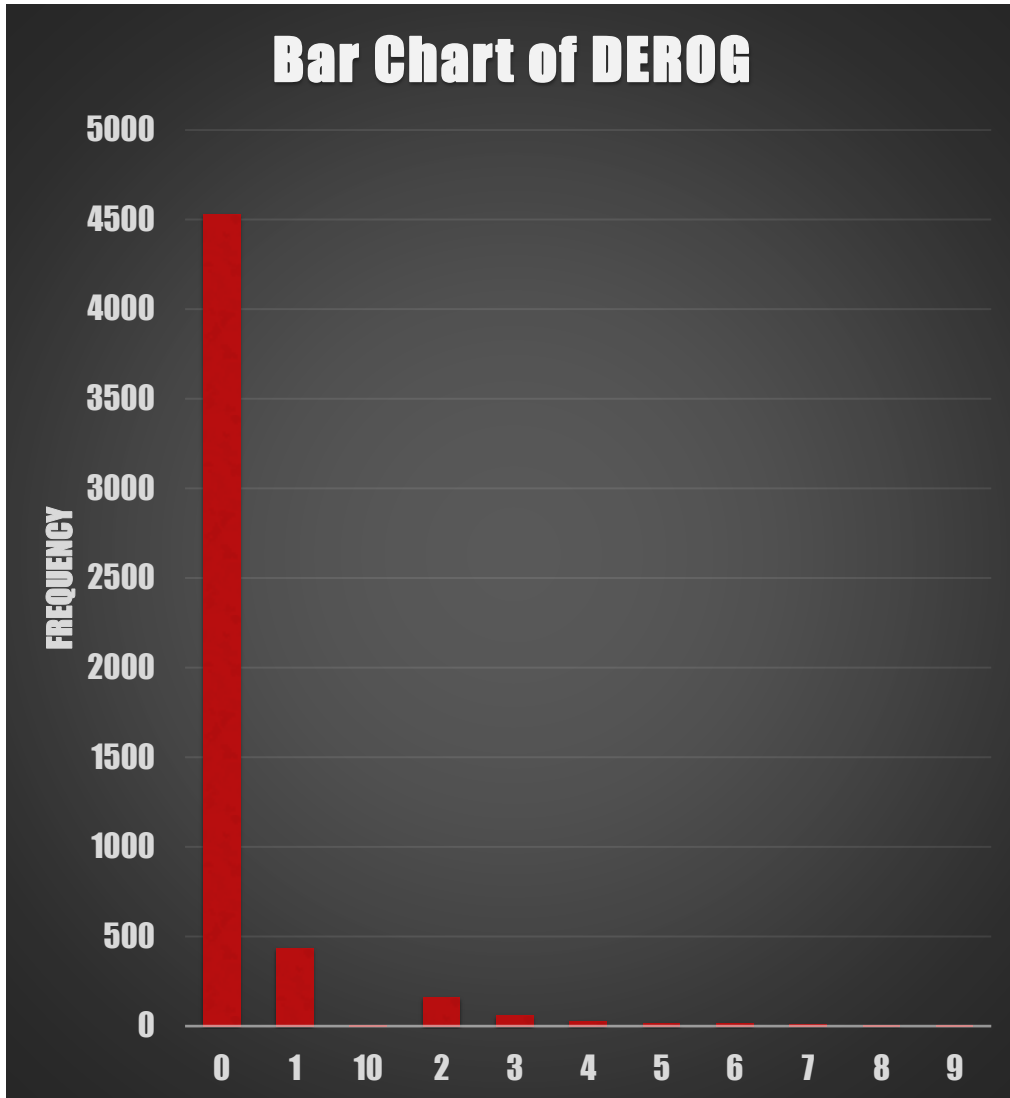
Derogatory term refers to accounts that are 60 or 90 days past due or more. The length of missed payments grows, an individual's credit worthiness drops.
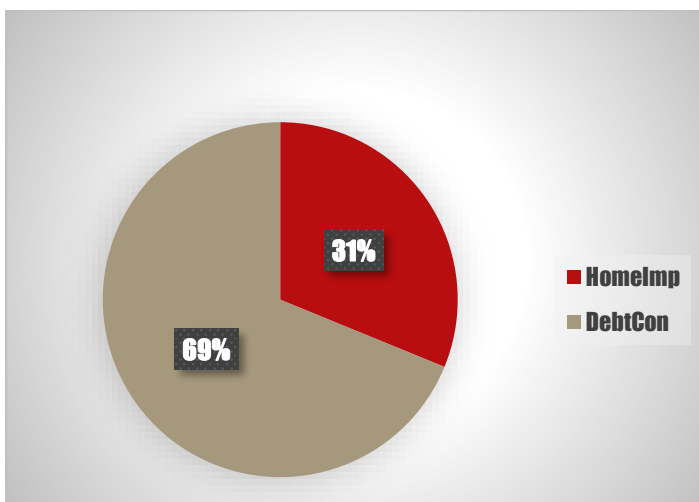
REASON

Row Labels	Sum of BAD=1	Sum of BAD=0
DebtCon	745	3183
HomeImp	396	1384

The sum of BAD=0 column depicts Good Borrowers and
The sum of BAD=1 column depicts Bad Borrowers

Under both the categories of reason, the number of good borrowers is more than bad
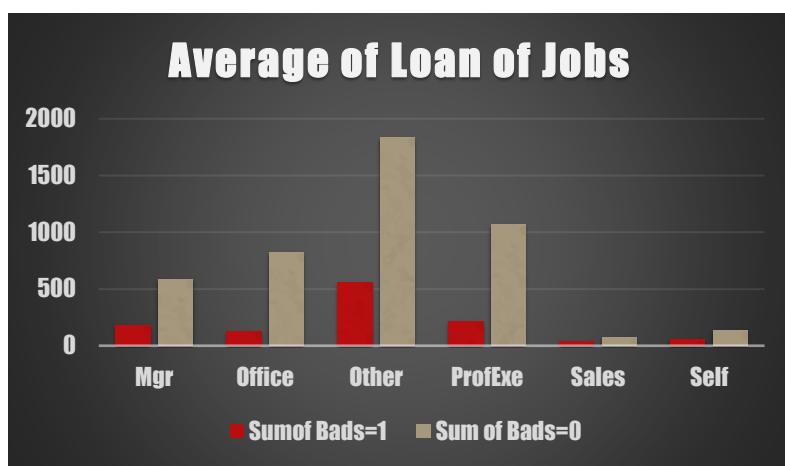**More people take loans for their debt consolidation as compared to home improvement**

69% people applied

**loan for debt consolidation**

31% people applied loan for home improvement

JOBS

Row lables	Sumof Bads=1	Sum of Bads=0
Mgr	179	588
Office	125	823
Other	554	1834
ProfExe	212	1064
Sales	38	71
Self	58	135

In every kind of job, there are more good borrowers than bad borrowers.

The cluster of "Other" jobs amount to the highest number of good borrowers.

The Sales has the lowest number of good borrowers.
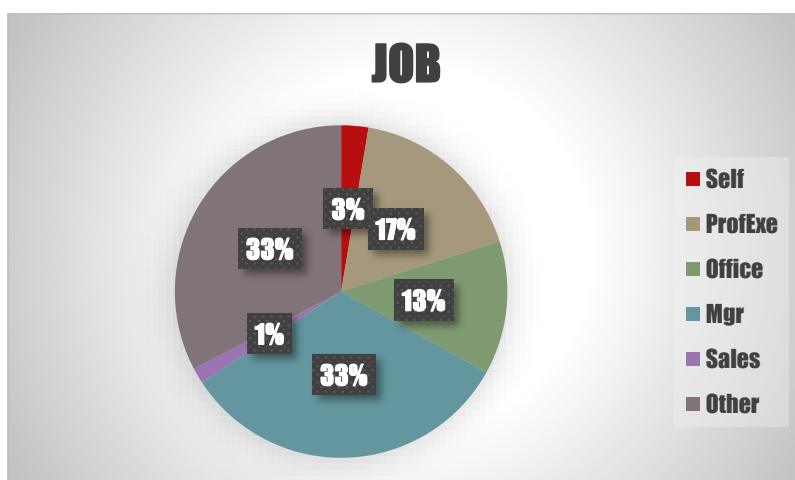
Other and Manager take the most percentages of the jobs of the people who applied for loans.

Only 1% of the entire households work for a sales job.

CLAGE

	0	1	Grand Total
Avg of CLAGE	187.0024	150.1902	179.7663

Good borrowers have a higher average age of oldest credit lines(months) as depicted by graph in red box.

4.2 CASE STUDY ON CREDIT SCORECARD

Loaning agencies (banks, NBFCs, and so on) have amassed a large amount of information about their clients' default behaviour. Demographic information such as a borrower's date of birth, gender, income, and employment status are examples. Furthermore, agencies have amassed a great deal of commercial experience with their credit products.

By separating the two sources of data, a credit risk application score model may be created for future credit applications, assisting in the decision of which to approve and which to refuse.

One of the most significant procedures for financial organisations is credit risk analysis and decision-making for loan approval. A data-driven risk model is built to estimate the chance of a borrower failing to repay loan based on their prior credit history. In the banking business, we must develop Possibility for Failure, Losses Provided Foreclosure, & Sensitivity in Fall-back designs in accordance with Basel rules.

Creditworthiness is critical for everybody as it's viewed as a measure of a person's dependability. In a variety of instances, service providers must first assess their clients' credit history before deciding whether or not to supply the service. However, individually checking every personal portfolios and generating a credit report is time-consuming. As a result, the credit rating is established and used for this reason since it saves time and is simple to understand.

Creditworthiness is the method of calculating a credit rating. It is frequently used in a variety of businesses, including banking. It is typically used by banks to assess who should be given loan, the amount of loan they should be given, and what operational approach may be used to minimise the risk of default.

The majority of us are aware with the notion of a credit rating, which is a numerical number that measures a person's creditworthiness. All credit lending companies, such as banks, employ complicated credit models to establish a credit score for an applicant or an existing clients based on information in the application, such as earnings, debt obligations, and historical credit behavior. If a

person is given a credit, the model generates a score that indicates how probable it is that the borrower will repay the loan on time.

The credit scoresheet is one of these credit metrics; it is amongst the most popular credit models since it is very simple to read for consumers and because it has been there for a several years, so the creation process is conventional and well-understood.

However, the score range may vary from organisation to organisation, as well as the minimum required score for rejecting applicants with lower scores may fluctuate from bank to bank, and even within the same lender for various products.

The future of your finances can feel overwhelming. It's easy to get lost in the numbers, trying to figure out where you stand and how to move forward. That's why it's so important to take a step back and understand what's happening with your financial health. Your Credit Scorecard is an easy way to stay on top of your finances by keeping an eye on your credit score and knowing where you stand.

Not everyone needs a credit score. But if you're shopping for a home or applying for a loan, your credit score is the single most important factor in determining whether you're approved. Credit score is a number that estimates your likelihood to payback a loan on time. It is calculated based on information in your credit report, which is typically a record of your debts and payments history. The credit score is a number between 300 and 850 that ranges from "worst" to "best".

4.2.2 <u>Advantages of Credit Scoring</u>

1.   There's no need to rely on the knowledge, intuition, or presence of mind of one or more company / domain   experts.

2.   Better in terms of speed and accuracy, compared to the judging technique, can now make faster decisions.

3.   Lower operational expenses, fewer bad debts, and, as a result, better portfolio management

4.2.3 <u>Basics of Credit Risk Modelling</u>

1. Probability of Default (PD): The most significant aspect of a credit risk model is the probability of default (PD), which is assessed as the chance of a borrower defaulting on their debts. Individuals' credit scores are determined by their debt-to-income ratio and current credit score.

2. Loss given Default (LGD): When a borrower defaults on a loan, this would be the sum of capital wasted by a banking entity, represented as a % of gross risk at the moment of default.

3. Exposure at default (EAD): When a credit defaults, the total amount a lender is exposed to is calculated as exposure at default (EAD). The internal ratings-based (IRB) technique is used by financial organisations to calculate risk. Banks commonly employ existing threat managing default method to predict their EAD systems.

4. Information Value (IV): Information Value is among the most useful approaches for choosing important factors in a forecasting model (IV). It facilitates the categorisation of variables based on their importance.

5. Weight of Evidence (WOE): The majority of probability determines an independent variable's forecasting power in respect to the dependent factor. It is described as a statistic used to discriminate between good and bad customers. Customers who fail on a loan are known as "Bad Clients," whereas those who repay the obligation are known as "Good Clients."

4.2.4 CREDIT SCORING PROCESS

The following diagram projects a hypothetical model on how credit scoring process is done.

- ❖ First of all, we need to identify, is it an Individual or an Organisation asking for credit.
- ❖ Next, we will consider some of the factors/variables that may affect credit worthiness of an individual/ organisation.
- ❖ If an Individual/organisation reaches the cut off, then Banks can lend credit, else they will reject the credit.
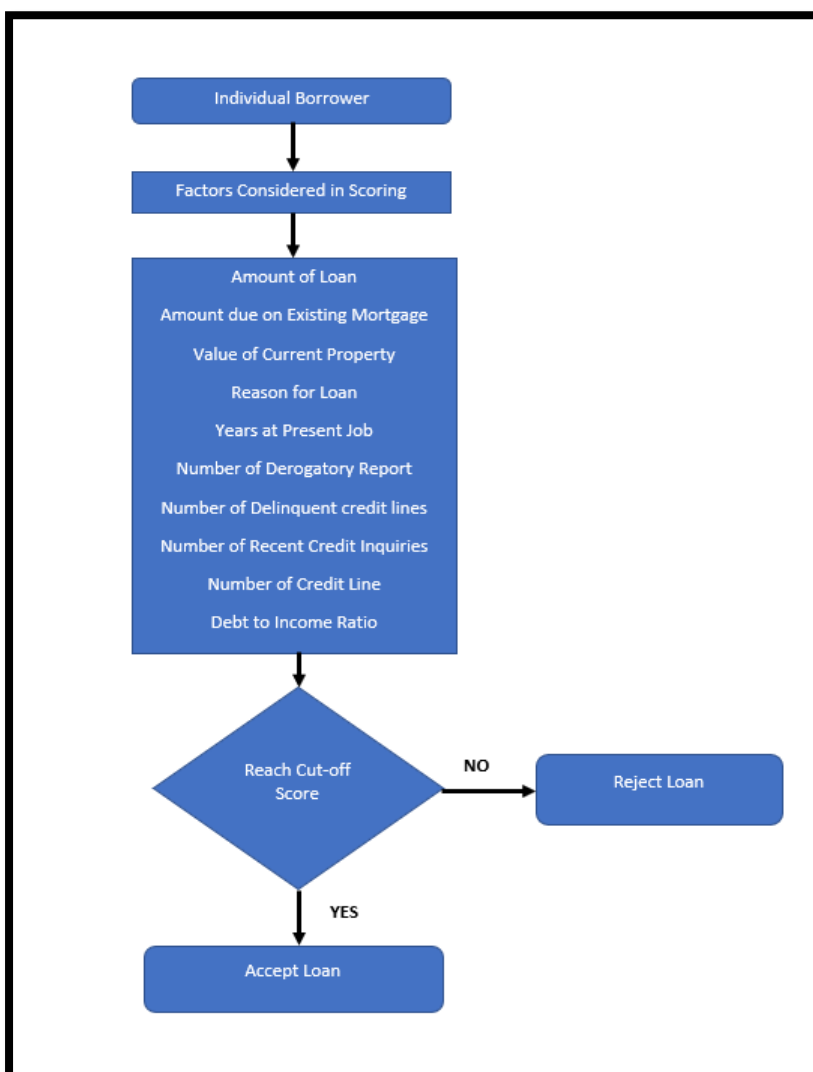

Figure 4.1

Above figure projects an image of the dataset that we have taken into consideration in this research.

INFORMATION VALUE

Information value is a data exploration technique which helps to determine the predictive power of different columns in a particular dataset

To analyse the Information value of our dataset, we have used R Language.

```
1   data<- read.csv("C:\\Users\\DHANANJAY\\Downloads\\hmeq.csv")
2   head(data)
3
4   summary(data)
5   install.packages("Information")
6   library(Information)
7   IV <- create_infotables(data=data, y="BAD", bins=10, parallel=FALSE)
8   IV_Value = data.frame(IV$Summary)
9   IV_Value
10
```

Figure 4.2

We have installed "Information" package which is further used to get the IV of different columns in the dataset.

The following diagram represents respective Information Values of the columns in our dataset.

```
   variable info_value
1      LOAN  0.79509838
2    DELINQ  0.67942645
3     DEROG  0.40258122
4       YOJ  0.34991504
5      CLNO  0.24815360
6      NINQ  0.14831341
7   MORTDUE  0.09694989
8       JOB  0.08980137
9     VALUE  0.07341026
10    CLAGE  0.05762004
11  DEBTINC  0.02684238
12   REASON  0.01226045
```

Figure 4.3

We defined the predictive power of different columns according to their Information Values.

Information value	Predictive Power
< 0.02	useless for prediction
0.02 to 0.1	Weak predictor
0.1 to 0.3	Medium predictor
0.3 to 0.5	Strong predictor
> 0.5	Suspicious or too good to be true

For model creation, factors having moderate and great prediction capacities are often chosen.
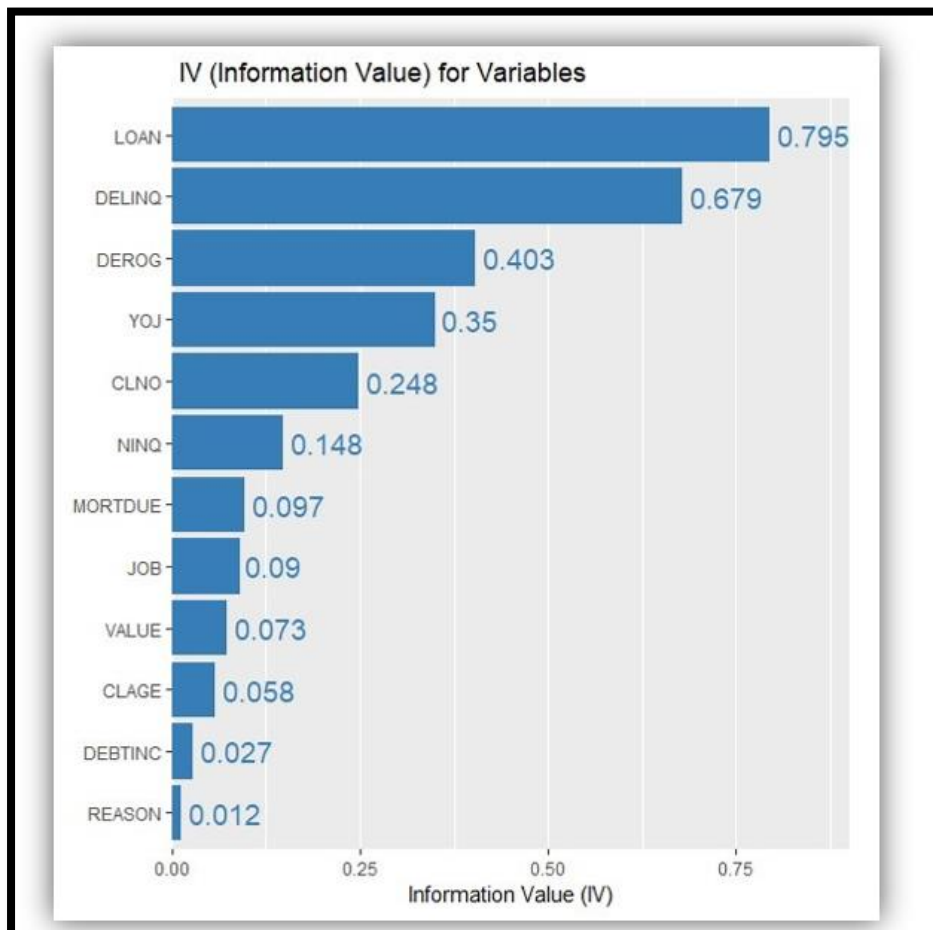

Figure 4.4

As we can see in above figure, LOAN, DELINQ, DEROG, YOJ, CLNO and NINQ have highest IV among all variables and hence have predictive power.

Scorecard

Following is the Scorecard made considering our Dataset and Information Values analysed so far.

Variable	Bin	Points
Loan	< to 6000	-15
Loan	6000 to 8000	65
Loan	8000 to 16000	112
Loan	16000 to >	165
DELINQ	< to 1	132
DELINQ	1 to 2	30
DELINQ	2 to >	-31
DEROG	< to 1	126
DEROG	1 to 2	51
DEROG	2 to >	-21
YOJ	< to 6	65
YOJ	6 to 12	93
YOJ	12 to >	140
CLNO	< to 9	70
CLNO	9 to 27	110
CLNO	27 to >	150
NINQ	< to 1	137
NINQ	1 to 2	100
NINQ	2 to 4	85
NINQ	4 to >	27

Figure 4.5

Different Bins are created for different variables and according to their effect on Credit Worthiness of an Individual, the certain points are allotted on the basis of which Banks/NBFC's analyse whether to lend credit or not
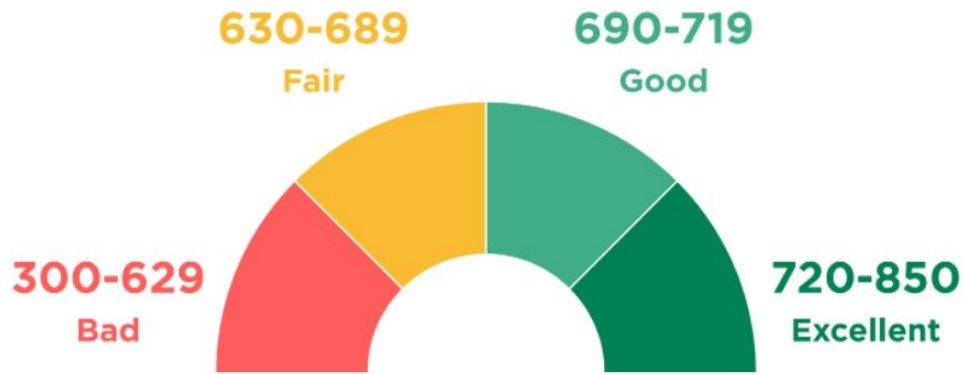
Figure 4.6

Typically, scores range from 300 to 850. While a credit score of above 750 is regarded desirable and can help your application get accepted with a cheaper interest rate, scores below 750 reveal your defaults, which can raise your interest rate. If your credit score is below 550, your loan application is likely to be denied.

Next, we have created another Hypothetical representation of a Credit Scoring process including some new variables which according to us should be included to analyse the Creditworthiness of an Individual or an organisation.
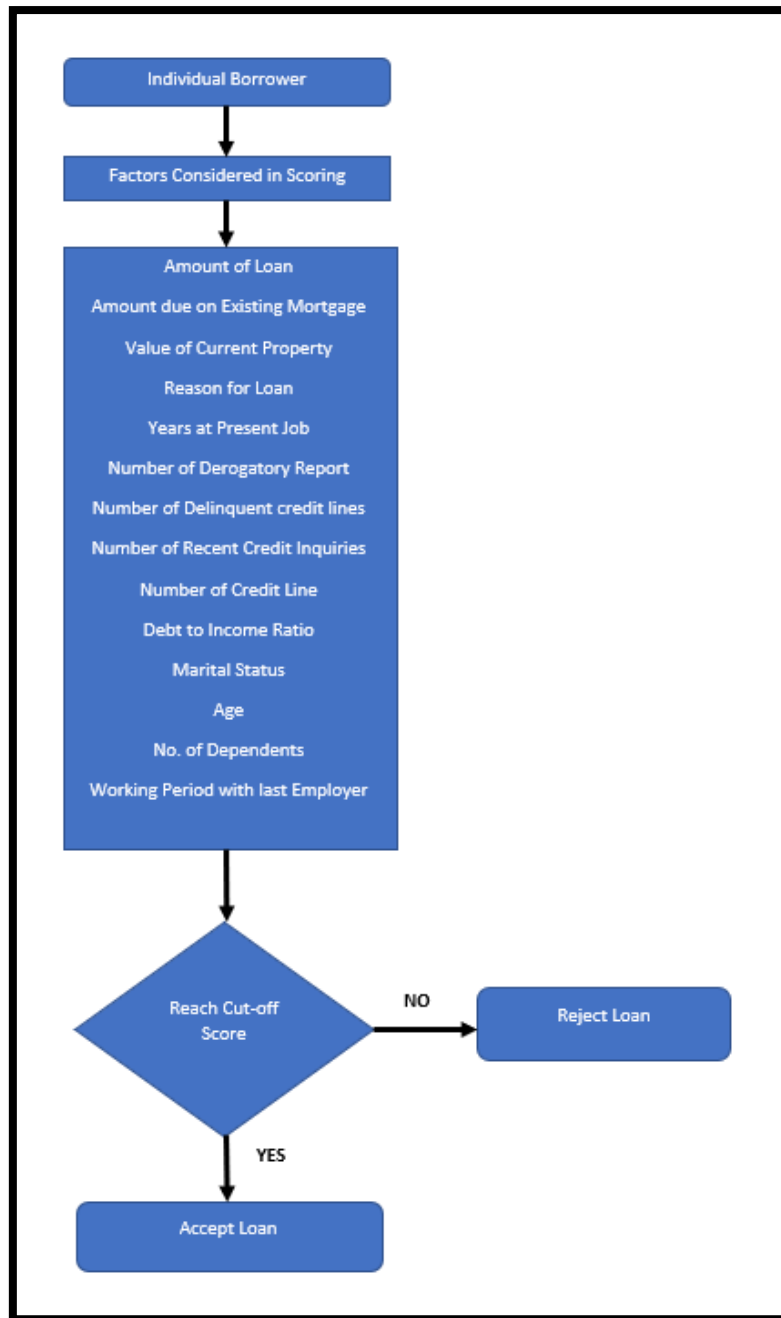
Fig 4.7

The new variables added are:

- ➢ Marital Status
- ➢ Age
- ➢ No. of Dependents
- ➢ Working period with last Employer

Below is the new scorecard built with additional variables that we have taken into consideration.

Variable	Bin	Points
Loan	< to 6000	-20
Loan	6000 to 8000	45
Loan	8000 to 16000	62
Loan	16000 to >	80
DELINQ	< to 1	90
DELINQ	1 to 2	20
DELINQ	2 to >	-30
DEROG	< to 1	85
DEROG	1 to 2	40
DEROG	2 to >	-20
YOJ	< to 6	30
YOJ	6 to 12	60
YOJ	12 to >	80
CLNO	< to 9	30
CLNO	9 to 27	70
CLNO	27 to >	90
NINQ	< to 1	85
NINQ	1 to 2	50
NINQ	2 to 4	30
NINQ	4 to >	10
Marital Status	Married	80
Marital Status	Unmarried/Single/Widow	30
No. of Dependents	< to 2	90
No. of Dependents	2 to 4	60
No. of Dependents	4 to >	30
Age	18 to 35	90
Age	34 to 50	50
Age	50 to>	20
Year with Last Employer	< to 6	20
Year with Last Employer	6 to 10	32
Year with Last Employer	10 to 12	45
Year with Last Employer	12 to 21	60
Year with Last Employer	21 to >	85

Figure 4.8

We have added some **new variables** as Marital status, Age, No. of Dependents and Year with last Employer certainly have greater impact on the credit score.

Credit risk is heavily influenced by the status of one's **marriage**. Another thing to think about is Couples with two incomes may be more creditworthy.

The quantity of money needed will almost certainly increase as the **number of dependents** in a household grows. A rise in the number of dependents might lead to a drop in creditworthiness.

Because younger candidates have fewer responsibilities and dependents than their elder counterparts, creditworthiness declines with **age**. As a result, younger age groups are considered more creditworthy than older ones.

The **number of years spent at a current employment or with past employers** has an impact on credit worthiness. As a consequence, the banks are able to analyse their credit eligibility and establish a direct contact with them.

4.3 Findings

I. The state of one's **marriage** is a substantial indicator of credit risk. We may assume that banks regard married candidates to be less hazardous and more creditworthy than single applicants since they are responsible for their spouses and families. Another aspect to consider Dual income may make married candidates more creditworthy.

II. The **number of dependents** in a home will almost likely raise the amount of money required. Marriage or adopting children might result in an increase in dependents, which can harm creditworthiness. Rather of repaying the debt, the person may prioritise meeting his or her basic requirements. An increase in the number of dependents might result in a reduction in creditworthiness.

III. Creditworthiness diminishes with **age** since younger candidates have fewer duties and dependents than their senior counterparts. As a result, younger age groupings are more creditworthy than older age groups.

IV. Credit worthiness is influenced **by the number of years spent at a current job** or with previous companies. The longer time an individual spends working for a firm, the more he or she establishes a reputation and gains loyalty. The banks are able to assess their credit worthiness and develop a direct relationship as a result of this. As the number of years spent with the company grows, so does credit worthiness.

   As the loan amount grows, banks become more interested in providing credit since it is profitable for them to provide loans with high interest rates. As a result, they favour and award larger-value loans with better scores.

V. **Delinquent and derogatory** terms refer to debts that have missed payments and by how much time. As a result, as the length/number of missed payments grows, an individual's credit worthiness drops.

VI. A **line of credit** is a bank-set limit that specifies the maximum loan amount that may be issued to a person. As a credit line grows, it indicates that a person has strong credit worthiness.

   In terms of credit worthiness, the number of recent credit queries has a higher influence.

   When a bank receives a large number of queries against an individual, it considers this to be a poor sign and lowers the individual's credit worthiness.

4.4 Recommendations

Banking and financial services have always been formal in character, and this is truer in light of present conditions. In any event, in the digital age, things are rapidly changing. It's just as important for banks to maintain their transparency as it is for their customers to maintain their trustworthiness. Banks and consumers both benefit from digitization since it saves time and money. With the expanding use of smart phones, the banking sector's digitalization is anticipated to keep up with the world's rising expectations. It did, in fact, minimise human mistakes while also increasing convenience.

However, because cyber risks are on the rise, banks must exercise extreme caution and be prepared to deal with cyber-attacks. To cope with present and anticipated threats, a risk management system should be in place.

A systematic assessment must be conducted on all institutions that report risk mitigation.

Adequate inner checks and inspections, threat oversight, adequate workforce planning, selecting learning & support, as well as an effective legal advisor ought to be involved in attempt to tackle risk mitigation concerns. With the continuously changing global environment, risk management processes must be monitored and reviewed.

Commercial banks should strongly consider incorporating this proposed credit score methodology into their appraisal procedure. Banks can minimise nonperforming loans by using this methodology. All of the elements that banks examine have been included by Computer System Management in corporation, but in a methodical manner.

It is suggested that sophisticated credit scoring systems such as genetic algorithms, fuzzy discriminant analysis, and neural networks be used in future research investigations.

It is recommended to have a big data set of individual borrowers for the generality and accuracy of the findings given by credit scoring algorithms. New variables can be found that will aid in estimating the likelihood of people and organisations defaulting.

4.5 Limitations of the study

1. **Risks associated with Securities-** Banks are vulnerable to security breaches due to outside risks like hackers, faking, and sniffer. Banks were especially concerned about internal risks, such as fraud conducted by employees in collaboration with other professionals or other employees.

2. **Financial Understanding / User Education -** In India, a major stumbling block is a scarcity of understanding of ways to utilize e-banking services.

3. **Panic issue** - The significantly older century's desire for conventional banking techniques, especially amongst some from remote areas, remains one of the main important impediments to online banking. E-banking use is hampered by the worry of dropping funds in an internet banking.

4. **Specialisation -** Absence of suitable experience and abilities hinders employees' capacity to cope with new and growing technologies in banks. Specialization on changing Technology advances at various stages is in high desire these days.

5. **High-speed internet access** in India's rural areas is a major concern. We have failed to provide 24x7 internet access in rural and distant areas in the past.

6. The credit ratings displayed on Scorecard may not accurately reflect a customer's true worthiness; a person   may be creditworthy despite a lower score on Scorecard. The key reason for bringing this up is because there are exceptions, such as unmarried/widow or elderly people who can repay their debts without becoming defaulters, and vice versa.

CHAPTER 5

CONCLUSION

The Indian financial system affects millions of individuals and is rapidly expanding. The banking business in India is confronted with a variety of issues, including changing client wants and views, new legislation from time to time, and rapid technological advancements. Banks have been forced to adapt their previous ways of conducting business as a result of the strain of solving these demands. The research looked at how technology has changed the face of banking in India. In recent decades, India's banking sector has experienced substantial financial breakthroughs that have resulted in significant advances in banking services and operations.

Risks exists in every facet of living; however, it is particularly common in the banking industry. Until very long ago, financial institutions cannot bear to gamble because of the legislative environment. Banking, on the contrary side, now face the same level of pressure as other firms and must be prepared to deal with a wide range of monetary and non-monetary hazards. Possibilities and ambiguities are an inescapable aspect of finance, which requires risk-taking by its very nature.

Credit Scorecard is a condense form of wide technology ocean which can bring lending to another level. We have tried to cover all the perspective Bank/NBFC can think of in order to lead the market with least Non-Performing Loans. We would like to conclude that the use of digitization in the lending business is not only to digitize the standard paper form model of working but also to automate the business to a next level where it improves the business in all aspects including cost, efficiency and turnaround time (TAT). Would like to bring forward some of the interesting facts which got realized during the research done during this project:

- ❖ A data driven mind-set built into every design process of the lending cycle will open up new insights for banks to identify gaps in their products & segments.
- ❖ Cloud technology, big data analytics and AI will be pivotal in redefining the lending business.
- ❖ Technology is reshaping the lending business. The winners will integrate banking into customers' lives
- ❖ Credit Scorecard as a part of evaluation process will help banks to identify credit worthiness of individuals and due to technological advancements, new algorithms with huge amount of data can predict probability of defaults more accurately.

REFERENCES

- https://www.nucleussoftware.com/
- https://www.pwc.in/consulting/financial-services/fintech.html
- https://en.wikipedia.org/wiki/
- https://www.investopedia.com/
- https://www.bankbazaar.com/
- https://www.ibm.com/
- https://economictimes.indiatimes.com/
- https://www.business-standard.com

- Barnes, S.J., and Corbitt, B.(2003), Mobile Banking: Concept and Potential, International Journal of Mobile Communications, 1 (3), pp. 273-288.
- S.Karnouskos (2004), Mobile Payment: A journey through existing procedures and standardization initiatives ,IEEE Communications Surveys & Tutorials, pp. 44-66,
- Seema Malik (2014), Technological Innovations in Indian Banking Sector: Changed face of Banking, International Journal of Advance Research in Computer Science and Management Studies ISSN: 2321-7782 (Online) Volume 2, Issue 6.
- Sharma, Prerna, Singh and Preeti (2009), Users' perception about mobile banking- with special reference to Indore and around, Review of Business and Technology Research, Vol. 2, 1, pp. 1-5.