Report On

“Measuring Credit Risk: A Quantitative Analysis of Credit Performance & CRM Testing”

By

Humayra Anjum

19304046

An internship report submitted to the Brac Business School in partial fulfillment of

the requirements for the degree of

Bachelor of Business Administration

BRAC Business School
BRAC University
October, 2024

Declaration

This declaration states that:

1. The internship report that was turned in is my own or our team's original work completed for our degree at Brac University.

2. The report doesn't include any content that has already been published or authored by a third party, unless it is properly referenced with complete and correct details.

3. Nothing in the report has been submitted or accepted for credit toward any other degree or certificate from a university or other organization.

4. I/We have thanked all primary sources of support.

Student’s Full Name & Signature:

Humayra Anjum

ID: 19304046

Supervisor’s Full Name & Signature:

Abu Saad Md. Masnun Al Mahi, PhD

Assistant Professor (Finance),

BRAC Business School (BBS)

BRAC University

Letter of Transmittal

Abu Saad Md. Masnun Al Mahi, PhD

Assistant Professor (Finance),

BRAC Business School

BRAC University

KHA 224, Progati Sarani, Merul Badda, Dhaka- 1212

Subject: Submission of Internship Report

Dear Madam,

It is a great pleasure to send in my BBA internship report, which examines ‚Measuring Credit Risk: A Quantitative Analysis of Credit Performance & CRM Testing Methodologies' and brings me tremendous satisfaction. This report provides a detailed account of my internship experience at Charm Limited, as well as the skills and knowledge I gained there.

Hopefully, my report will provide some insight into what I discovered while working and how I may benefit that specific company. I'm available to discuss the report or to answer any more questions. I appreciate your kind assistance and astute advice. Please let me know what you think about any areas that need improvement.

Regards,

____

Humayra Anjum

Student ID: 19304046

BRAC Business School

Date: October 02, 2024

Non-Disclosure Agreement

The undersigned student, Humayra Anjum of BRAC University, and Charm Limited have made and entered into this agreement. In connection with Humayra Anjum‘s internship project with Charm Limited, the "Organization" and the "Intern" have entered into this non-disclosure agreement (the "Agreement"). The undersigned student understands that any technical or non-technical data disclosed to the Receiving Party by the Disclosing Party is considered Confidential Information under the terms of this Agreement. Information that was obtained lawfully, publicly known, discovered, or created by the Receiving Party before disclosure, or that was disclosed with the Disclosing Party's prior written consent, is not subject to the Receiving Party's obligations under this Agreement. The most significant parts of this Agreement are the sections on nondisclosure, relationships, severability, integration, waiver, and notice of immunity. This Agreement's nondisclosure clauses will still apply even after it is terminated, and the Receiving Party will be responsible for protecting the confidentiality of Confidential Information until it can no longer be considered a trade secret or until the Disclosing Party gives the Receiving Party written release.

Acknowledgment

I would like to thank Charm Limited for the opportunity to participate in an internship program with them. It was an excellent learning experience, and I am grateful for the knowledge and skills that I gained during my internship.

I‘d like to thank my supervisor, Jasim Uddin Tonmoy, (CFO, Charm Limited), for his guidance and support throughout my internship. His guidance and encouragement have assisted me in honing both my professional and personal qualities. I‘d also like to thank the entire Charm team for their warm welcome and for making my internship experience unforgettable. In addition, I appreciate the team‘s cooperation and assistance in successfully implementing my internship project.

Nonetheless, I want to express my heartfelt gratitude to my advisor, Abu Saad Md. Masnun Al Mahi, PhD (Assistant Professor, BRAC University), for her assistance and guidance in completing my internship report. I appreciate her wise suggestions, insightful feedback, and unwavering encouragement throughout my internship.

Finally, I‘d like to thank everyone who helped vea long the way with my internship and report writing. I‘ve gained invaluable skills, knowledge, and experience that will last a lifetime, and I‘m eternally grateful.

Thank you once again for this amazing opportunity.

Sincerely,

Humayra Anjum

Executive Summary

Throughout my internship, I was able to gain expertise and useful information in Charm Limited's finance department. During my internship, I worked on a variety of projects and tasks, such as data input related to financial statements, vat and tax, cost analysis, monthly budgets, requisitions, bill summaries, documents related to LC, reconciliations, presentations, drafts related to BIN and BIDA, and more. During this program, I had the opportunity to observe and participate in the organization's regular finance-related operations, which improved my understanding of industry standards and procedures. I also got to improve my communication, problem-solving, and time-management abilities. One of my internship projects was to analyze the credit risk management. I was able to use the theoretical knowledge I had studied in my academic program in a real-world environment with this assignment. Overall, the internship program has been a valuable learning opportunity, and I am grateful for the opportunity to work with Charm Limited's supportive and competent team.

Keywords: Internship; SME; Credit Risk; Loan; Debt; Leverage; Financial Stability

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Acronyms

CFO – Chief Financial Officer

WTP - Water Treatment Plant

VAT – Value Added Tax

BIN – Business Identification Number

BIDA – Bangladesh Investment Development Authority

LC – Letter of Credit

STP – Sewage Treatment Plant

MBR – Membrane BioReactor

RO – Reverse Osmosis

WTP – Water Treatment Plant

ETP – Effluent Treatment Plant

HR – Human Resource

DNCC – Dhaka North City Corporation

LGED – Local Government Engineering Department

WASA – Water Supply and Sewerage Authority

E-GP – E-Government Procurement

R&D – Research and Development

POSM – Point of Sale Marketing

SEO – Search Engine Optimization

P/E – Price-to-Earning

P/BV – Price to Book Value Ratio

EPS – Earning Per Share

EBIDTA – Earnings Before Interest, Taxes, Depreciation, and Amortization

EBIT – Earning Before Interest and Tax

FFO – Funds from Operations

ROA – Return on Asset

ROE – Return on Equity

EVA – Economic Value Added

MVA – Market Value Added

ERP – Enterprise Resource Planning

ISO – International Organization for Standardization

SME – Small and Medium Enterprise

CRM – Credit Risk Management

CR – Credit Risk

BOD – Board of Directors

PD – Probability of Default

EAD – Exposure at Default

LGD – Loss Given Default

EL – Expected Loss

Measuring Credit Risk: A Quantitative Analysis of Credit Performance & CRM Testing

Chapter 1

Overview of Internship

1.1 Student Information

Name: Humayra Anjum

ID: 19304046

Program: Bachelor of Business Administration.

Major: Finance

1.2 Internship Information

1.2.1 Company Information

Period: 3 Months

Company Name: Charm Limited

Department: Accounts & Finance Department

Office Address: 15A, Road 35, Gulshan 2, Dhaka 1212, Bangladesh

Head Office Address

1.2.2 Internship Company Supervisor's Information

Name: Md. Jasim Uddin Tonmoy

Designation: CFO

1.2.3 Job Scope

1.2.3.1 Job Description

I was given the chance to intern in the accounts and finance department of Charm Limited. The finance department's duties include keeping daily records and an accurate history of the business's financial data. It also generates income statements and provides the management team with the financial data they require to make choices. This department's responsibilities include payroll, accounts payable, accounts receivable, financial reporting, and maintaining financial controls, to name a few crucial positions and duties. I've spent a month participating in this program. Nine in the morning and six in the evening is when the office workday begins. I consider myself fortunate to have been chosen as Charm Limited's intern, as I am gaining valuable experience and picking up important financial knowledge.

1.2.3.2 Job Responsibilities

- Inputting financial statement related data into the company's internal software
- Involved in quotation collection from the service provider companies and price comparison of the services
- Preparing drafts and presentation for BIN certificate and BIDA registration
- Analyzing Financial reconciliation
- Preparing salary budgeting and increment calculation sheet
- Assisting with corporate financial activities
- Collaborating with consultants for foreign company collaboration
- Preparing requisitions and bill summaries for company's marketing promotions
- Making PowerPoint for company's internal presentation

- Involved in many special projects like company’s exhibition, launching events and other onboarding events
- Analyzing company’s procurement process and preparing presentation on the procurement process
- Handling Tax and VAT related all work and preparing Mushak 6.3 documents
- Conducting cost analysis for exhibition
- Participating meetings for company’s launching event
- Updating company’s internal database.

1.3 Internship Outcomes

1.3.1 Students Contribution to the Company

As an intern in Charm Limited's Accounts and Finance Department, I handle various tasks such as writing vouchers, entering and managing financial data, preparing financial reports, analyzing data, budgeting and forecasting, handling accounts payable and receivable tasks, supporting audit processes, conducting research on financial best practices and market trends, and analyzing investment opportunities and risks. I also provide administrative support to the finance team, including scheduling meetings, preparing presentations, and handling correspondence. Additionally, I participate in ad hoc projects and cross-functional team initiatives as assigned by supervisors.

I oversee the timely and accurate execution of LC (Letter of Credit) for four to five unique projects of Charm Limited. By ensuring adherence to international trade laws, keeping accurate records, and working with banks and clients to address inconsistencies, I assist the financial team. To guarantee smooth financial transactions, the responsibilities also include creating documentation, keeping an eye on the status of LCs, and offering analytical help. My proactive communication and meticulous attention to detail are essential for risk mitigation and efficient financial operations.

I have also worked with BIDA, a Bangladesh Investment Development Authority, to support the preparation and submission of necessary documentation to comply with regulations. I have assisted in application processes for investment permits, licenses, and approvals, ensuring accurate financial reports and data. I have maintained communication with BIDA officials, track application status, and address any issues. I have collaborated with internal teams to gather and analyze financial information for BIDA submissions, ensuring compliance with regulatory standards and successful facilitation of investment initiatives.

1.3.2 Benefits to the student

Both academic and practical knowledge are necessary for an adequate education. A complete education necessitates a theoretical and practical balance. Throughout my time as a student of undergraduate study, I have acquired theoretical knowledge that helps me to comprehend the meaning, purposes, and procedures of finance. I am obtaining useful knowledge about corporate finance through my internship experience. I learned from my internship that the theoretical information I had learned as an undergraduate differs greatly from the practical application of finance. It is highly advantageous for a student's future career.

1.3.3 Difficulties

- The computer setup that was assigned to me was slow.

- Charm Limited integrates their internal software for financial inputs, which is completely distinct, to input data in financial statements. I had trouble utilizing it for the first week or two.

1.3.4 Recommendations

- **Organize at least one session about their Financial Software:** The finance department of Charm Limited is heavily intern-dependent and interns are treated as full-time employees. Which is when I joined, I had to learn the ropes quite quickly to keep up with the work pressure and that is why if there had been a small session about their internal software to manage financial statements of the company would have been fruitful.
- **Need to maintain a repair schedule for their computers:** The computer I was allocated to was very slow and hampered the workflow. But it is not only my allocated PC. I have noticed more or less every computer is in the same state and we need to call the IT department to fix the issue. And this happens quite frequently. So, if a repair schedule is maintained it would increase productivity.

Chapter 2

Organization Part

2.1 Introduction

CHARM LIMITED is a Change and Resource Management Company with experience in building, commodities production, trading, and environment engineering. Their aim is to establish itself as a preeminent "Environmental Management Company" that offers answers for all types of intricate pollution issues. They operate all around the nation in partnership with reputable foreign businesses. They use integrated and cutting-edge technology in the design, development, support, and promotion of sewage treatment facilities, drinking water treatment plants, and waste management applications.

2.2 Overview of the Organization

2.2.1 Company Background

A group of businesspeople from Bangladesh, Malaysia, Thailand, and Germany founded CHARM LIMITED in 2015 to address the environmental concerns that Bangladesh is currently facing and to offer the most environmentally friendly solutions to lessen those challenges. Charm Ltd. is currently focusing on sewage treatment and sludge removal in order to preserve Bangladesh's key waterbodies and environment. Initially, their focus was on reducing, recycling, and reusing industrial waste water, particularly in the textile sector. Numerous well-known national and international organizations encourage and assist them as they work toward their objective. Through their skills in engineering, building, and eco-friendly goods, they minimize Bangladesh's environmental difficulties and offer innovative sustainable solutions. They want to be in the vanguard of transforming Bangladesh's environmental sector, leading the way in establishing international standards for wastewater and water treatment, and promoting a more environmentally friendly future.

2.2.2 Company Purpose

- The company's motto is "EMPOWERING CHANGES FOR SUSTAINABLE BANGLADESH".
- To provide pioneer sustainable solutions and mitigate Bangladesh's environmental challenges through expertise in engineering, construction, and eco-friendly commodities.
- To forefront catalyst in revolutionizing Bangladesh's environment sector, setting global standards in water and wastewater treatment, and fostering a greener future.

2.2.3 Vision of the Company

Charm's nationwide operational and performance standards translate the corporate values into specific management expectations. They preserve a high level of business ethics characterized by integrity and honesty in all their business actions.

2.2.4 Mission of the company

Their mission is to provide value to its clients by offering engineering services, materials, building, industrial, and resource management project operations and management. Moreover, is to understand the needs of our clients and offer them the best solution that fits their needs both financially and practically.

2.2.5 Services of Charm Limited

Sewage Treatment Plant: In Bangladesh, Charm Ltd. is a top producer and supplier of packaged STP plants and MBR sewage treatment plants. Their goal is to protect the environment and public health by offering sewage treatment services that are dependable and effective. They have over ten years of expertise, which has made them an enviable name in the field. They give efficient and long-lasting solutions that satisfy their consumers' wants by utilizing cutting-edge technologies and procedures.

Effluent Treatment Plant: Charm Limited is a leading distributor of advanced Effluent Treatment Plants (ETP) in Bangladesh, offering reliable and innovative wastewater treatment solutions. Their systems are designed for smooth operation, user-friendly interfaces, and effective execution. They focus on water treatment process integration, offering adaptable designs, advanced technologies, and scalable solutions. Charm Limited is committed to affordability and environmentally responsible methods, and works closely with clients to ensure effective project outcomes.

Water Treatment Plant: Charm Ltd. is a leading provider of RO drinking WTP systems in Bangladesh, used in drinking water facilities, desalination of saltwater, and industrial effluent treatment. Their goal is to offer affordable and effective drinking WTP services, making them a competitive choice for companies looking to cut costs. They have experience with gravel media and multigrade sand, focusing on improving water quality for residential and industrial applications. Charm Ltd. emphasizes innovation and reasonably priced water treatment across various applications.

Sludge Treatment: In Bangladesh, Charm Ltd. ranks as one of the most prominent manufacturers of sludge solutions. By offering the best Amcon dewatering presses and Asher sludge composters, they concentrate on reinventing sludge processing and reusing sludge in Bangladesh, guaranteeing sustainable, effective, and environmentally friendly solutions for a cleaner future.

2.2.6 Organizations Under Charm Limited

2.2.6.1 Sister-Concerned Companies

REVENCO: In Bangladesh, REVENCO is a reputable provider of cleaning and security services. The subsidiary business was founded in March of 2016. They saw a chance to bring fresh, cutting-edge technology to the cleaning and security sectors. Their strategy is built on tried-and-true procedures, workers with expertise, and personnel. They provide a comprehensive range of cleaning and security solutions for small businesses, commercial office buildings, and institutional or industrial settings, both on a contract and on-demand basis. They cater to clients in the following industries: banking, real estate, construction, convention centers, government, sports venues, events, shopping malls, small and large businesses, manufacturing, and industry retail.

CCCL: Project management, engineering, procurement, and construction are all included in CCCL's services. Numerous airports, biotech parks, bridges and flyovers, car parking solutions, commercial buildings (such as auditoriums, banks, business centers, convention centers, food courts, malls, offices, public buildings, and show rooms), data centers, health care facilities, heavy civil structures, hotels and resorts, industrial and factory buildings, institutional buildings (such as dormitories, schools, colleges, hostels, libraries, and other institution-affiliated buildings), power plants, railroads and metros (Depo), research and development centers, and residential buildings are all to CCCL's credit.

Tizaraa.com*:* Tizaraa is a smooth and varied online buying experience. Tizaraa was founded in 2023 as a result of a passion for bringing customers and reliable vendors together worldwide to find high-quality products. The goal of Tizaraa is to empower buyers and sellers by offering a dependable and easy-to-use platform. Their goal is to establish a lively online marketplace where people can find one-of-a-kind items, form enduring relationships, and enjoy the convenience of simple transactions.

Colormatch BD*:* Colormatch first began its journey in the field of color-related technologies, offering the best possible outcome. With nearly 30 years of experience, Colormatch BD is a sales and services firm with a strong connection to the regional textile sector. They offer technical solutions for renewable energy, washing and pretreatment, and color management.

2.3 Management Practices of Charm Limited

2.3.1 Leadership Style

Charm Limited does not possess a certain style of leadership. Here, many leadership philosophies are applied based on the positions held by their employees' seniorities. The adopted leadership philosophies are as follows:

Laissez-Faire: Laissez-faire leadership is exhibited by senior leadership at the highest level. when assistant managers are given the majority of decision-making authority by general managers.

General managers trust their staff members to make their own decisions and complete tasks with minimal guidance.

Democratic Leadership: Democratic leadership is seen at all levels, from the assistant general manager to the senior manager or assistant manager. Assistant general managers encourage senior managers and assistant managers to share their ideas, thoughts, and opinions in order to build cooperation and a sense of ownership in the company's goal. This participation may lead to better customer service, happier employees, and higher-quality products.

Autocratic Leadership: Only the Managing Director has the authority to decide on important matters, such as assigning cash to projects or planning events. He is a self-governing individual who expects total compliance with his orders.

2.3.2 Human Resources Planning of Charm Limited

2.3.2.1 Human Resources Department

Charm Limited employs a small workforce, which means it doesn't have any HR practices. There aren't any team-based divisions within the Human Resource department, which explains the absence of team-based divisions within the department.

2.3.2.2 Human Resource Practice of Charm Limited

Charm Limited has less than 300 workers overall, yet their HR procedures are a little more thorough. Charm Limited is extremely selective when it comes to hiring new staff. Each team member is in charge of a separate operation. The procedure for HR is described below.

Recruitment & Selection Process: Recruitment is crucial for a company's talent strategy and competitive advantage. The HR department handles recruitment, selection, and onboarding, expanding the organization's pool of qualified candidates. Departments fill out Recruitment Request Forms, justify their requests, and review them before sending CVs to the HR department. Successful applicants are invited for interviews, and their joining dates are finalized a few days after the interview.

Compensation System: The Human Resources Department pays out compensation following an assessment of factors such as monthly attendance, tardiness, loans taken out, performance review, lunch cost, etc. Being on time is crucial when it comes to pay because employees who miss work at least three days a month are not compensated for one day's work. In addition, TA/DA bills, medical benefits, travel expenses, and mobile allowances are taken into account prior to determining compensation.

The Onboarding Process: Upon joining, employees undergo structured onboarding steps, including mandatory orientation, a 30-90-day plan, and proper training according to job description. This helps them understand company rules, culture, job responsibilities, and performance measures. Projects are currently being implemented to alleviate anxiety and ensure new employees feel comfortable learning.

The Offboarding Process: Charm Limited's HR division is always looking for ways to get better. Even though employee resignations are uncommon, when they do occur, a comprehensive exit interview is held. Employees who have acknowledged their reasons for leaving the company also provide candid opinions and suggestions for Charm Limited in this section. Every financial year, a thorough separation report is created in addition to the exit interview for monitoring purposes.

2.4 Marketing Practice in Charm Limited

1. Strategies Employed

Charm Limited advertises its services through different types of marketing. For instance, content marketing, advertising, influencer marketing, social media marketing, promotional strategies, event management, and online advertising are currently utilized. Services from Charm Limited, such as ETP, STP, WTP are regularly advertised on several platforms. Also, they have a well-known collaboration with foreign company of similar industry.

2. Targeting & Positioning

Since Charm Limited offers a limited range of services, their target clientele is made up of people with somewhat similar social classes, genders, lifestyles, and other characteristics. Customers in both the public and private sectors are their target market. Target clients in the private sector include businesses in the textile, apparel, healthcare, leather processing, hotel & resort, real estate, and educational sectors. In addition, their target audience includes numerous governmental agencies like as the Bangladesh Army, Navy, Air Force, Public Works Department, Coxs Bazar Development Authority, DNCC, LGED, WASA, and many more. Additionally, Charm Limited's target market consists of those who are directly involved in the task of treating water or who have the desire to take the initiative in promoting clean water.

3.Marketing Channels

Direct to Customer sales: Assisted by a committed marketing team that handles service projects and interacts directly with clients. Additionally, a tender team uses the E-GP website to look for projects all the time.

4. **Service development for reduced competition**

In this fast-changing world, buying trends and consumer demands are constantly changing. To cope in the competition, Charm Limited is committed to ongoing service development to satisfy the demands of the customers. To develop new modules and raise the caliber of current ones, the corporation makes R&D investments. In addition to using competitive strategies, Charm Limited also regularly checks the industry- related challenges. This helps the company to stay competitive and to hold its position as a major agricultural rival in Bangladesh.

5. Promotional Activities

To increase awareness of its services among its target market, Charm Limited devotes a lot of effort to promotion. They use a range of mediums, such as offline, online, and conventional media, to market. As part of their promotional operations, they collaborate with a third party to develop POSM and other promotional tools.

Standard Practices and Advertisements: Conventional media includes print media and electronic media. Newspapers, magazines, and pamphlets are considered to be the components of print media. Whereas, radio and television advertisements, billboard advertisements, banner commercials, and social media advertisements are relatively known as the components of electronic media. Businesses can utilize advertisements on each of these channels to reach consumers. For advertisement, Charm Limited didn't air their commercial on television, due to their desire to maintain a balance between supply and demand.

Advertisements on Billboards and other Mediums: This type of advertisement where the ad is placed on attractive billboards, light boxes, posters, festoons, X banners, press advertisements, and brochures are called point of sale materials. According to Law Insider, when a Placement, the moment at which a buyer of Placement Shares signed a legally binding agreement to buy such Placement Shares, is considered a Point of Sales. Items for the point-of- sale Ads are used specifically at points of sale to promote and draw attention to products and services. Charm Limited uses a range of point-of-purchase tools to entice customers, including festoons, X banners, press advertisements, brochures, etc.

7. Marketing Activities

Digital media, such as the Internet and social media, is a contemporary means for businesses to interact with clients. This is because news, information, and advertisements are displayed on these platforms despite the technological constraints of print and broadcast media.

Social Media & website Activation: Charm values digital marketing highly to reach its target audience and benefit from its simplicity. You may find out everything there is to know about their services by visiting www.charmbd.com. Charm Limited keeps its target demographic informed about new projects, new module developments, and other information via its Facebook page. They are also active on LinkedIn and Instagram.

8. Critical Marketing issues and gaps

Lack of Market Positioning & Differentiation: Charm Limited may face difficulty in standing out in a crowded market where many companies offer similar environmental services. Also, the company lacks of a unique value proposition that clearly distinguishes the company from competitors.

Lack of Digital Marketing Strategy: Charm Limited has underutilization of digital marketing channels like SEO, content marketing, and social media. Also, the company lacks behind in comprehensive digital media plan to enhance online presence and attract potential customers.

2.5 Financial Performance & Accounting Practices

2.5.1 Financial Performance

Table 1 Activity Ratio Analysis

Activity Ratios				
Ratios	**2019**	**2020**	**2021**	**2022**
Total asset turnover	**22.10%**	**12.22%**	**11.18%**	**14.97%**
Fixed asset turnover	**4.18**	**1.06**	**1.08**	**1.87**
Working capital turnover	**0.42**	**0.40**	**1.87**	**1.25**

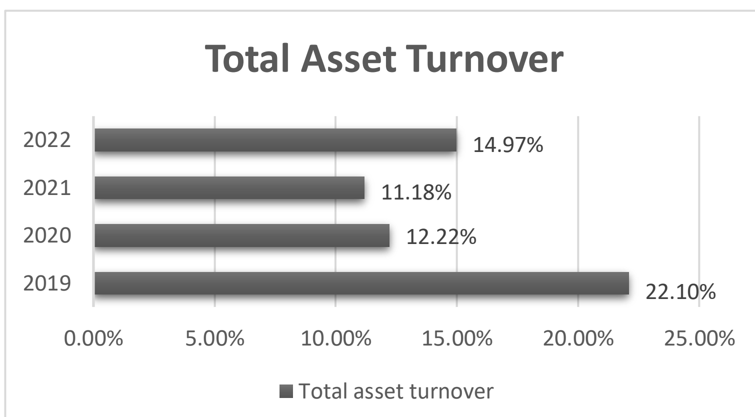

Figure 1 Total Asset Turnover

The graph shows the Total Asset Turnover ratio from 2019 to 2022, peaking at 22.10% in 2019. However, it declined significantly in 2020, then to 11.18% in 2021. In 2022, it slightly improved to 14.97%, but still below 2019, indicating a decline in the company's efficiency in using assets for revenue production, despite a minor recovery in 2022.

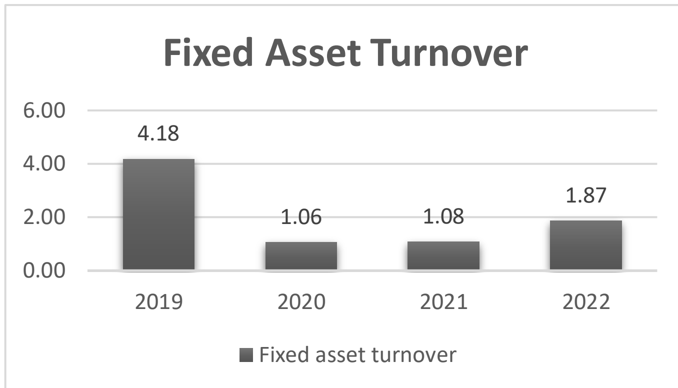

Figure 2 Fixed Asset Turnover

The graph shows a decline in the Fixed Asset Turnover ratio from 2019 to 2022, from a high of 4.18 in 2019 to 1.06 in 2020, and 1.08 in 2021. Despite some recovery in 2022, the ratio still fell short of the 2019 level, indicating a significant decrease in the company's efficiency in generating revenue from its fixed assets.

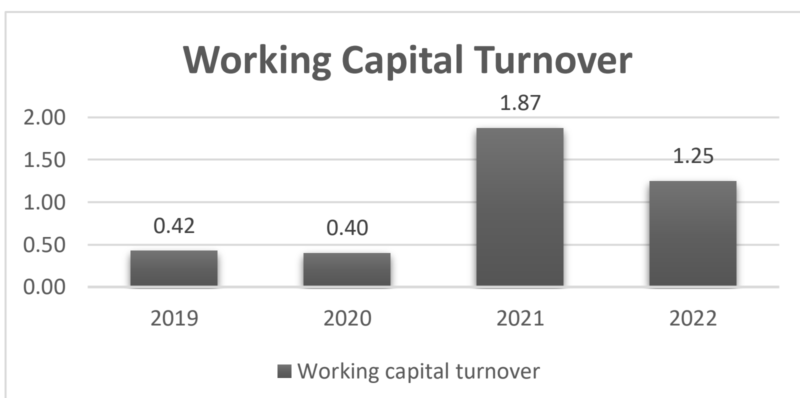

Figure 3 Working Capital Turnover

The graph shows a company's working capital turnover from 2019 to 2022. In 2019, it was 0.42, slightly decreasing to 0.40 in 2020. However, in 2021, it increased to 1.87, indicating a significant improvement in managing working capital for sales. In 2022, it declined to 1.25 but remained higher, indicating a significant improvement in working capital management over four years.

Table 2 Profitability Ratio Analysis

Profitability Ratio				
Ratio Type	**2019**	**2020**	**2021**	**2022**
Net profit margin	**12.9%**	**23.4%**	**15.4%**	**0.9%**
Gross profit margin	**99.4%**	**99.5%**	**99.9%**	**99.7%**
Operating profit margin	**46.1%**	**33.9%**	**36.8%**	**14.0%**
Return on asset	**2.8%**	**2.9%**	**1.7%**	**0.1%**
Cost to Income	**55.1%**	**82.1%**	**70.2%**	**89.5%**
Return on equity	**212.7%**	**129.0%**	**200.5%**	**14.5%**
Gross Profit to Asset	**22.0%**	**12.1%**	**11.2%**	**14.9%**

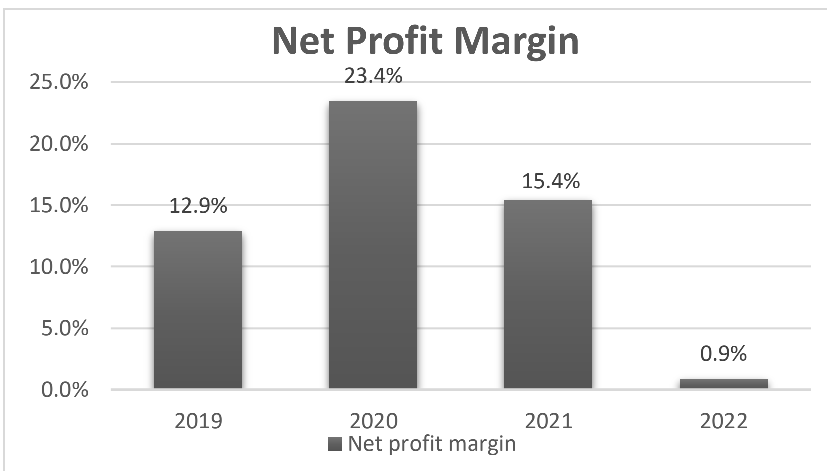

Figure 4 Net Profit Margin

The graph shows the Net Profit Margin from 2019 to 2022, showing a significant increase from 12.9% in 2019 to 23.4% in 2020. However, in 2021, it dropped to 15.4%, a significant decline from the previous year. By 2022, it dropped to 0.9%, indicating a severe financial downturn.

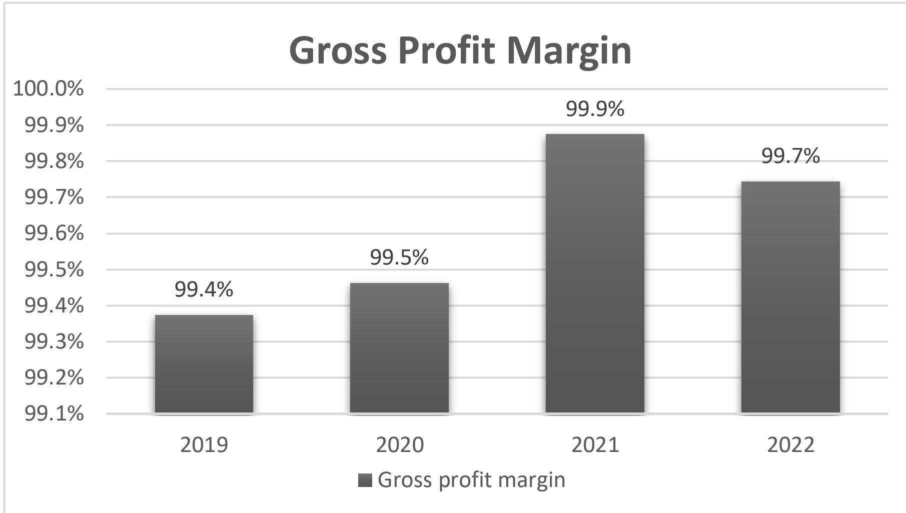

Figure 5 Gross Profit Margin

The graph shows the Gross Profit Margin from 2019 to 2022, showing a slight increase from 99.4% in 2019 to 99.5% in 2020 and a peak of 99.9% in 2021, indicating efficient cost management. Despite a slight decline to 99.7% in 2022, the margins remain high, indicating effective control over costs.

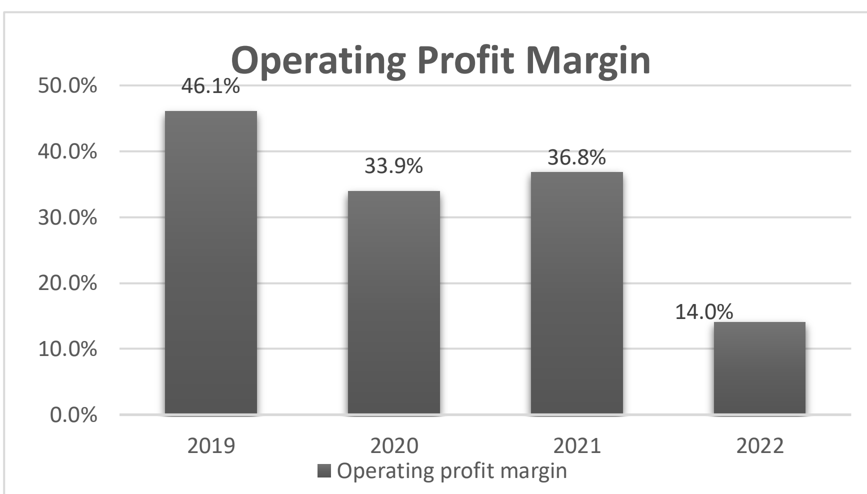

Figure 6 Operating Profit Margin

The bar chart shows a downward trend in the Operating Profit Margin from 2019 to 2022, with a peak of 46.1% in 2019, indicating a profitable period. The margin dropped to 33.9% in 2020, with a slight recovery in 2021, but a significant drop to 14.0% in 2022, indicating operational difficulties or increased costs impacting profitability.

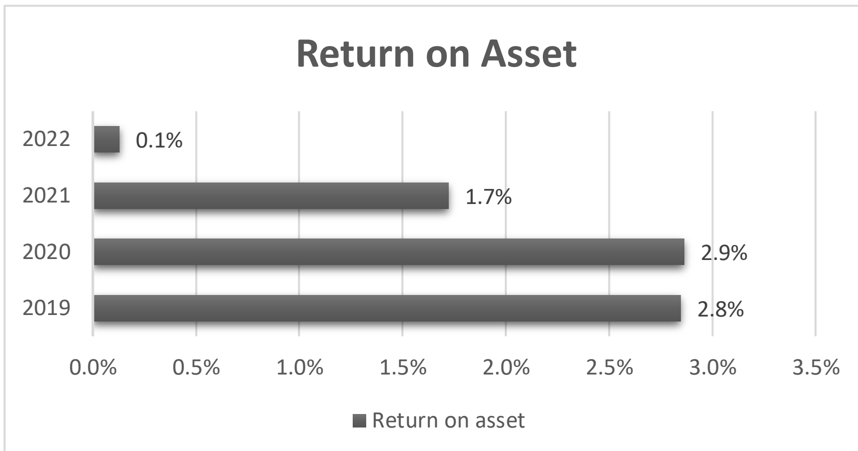

Figure 7 Return on Asset

The graph shows a significant decline in Return on Assets (ROA) from 2019 to 2022, from a high of 2.8% in 2019 to a drop of 1.7% in 2021 and a drastic drop to 0.1% in 2022, indicating a decrease in asset utilization efficiency and potential operational performance challenges.

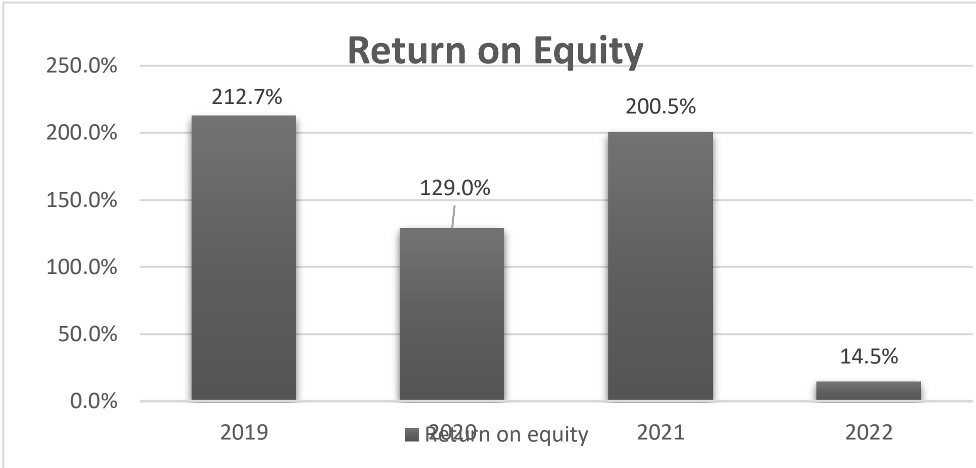

Figure 8 Return on Equity

The graph shows a company's Return on Equity (ROE) from 2019 to 2022, showing a high of 212.7% in 2019, indicating strong profitability. However, in 2020, the ROE dropped to 129.0%, indicating challenges. In 2021, it rebounded to 200.5%, indicating effective management strategies or favorable market conditions. In 2022, it plummeted to 14.5%, indicating operational issues, increased costs, or decreased profitability.

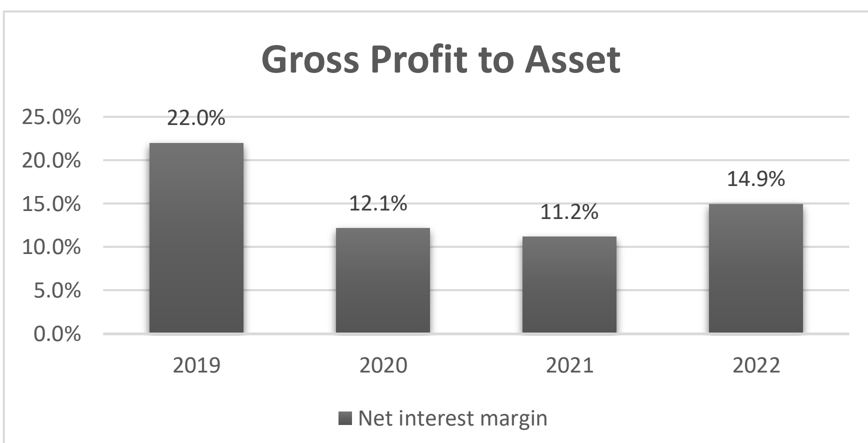

Figure 9 Gross Profit to Asset

The graph "Gross Profit to Asset" shows a significant decline in net interest margin from 22.0% in 2019 to 12.1% in 2020, 11.2% in 2021, and a recovery to 14.9% in 2022, indicating a period of volatility and recovery in profitability over four years.

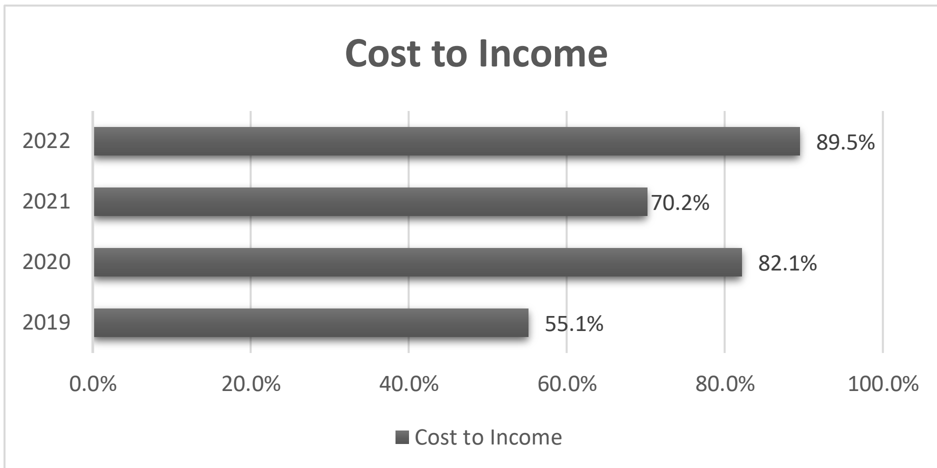

Figure 10 Cost to Income

The graph shows a rising Cost to Income ratio from 2019 to 2022. In 2019, it was 55.1%, with over half of the company's income used to cover costs. In 2020, it increased to 82.1%, indicating a significant increase in costs. In 2021, it decreased to 70.2%, suggesting better cost management. In 2022, it reached 89.5%, indicating higher expenses.

Table 3 Liquidity Ratio Analysis

Liquidity Ratio				
Ratio	**2019**	**2020**	**2021**	**2022**
Cash ratio	**6.72**	**3.30**	**1.66**	**2.47**

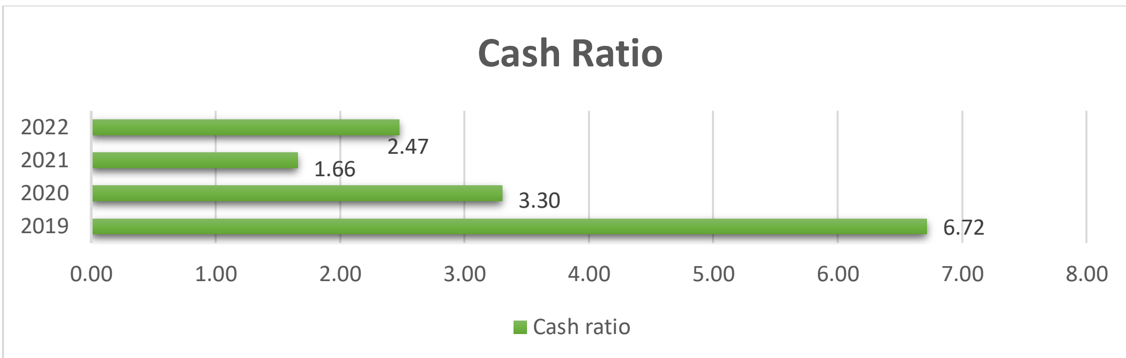

Figure 11 Cash Ratio

The graph shows a significant decrease in the company's cash ratio from 2019 to 2022, with a high ratio of 6.72. This indicates a strong liquidity position, but less so than the previous year. In 2021, the ratio declined to 1.66, indicating a balanced position. By 2022, it slightly rose to 2.47, indicating a slight recovery.

Table 4 Slovency Ratio Analysis

Solvency Ratio				
Ratio	**2019**	**2020**	**2021**	**2022**
Debt to asset	**0.12**	**0.18**	**0.10**	**0.18**
Debt to equity	**9.14**	**7.89**	**11.46**	**11.89**
Financial leverage	**74.73**	**45.07**	**116.42**	**111.96**

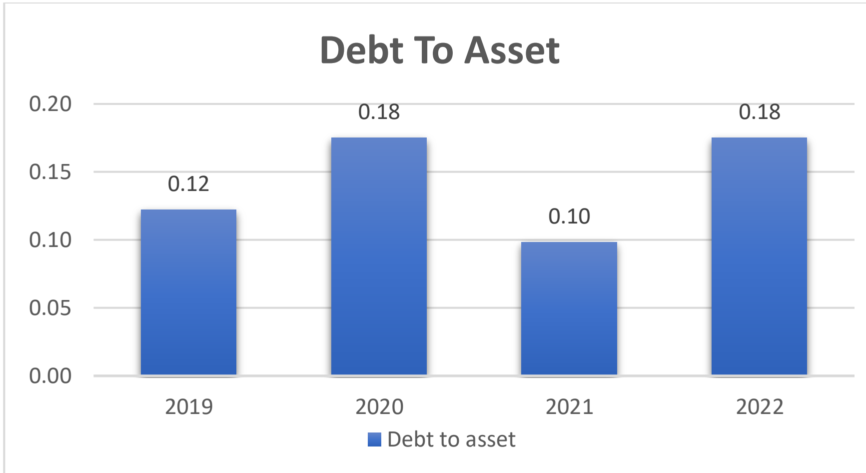

Figure 12 Debt to Asset

The graph shows the Debt to Asset ratio from 2019 to 2022, showing a fluctuation of 12% of the company's assets being financed through debt. In 2020, the ratio increased to 0.18, indicating a higher reliance on debt financing. In 2021, it decreased to 0.10, but in 2022, it rose to 0.18, indicating varying levels of debt financing.

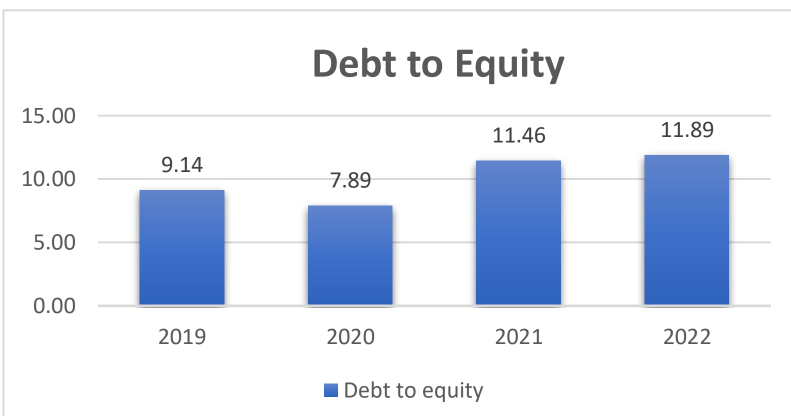

Figure 13 Debt to Equity

The graph shows a high debt-to-equity ratio from 2019 to 2022, with a decrease in 2020 to 7.89. However, it rises to 11.46 in 2021 and 11.89 in 2022, indicating a growing reliance on debt for growth or operations, but also posing higher financial risk due to the increased debt burden.

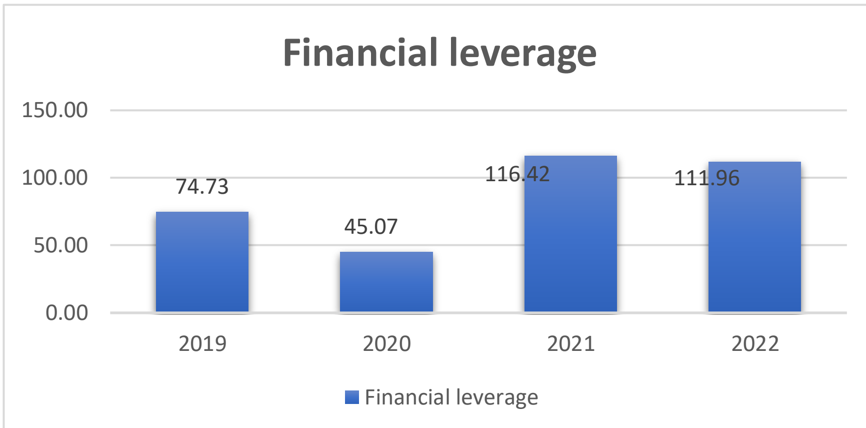

Figure 14 Financial Leverage

The graph shows financial leverage from 2019 to 2022, showing a moderate debt-to-equity ratio. In 2020, it decreased to 45.07, indicating a reduction in debt or equity. In 2021, it surged to 116.42, indicating a significant increase in debt or decrease in equity. In 2022, it slightly decreased to 111.96, indicating significant fluctuations in debt use.

6. Economic Value Added (EVA) & Market Value Added (MVA) Analysis

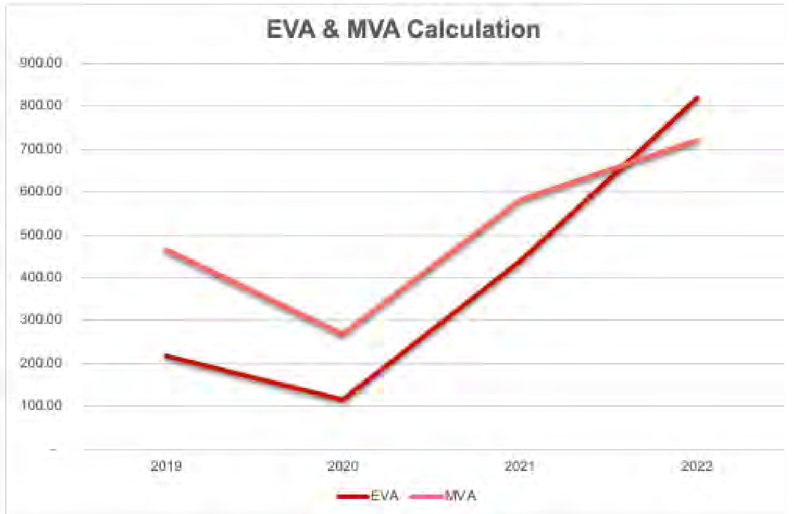

Figure 15 EVA & MVA

The graph shows a downward trend in Economic Value Added (EVA) and Market Value Added (MVA) from 2019 to 2022, indicating a decrease in the company's financial performance and market value. From 2020, both metrics significantly increased, reaching their highest points by 2022. MVA consistently outperforms EVA, indicating a positive market valuation beyond economic value added.

2.5.2 Accounting Practices

Charm Limited ensures consistency, relevance, and dependability in its financial reporting by adhering to IFRS and BFRS fundamental accounting standards. The accrual basis of accounting records revenues and expenses, providing a comprehensive understanding of the business's finances. The company follows every phase of the accounting cycle, from trial balances to transaction identification, and depreciates fixed assets using a straight-line technique. Comprehensive disclosures in financial filings enhance transparency and stakeholder confidence.

2.6 Operations Management and Information System Practices

Charm Limited, a leading environmental company, prioritizes data framework techniques and operations management to ensure sustainability and quality. Their Enterprise Resource Planning (ERP) system enables real-time supply chain management and monitoring, incorporating natural management frameworks like ISO 4001 to ensure environmental sustainability. The company uses two Websnit-designed servers for real-time supply chain monitoring, financial data entry, computations, and financial statement creation, and server number 8, used for Revenco. Their success in a rapidly changing industry is attributed to their focus on continuous development, quality assurance, and innovation. The ERP server, created by Websnit, supports knowledge development and maintainability, ensuring Charm Limited's competitiveness in the rapidly evolving business landscape.

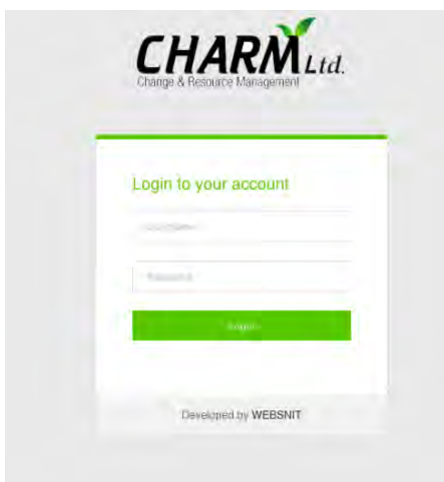

Figure 16 Charm Limited Software

2.7 Industry & Competitor Analysis

2.7.1 Porter's Five Forces Model

To identify and analyze the strengths and weaknesses of any particular organization, Porter’s Five Forces model can be used. Porter's Five factors model identifies and evaluates the five competitive aspects that impact every given industry. An analysis of Charm Limited using Porter's Five Forces is shown below.

Threat of New Entrants: The Water Treatment Plants (WTP) projects need a huge amount of capital. So, there is a less chance of new entrance in the market. Conversely, Charm Limited has enormous economies of scale that makes it difficult for contemporary competitors to compete successfully in Bangladesh and its cutthroat industry. That’s why the threat of new entrants is considered to be low here.

The threat of Substitute: Though Charm Limited is well-recognized in Water Treatment Plant area, but the company faces fierce competition and numerous substitutes in the environment sectors. Aside from that, even if Charm Limited's STP has created a hype in Bangladesh, imported modules, like Johkasou, that are brought in from outside the nation may be seen as alternatives or threats. Because of this, the company views the threat of substitute as high.

Buyer’s Bargaining Power: Due to not having the large number of buyers and, customers do not have direct bargaining power. However, Charm Limited may have significant negotiating power over conditions and prices due to its devoted customer base. Thus, in this case, the buyer’s bargaining power is deemed to be minimal.

Supplier's Bargaining Power: In the environment industry, provider arranging control is usually insufficient due to the medium number of suppliers of supplies. Conversely, Charm Limited has cultivated ties with its suppliers and could be able to leverage these relationships to secure favorable terms in negotiations. Consequently, in this scenario, the supplier has limited negotiating power.

Industrial Rivalry: Several prominent competitors are operating in the environmental sector, making it a fiercely competitive business. In addition to, the differentiation of Charm Limited's service is not that much high. That is why rivalry with this company is more intense in Charm Limited.

2.7.2 SWOT Analysis

STRENGTHS:

- **Diverse Team Skills:** Charm Limited benefits from a team with a broad variety of expertise, allowing for innovative solutions and flexibility in tackling various environmental challenges.
- **10 Years of Experience:** More than a decade of experience has provided Charm Limited with profound industry knowledge, client trust, and operational maturity.
- **Motivated and Synergized Teams:** High levels of motivation and collaboration among teams in Charm Limited contribute to increased productivity and a positive workplace culture.
- **Lower Employee Turnover:** Charm Limited's retention of employees reduces recruitment costs, maintains continuity, and preserves institutional knowledge.

- **Foreign Collaborators:** Partnerships with international entities such as Daiki Axis Co., Mitshubishi Chemical Group, Lackby, Amcon, and others provide diverse perspectives, advanced technologies, and potential for global market expansion.

WEAKNESS:

- **Irregular Board Meetings:** Inconsistent meetings of Charm Limited may result in a lack of cohesive direction, delayed decision-making, and inefficient governance.

OPPORTUNITIES:

- **Networking:** Building strong industry connections can lead to new partnerships, increased visibility, and business development opportunities.
- **Government subsidies:** Access to subsidies can reduce operational costs, support research and development, and enhance competitiveness.
- **Investment Opportunities:** Attracting investors can provide the necessary capital for expansion, innovation, and scaling operations.
- **Market Credibility:** A strong market reputation can attract high-quality clients, partners, and employees, boosting overall growth prospects.
- **Professional Growth:** Offering opportunities for professional development can enhance employee satisfaction, retention, and attract top talent.

THREATS:

- **Lack of External Funding:** Difficulty in securing external funds can hinder growth, limit project execution, and reduce financial stability.

- **Unstable Business Environment:** Economic instability can impact operations, increase costs, and reduce market demand.
- **Change in Government Policies:** Regulatory changes can affect compliance requirements, operational costs, and market opportunities.
- **Inflationary Trends:** Rising product and service costs can compress profit margins, making it difficult to maintain competitive pricing.
- **Strong Competitors in the Same Industry:** Intense competition can lead to price warfare, reduced market share, and pressure to innovate continuously.

2.8 Recommendations

- To remain competitive, Charm Limited should give their R&D department more attention.
- They need to project the expansion of the Sewage Treatment Plant Modules in the future as Government making it mandatory for each building having 5 storied or above.
- They need to sponsor shows as well as many other sponsorships. Such as when they sponsor a cricket series in Bangladesh. They can greatly expose themselves in this way.
- Influencers should be used to promote their service. The influencer market is currently in the lead. Teenagers adore seeing their favorite public figures or influencers on social media. If their favorite influencer is promoting the services, they will be curious to learn more about them.

2.9 Summary

Importing WTP modules, purchasing raw materials, installing, and other related activities are all part of Charm Limited's business operations. The importing Division of Charm limited import modules for service setup, and the service implementing divisions place modules in the project areas. The most recent advancements are incorporated with the foreign collaborator, Daiki Axis to make ETP, STP modules in the country. Also, the company has assigned a separate maintenance unit to constantly look into the modules whether working or not properly to guarantee a quality level-maintained pollution control board norm. In addition to growing its primary business of providing water treatment services, Charm has now entered the sludge treatment process.

All things considered, it is a vibrant and innovative venture firm that has revolutionized the growth of Bangladesh's agricultural industry. It is one of Bangladesh's top listed environmental companies, enjoying great market share and recognition as a reputable organization in water treatment sectors. It has kept its place in the market by consistently innovating and adjusting to shifting developed services. It places a high value on quality control and sustainability in its operations.

Chapter 3

Project Part

Measuring Credit Risk: A Quantitative Analysis of Credit Performance & CRM Testing

3.1 Introduction

Charm Limited is an overarching company that manages numerous subsidiary businesses. Up to now, Charm Limited and its sibling companies have completed over 3,000 projects. There are two ways that Charm Limited creates credit risk: (1) credit sales; and (2) loans. Charm Limited, a lending company, has the ability to draw in new clients while keeping hold of current ones. It is beneficial. Customers of Charm are usually given credit sales, allowing them to pay for the provision of products and services at a later time. Credit sales help them establish enduring connections with customers who might potentially utilize other services the business provides. According to Adamko, Birtus, and Kliestik (2014), credit sales are a standard feature of an economy that runs smoothly. In addition to credit sales, Charm offers loans to businesses or well-known people with whom they have already done business. Lending money to them enables them to develop a reputation and track record in the marketplace. Future borrowing and investment opportunities may benefit from this. Strict credit procedures are required, regardless of whether the transaction is a loan or a credit sale. According to Kliestik (2013), establishing credit policies can be included in the purview of credit risk management. Sometimes the hardest thing to do is to create a culture of respect and credit policy in general. Effective corporate credit risk management is important to them since they extend credit more frequently. When a corporation manages its credit risk well, they take advantage of financial leverage to expedite commercial operations.

Financial risk assessment and management are critical to the operations and financial health of small and medium-sized enterprises (SMEs), as noted by Stan-Maduka (2013). According to Kozubíková et al. (2017), financial risk is regarded as one of the most significant categories of risk in this particular context since it has the potential to significantly impact a company's liquidity when substantial financial risk-taking occurs. Better cash flow management at Charm Limited is a result of an effective CRM. Customers that pay their bills on time and steer clear of high-risk clients help the business minimize losses, retain sound strategic decision-making, and eventually develop and expand.

3.1.1 Background of the Research

The method of managing credit risk involves minimizing losses by determining if an organization's capital and loan loss reserves are sufficient at any given time. This has always been a difficult task for all kinds of businesses. There are clear specifics in the SME lending process, and credit risk research is an essential component of every credit procedure in an organization. Because of the financial crisis and the higher capital requirements for banks, it is more important than ever to monitor these processes (Corazza, Funari, & Gusso, 2016; Yahaya, Mansor, & Bakar, 2016; Psillaki & Eleftheriou, 2014). The company must control both the risk associated with individual credit or transactions and the exposure to credit risk that is inherent in the overall portfolio. A thorough approach to risk management must include the efficient management of credit risk, which is crucial for any firm to succeed in the long run. Furthermore, according to Tripp et al. (2008), CRM enables businesses to better respond to risk and match their strategy with their risk appetite, both of which lower losses. Companies can thus achieve a better long-term performance trade-off (Bohnert et al., 2019; Farrell & Gallagher, 2015; Lechner & Gatzert, 2018). The senior management of financial institutions should create and approve credit policies and credit administration procedures as part of credit risk management in order to set up a framework for credit risk management. Three key jobs are likely carried out by Charm Limited in practice: (1) Lending rules; (2) Credit Assessment Process; and (3) Approval Authority with the intention of safeguarding their balance sheets and preserving the stability of their business.

3.1.2 Literature Review

This section of the report reviews the literature that has already been written about credit risk management in businesses and how it has impacted productivity.

According to Heffernan (1996), credit risk is the possibility that a loan or asset would be lost entirely in the event of an outright default, or the possibility that loan servicing would take longer than expected. Either way, the asset's present value decreases, jeopardizing a bank's ability to remain solvent. Credit risk is crucial since a few major clients' default can result in significant losses and ultimately lead to insolvency. The success of banks' operations is largely dependent on the precise measurement and effective management of credit risk, which is by far the biggest risk they face (Giesecke, 2004).

The inability or unwillingness of a counterparty or client to fulfill obligations in connection with lending, trading, hedging, settlement, and other financial transactions is known as credit risk, sometimes known as default risk. Uncertainty about the counterparty's capacity or willingness to fulfill its contractual obligations gives rise to credit risk. A deterioration in the counterparty's credit standing is included in Basis (1998) as a component of credit risk. Credit risk management includes all monitoring and reporting procedures in addition to the decision-making process that takes place prior to granting credit as well as the follow-up on credit obligations (Miller, 1996).

The simplest definition of credit risk is the possibility that an organizational borrower or counterparty won't fulfill its commitments according to the terms set forth. By keeping credit risk exposure within reasonable bounds, credit risk management seeks to optimize a company's risk-adjusted rate of return. Both the risk associated with individual credits or transactions and the credit risk present in the entire portfolio must be managed by businesses. Businesses must also take into account how credit risk is related to other hazards. A comprehensive approach to risk management must include excellent credit risk management as a key component, as it is vital to the long-term viability of any corporate enterprise. (The Basel Committee on Supervision of Banking, 1999) Setting up a suitable CR environment, following a reliable credit-granting procedure, keeping up a suitable credit administration system that includes a monitoring procedure, and having sufficient controls over credit reporting are all necessary for effective CRM. (Greuning and Bratanovic, 2003; IAIS, 2003; Basel, 1999)

Top management must make sure that appropriate and unambiguous guidelines are in place for managing customer relations (CR), that these guidelines are effectively disseminated throughout the business, and that all parties involved in CRM are aware of and comply with them. A solid CRM system is built on a foundation of policies and strategies (guidelines) that precisely define the extent and distribution of bank credit facilities as well as the processes involved in managing a credit portfolio, such as loan origination, appraisal, supervision, and collection (Basel, 1999; Greuning and Bratanovic, 2003).

Monitoring entails, among other things, keeping in regular contact with borrowers, fostering an atmosphere in which the bank is perceived as a problem solver and a reliable advisor, and cultivating a culture of support for borrowers who are identified as having difficulties and are making an effort to resolve the situation. monitoring the borrower's business activities, going over their reports, keeping track of updates to their credit files, and occasionally checking the rating that was given to them when they were first given credit (Donaldson, 1994; Treacy and Carey, 1998; Tummala and Burchett, 1999; Mwisho, 2001).

According to Marphatia and Tiwari (2004), risk management is essentially about people and how they think and interact with each other.

Leopoulos et al. (2006) state that SMEs should make controlling credit and financial risk an integral component of their daily operations. The writers provided clear, numerical instruments for effectively managing it (Kulišauskas, Galinienė, 2015; Tamulevičienė, 2016).

3.1.3 Research Objective

3.1.3.1 Specific Objectives

- To measure probability of default for Charm Limited's customers
- To analyze financial stability from the year 2019-2024 of Charm
- To analyze key credit performance indicators that impact credit risk.

3.1.4 Significance

By controlling credit risk exposure to the risk present in each individual credit and transaction as well as the risk inherent in the total portfolio, credit risk management seeks to optimize a company's risk-adjusted rate of return. A corporation must manage credit risk so that it does not spiral out of control because it is impossible to completely eliminate all risk. Therefore, controlling those risks effectively is the only way out. Identification, measurement, matching, mitigation, monitoring, and control of the credit risk exposure are all included in credit risk management to ensure that:

- Those who accept or manage risk have a clear understanding of it.
- The risk exposure of the organization is within the boundaries established by the Board of Directors (BOD) in relation to the industry, group, and nation's current circumstances.
- Decisions on accepting risks should be clear and thorough, and they should be backed by the business strategies and regulations established by the BOD.
- Anticipated rewards offset the risks assumed.
- There is enough money to assume the risk.
- Poor risk management might result in significant expenses for the business.

3.2 Methodologies

3.2.1 Collection of Data

For the creation of this study, primary and secondary data sources were consulted. Observations made while working at various workstations and casual conversations with professionals serve as primary data sources. Charm Ltd.'s annual reports, manuals, and brochures are the secondary data sources. Examining the financial statements, notes to financial statements, and credit risk management information found in the company's annual reports is necessary for my study.

3.2.1.1 Secondary Source

- Secondary data:

  1. Annual reports from 2019-2022

2. Charm Limited's Accounting & Finance Software
3. Different files related to topic

3.2.2 Variables

For this experiment, two variables have been selected. Out of these, one is the independent variable and the other is the dependent variable.

a) Dependent variable: Default (D) is a binary indicator used in credit risk analysis to represent a customer's credit status. A '0' indicates good credit standing, while a '1' indicates default, indicating failure to repay debts and higher credit risk. This variable is crucial in predictive models to assess and manage default likelihood, allowing institutions to make informed decisions about lending and risk management.

b) Independent variable: Credit risk analysis relies on the variables of leverage (X1), profit margin (X2), and current ratio (X3). High leverage indicates greater debt reliance, while higher profit margins indicate better profitability and financial health. The current ratio measures a company's short-term liquidity and ability to meet obligations. High leverage can increase financial risk, potentially leading to lower profit margins due to higher interest expenses, and a weaker current ratio may indicate liquidity issues, impacting a company's creditworthiness and risk profile.

3.3 Findings & Analysis

3.3.1 Research Outcome

3.3.1.1 Regression Analysis

The regression analysis that was conducted is concentrated on evaluating the expected loss for Charm Limited based on data from previous projects undertaken by the company. This analysis seeks to identify and quantify the relationship between various financial metrics and the company's expected loss, helping in improved financial forecasting and risk management.

This analysis examines several critical financial ratios and metrics. The formulas used for these metrics are as follows:

1. Leverage: This metric is critical in comprehending the company's financial structure and is calculated as:

Leverage = Debt/Total Equity

A high leverage ratio impacts the possibility that a business won't be able to pay off its debt since it shows that there is a lot of debt relative to equity. When a business is highly leveraged, it may be more difficult for it to pay off debt and make interest payments, especially during bad economic times. On the other hand, a low leverage ratio implies that the business is less dependent on debt, which lowers the credit risk.

2. Net Profit Margin: This ratio provides insights into the company's profitability. Net Profit Margin is computed as:

Net Profit Margin = Net Profit/Revenue *100

A company that has a higher net profit margin is likely profitable and makes sufficient revenue to pay all of its costs, including debt repayment. A corporation's inability to maintain profitability may be indicated by a lower or declining net profit margin, which raises credit risk because the company might not be able to generate enough cash flow to pay down debt.

3. Current Ratio: This liquidity ratio analyzes the company's ability to cover short-term liabilities with short-term assets. Current Ratio is calculated as:

Current Ratio = Current Assets/Liabilities

An organization is better positioned to pay down short-term debts if its current ratio is greater than 1, which shows it has more current assets than liabilities. A ratio less than one suggests that the business may have trouble paying short-term debts, which raises the credit risk. Strong liquidity means that a company can pay off its debts quickly, which makes it less hazardous.

The regression model incorporates these metrics to predict the expected loss by analyzing historical data from Charm Limited's past projects. By establishing relationships between these financial indicators and the expected loss, the company can more precisely estimate potential financial risks and make informed strategic decisions.

Table 5 Calculations for Regression Analysis

Default (D)	Leverage (X1)	Net Profit Margin (X2)	Current ratio (X3)
0	0.93	2.14	1.78
0	2.89	1.20	0.57
0	2.75	1.12	3.09
1	2.46	0.82	0.32
0	1.97	2.01	0.45
0	1.10	1.45	0.22
0	2.83	1.34	2.03
1	0.15	0.76	1.56
0	0.62	3.14	2.25
0	1.87	2.38	0.99
0	2.55	1.32	0.37
1	2.68	0.70	3.22
0	0.50	2.92	1.21
1	2.20	0.64	1.78
0	0.18	2.94	2.03
1	0.76	0.93	2.14
0	3.14	1.10	1.45
0	1.10	2.55	1.87
0	1.43	2.12	1.67
0	0.50	1.09	1.10
1	0.60	0.11	0.62
0	0.87	1.90	1.87
0	1.79	2.83	2.55
1	1.30	0.68	0.70
1	0.18	0.93	0.22
0	0.48	1.97	2.25
0	2.55	2.20	0.50
0	1.01	2.14	3.25
0	1.17	1.20	0.89
0	1.64	1.12	0.97
1	1.56	0.93	1.72
0	0.29	2.89	2.54
1	1.87	0.27	1.88
1	1.00	0.22	0.50
0	1.59	2.25	1.26
0	0.26	2.14	2.98
0	1.20	1.12	3.09
0	1.45	2.94	2.03
0	1.32	1.78	1.12
1	0.50	0.22	0.18

0	2.55	2.03	1.56

3.3.3 Methods

3.3.3.1 Linear Regression Analysis

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.753440546
R Square	0.567672656
Adjusted R Sq	0.530616027
Standard Error	0.312331211
Observations	39

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	4.483158413	1.494386138	15.31905801	1.56879E-06
Residual	35	3.414277484	0.097550785		
Total	38	7.897435897			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.102661876	0.167307676	6.590623361	1.29796E-07	0.763009237	1.442314515	0.763009237	1.442314515
X1	-0.12433191	0.060415343	-2.057952535	0.047102183	-0.24698157	-0.00168224	-0.24698157	-0.00168224
X2	-0.41948269	0.063611958	-6.594399877	1.28332E-07	-0.54862182	-0.29034355	-0.54862182	-0.29034355
X3	0.015263629	0.058408562	0.261325195	0.795373411	-0.10331206	0.133839314	-0.10331206	0.133839314

Figure 17 Linear Regression Analysis

Interpretation

The Credit Risk Analysis model has a strong positive correlation between observed and predicted values, with approximately 56.77% of variability explained by the independent variables Leverage (X1), Profit Margin (X2), and Current Ratio (X3). The ANOVA table shows a statistically significant model, with Leverage having a negative impact on Credit Risk (coefficient = -0.1243, $p = 0.0471$) and Profit Margin having a significant negative impact (coefficient = -0.4149, $p < 0.0001$). However, the Current Ratio (X3) has a small positive coefficient (0.0153) but is not statistically significant ($p = 0.7953$), indicating that changes in the Current Ratio do not have a meaningful impact on Credit Risk within this model. The intercept of 1.1027 is significant, indicating the baseline level of Credit Risk when all predictors are zero. Overall, the model is effective in explaining Credit Risk, with significant contributions from Leverage and Profit Margin, but not from the Current Ratio.

Summary

The model explains 56.77% of credit risk variability, with leverage and profit margin having significant negative impacts. As these variables increase, credit risk decreases. Current ratio does not significantly impact credit risk. The overall model is significant, as indicated by F-statistic and p-value.

3.3.3.2 Expected Loss Analysis

Table 6 Probability of Default, P(D)

Intercept	B1	B2	B3
1.10266188	-0.1243319	-0.419482685	0.01526363

New Customer	Leverage	Profit margin	Current Ratio	Score	P(D)
	X1	X2	X3		
A	0.10	2.13	1.10	0.213520557	45%
B	1.58	0.16	3.29	0.889317572	29%
C	0.68	2.64	1.94	-0.05970667	51%
D	3.14	1.10	1.45	0.272960995	43%
E	1.10	2.55	1.87	-0.075241084	52%
G	1.43	2.12	1.67	0.061054216	48%
H	0.50	1.09	1.10	0.600049787	35%
I	0.60	0.11	0.62	0.991383087	27%
J	0.87	1.90	1.87	0.226019001	44%
K	1.79	2.83	2.55	-0.268105984	57%
L	1.30	0.68	0.70	0.666466711	34%
M	0.18	0.93	0.22	0.693521234	33%
N	0.48	1.97	2.25	0.250944836	44%
O	2.55	2.20	0.50	-0.129614581	53%
P	1.01	2.14	3.25	0.129000497	47%
Q	1.17	1.20	0.89	0.467398952	39%
R	1.64	1.12	0.97	0.443742661	39%
S	1.56	0.93	1.72	0.544838645	37%
T	0.29	2.89	2.54	-0.10692972	53%
U	1.87	0.27	1.88	0.785596507	31%

V	1.00	0.22	0.50	0.893675593	29%
W	1.59	2.25	1.26	-0.019629726	50%
X	0.26	2.14	2.98	0.218128248	45%

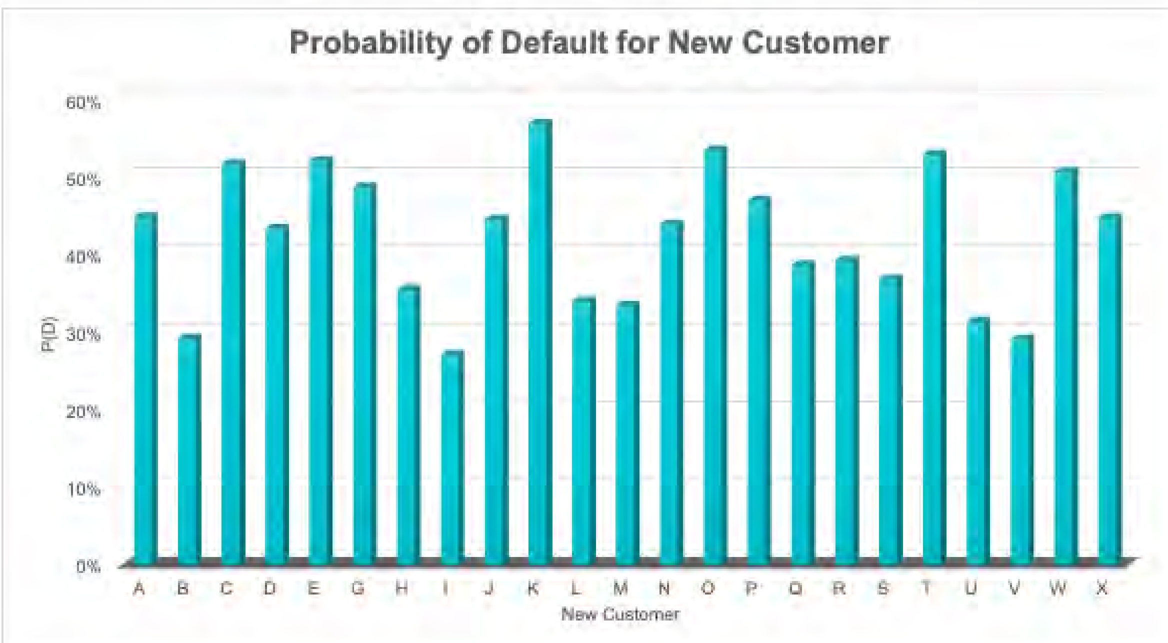

Figure 18 P(D) of New Customer

The graph shows the probability of default for new customers, with most having a probability between 30% and 60%. Customers G, K, M, and P have the highest probabilities, each exceeding 50%, indicating significant risk. Customers B, H, R, S, T, and V have lower probabilities, ranging from 20% to 40%. This diversity highlights the varying risk levels associated with different new customers, requiring tailored risk management strategies.

Table 7 Expected Loss (EL)

Credit Details	EAD	PD	LGD	EL
A	534,900.00	45%	25%	59,751.24
B	3,543,800.00	29%	10%	103,213.41
C	4,876,500.00	51%	12%	301,322.19
D	1,052,400.00	43%	16%	72,772.25
E	536,700.00	52%	58%	161,495.61
G	3,333,000.00	48%	38%	613,944.10
H	4,504,648.00	35%	49%	782,109.73
I	2,419,300.00	27%	43%	281,545.46
J	3,753,964.00	44%	23%	383,125.63
K	4,660,400.00	57%	16%	422,514.00
L	5,215,500.00	34%	42%	743,214.75
M	2,168,300.00	33%	29%	209,550.07
N	4,143,900.00	44%	68%	1,233,066.55
O	4,574,100.00	53%	21%	511,362.68
P	2,281,700.00	47%	28%	298,862.69
Q	2,205,200.00	39%	18%	152,912.47
R	582,000.00	39%	36%	81,890.79
S	4,469,100.00	37%	9%	147,639.60
T	1,164,503.00	53%	28%	171,738.52
U	4,760,140.00	31%	17%	253,380.08
V	4,058,750.00	29%	23%	271,047.13
W	786,500.00	50%	11%	43,682.05
X	5,331,640.00	45%	13%	308,908.86

Figure 19 EL

The "Expected Loss Calculation" graph displays the estimated loss values for different credit details, labeled A through X. The values exhibit significant variability, with some credit details showing minimal losses (e.g., B, C, D) and others indicating much higher losses. Notably, credit detail N has the highest expected loss, exceeding 1.2 million, while G and K also present substantial losses, each around 600,000. Other credit details such as L, O, and Q have moderate expected losses, ranging between 400,000 to 800,000. The rest of the credit details reflect relatively lower expected losses, highlighting the disparate risk profiles across different credit entities.

3.3.3.3 Altman Z-Score Model

Table 8 Altman Z-Score Model Calculations

Altman Z-Score

Model Assumptions		Year 2022		Year 2021		Year 2020		Year 2019
Current Assets	BDT	971,292,632.50	BDT	660,569,498.00	BDT	200,648,335.00	BDT	253,821,974.00
Less: Current Liabilities	BDT	114,313,640.35	BDT	79,541,505.00	BDT	43,132,018.00	BDT	37,671,040.00
Working Capital	BDT	856,978,992.15	BDT	581,027,993.00	BDT	157,516,317.00	BDT	216,150,934.00
Current Assets	BDT	971,292,632.50	BDT	660,569,498.00	BDT	200,648,335.00	BDT	253,821,974.00
Plus: Fixed Assets	BDT	104,930,541.93	BDT	147,316,325.00	BDT	45,643,773.00	BDT	54,301,578.00
Total Assets	BDT	1,076,223,174.43	BDT	807,885,823.00	BDT	246,292,108.00	BDT	308,123,552.00
Retained Earnings	BDT	960,520,441.00	BDT	706,028,305.00	BDT	196,108,769.00	BDT	238,281,692.00
Sales	BDT	161,111,589.68	BDT	90,351,643.68	BDT	30,085,456.00	BDT	68,085,321.00
Less: COGS and SG&A		4,457,195.00		719,644.00		197,445.00		298,457.00
Operating Income (EBIT)	BDT	165,568,784.68	BDT	91,071,287.68	BDT	30,282,901.00	BDT	68,383,778.00
P/E Multiple	BDT	6.70	BDT	0.87	BDT	1.80	BDT	1.02
Market Capitalization	BDT	9,300,000.00	BDT	12,060,000.00	BDT	12,680,000.00	BDT	8,945,000.00
Total Liabilities	BDT	114,313,640.35	BDT	79,541,505.00	BDT	43,132,018.00	BDT	37,671,040.00

Charm Limited
Altman Z-Score Model

Original Z-Score Model	Year 2022		Year 2021		Year 2020		Year 2019	
	Coefficient	Variable	Coefficient	Variable	Coefficient	Variable	Coefficient	Variable
X_1 = Working Capital ÷ Total Asset	6.56	0.80	6.56	0.72	6.56	0.64	6.56	0.70
X_2 = Retained Earnings ÷ Total Assets	3.26	0.89	3.26	0.87	3.26	0.80	3.26	0.77
X_3 = EBIT ÷ Total Assets	6.72	0.15	6.72	0.11	6.72	0.12	6.72	0.22
X_4 = Market Capitalization ÷ Total Liabilities	1.05	0.08	1.05	0.15	1.05	0.29	1.05	0.24
X_5 = Sales ÷ Total Assets	0.99	0.15	0.99	0.11	0.99	0.12	0.99	0.22
Altman Z-Score		**9.40**		**8.59**		**8.05**		**9.08**
Implied Zone		Safety Zone		Safety Zone		Safety Zone		Safety Zone

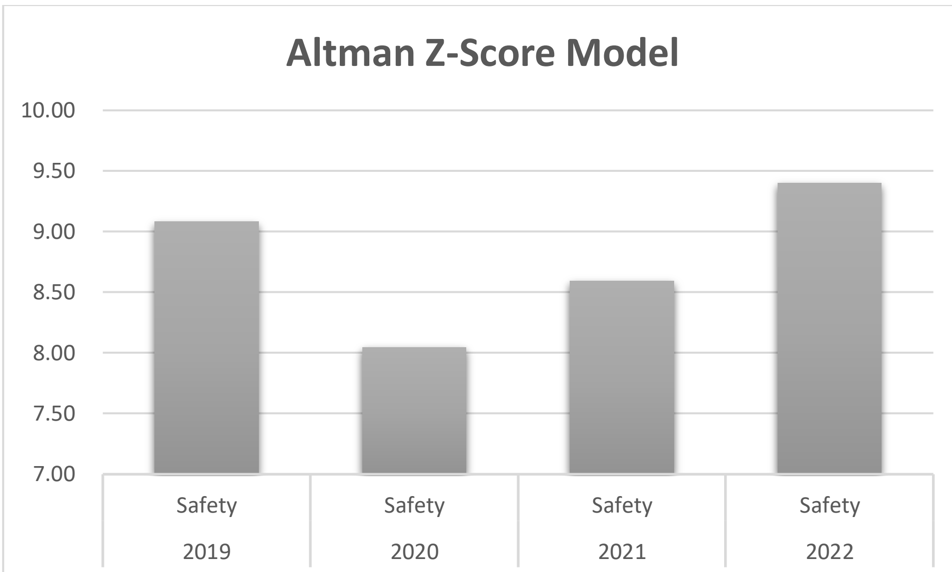

Figure 20 Altman Z-Score Model

The Altman Z-Score Model graph shows a company's financial health from 2019 to 2022. In 2019, the company was in the "safety" zone, indicating strong financial stability. However, in 2020, the score dropped to around 2.50, indicating increased financial risk. In 2021 and 2022, the scores remained in the grey zone, but showed improvement each year, with 2022 approaching the safety threshold again.

3.4 Recommendation

The research findings suggest several recommendations and consequences for Charm Limited's CRM operations to enhance efficiency and strengthen its operations.

- Charm Limited should establish a robust monitoring system to prevent loan default by adhering to sound lending principles and not being overly generous in measuring credit facility risk.
- The company should regularly generate and monitor aging reports to track overdue accounts.
- Charm should enforce stricter credit policies and clearly outline terms, payment schedules, and late payment penalties.
- The organization should enforce rigorous approval procedures for credit extension to new customers or credit limit increases for existing customers.
- They should incorporate credit scores and ratings into their overall credit evaluation.
- The company should implement effective collection methods for overdue accounts, including reminders and follow-up procedures.
- They should consider utilizing credit insurance to safeguard against customer non-payment.
- The integration of credit management software with accounting and ERP systems is crucial for real-time data and reporting.

3.5 Conclusion

Credit risk management is crucial for businesses to maintain long-term profitability, asset protection, and financial stability. It involves evaluating potential credit risks based on factors like borrower's creditworthiness, financial stability, market dynamics, and industry advancements. Businesses use various models and strategies to assess risk associated with loans and transactions. To lower credit risk, strategies like credit insurance, collateral requirements, credit limiting, and portfolio diversification can be implemented. Comprehensive reporting and monitoring systems can track loan performance. Strict credit risk policies and procedures are required for uniformity in assessment and decision-making. Companies must also comply with industry and legislative regulations.

Charm Limited, a Bangladeshi company, has developed a sophisticated CRM system but struggles with recovery and management. Despite this, the company effectively manages customer relationship management (CRM) and assesses credit risk in line with internal and federal regulations. To minimize credit risk, the company needs to hire qualified individuals using the latest methods.

Reference

https://charmbd.com

Anna, S., Boris, K., & Ivana, W. (2015). *Impact of Credit Risk Management. Procedia Economics and Finance, 26, 325–331.*doi:10.1016/s2212-5671(15)00860-6

Giesecke, K. (2023, December). *Credit risk modeling and valuation: An introduction*.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=479323

Auronen, L. (2003), "*Asymmetric information: theory and applications*", paper presented at the Seminar of Strategy and International Business, Helsinki University of Technology, Helsinki, May.

https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=cdc110d48cfa54659f3a09620d51240f09cf1acc

Barth, J.R., Caprio, G. Jr and Levine, R.(2004), "*Bank regulation and supervision: what works best?*", *Journal of Financial Intermediation*, Vol. 13, pp.205-48.
https://www.sciencedirect.com/science/article/abs/pii/S1042957303000603

Basel (1999), "*Principles for the management of credit risk*", Consultative paper issued by the Basel Committee on Banking Supervision, Basel.
https://ejournal.undip.ac.id/index.php/dlr/article/view/24904

Basel (2004), "*Bank failures in mature economies*", Working Paper No. 13, Basel Committee on Banking Supervision, Basel.

Benveniste, L.M. and Berger, A.N. (1987), "*Securitization with recourse: an instrument that offers uninsured bank depositor sequential claims*", *Journal of Banking & Finance*, Vol. 11, pp. 403-24.

https://www.sciencedirect.com/science/article/pii/0378426687900410

Berger, A.N. and Udell, G.F. (1992), "*Some evidence on the empirical significance of credit rationing*", *Journal of Political Economy*, Vol. 100 No. 5, pp.1047-77.
https://www.journals.uchicago.edu/doi/abs/10.1086/261851

Bluhm, C., Overbeck, L. and Wagner, C.(2003), *Credit Risk Modeling*, Wiley, New York, NY.
https://www.jstor.org/stable/2078035

BrownBridge, M. (1998), "*Financial distress in local banks in Kenya, Uganda and Zambia: causes and implications for regulatory policy*",*Development Policy Review Journal*, Vol. 16 No. 2, pp. 173-89.
https://library.fes.de/libalt/journals/swetsfulltext/4126011.pdf

BrownBridge, M. and Harvey, C. (1998),*Banking in Africa*, James Currey,Oxford.
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2348417

Bryant, K. (1999), *The Integration of Qualitative Factors into Expert Systems for Evaluating Agricultural Loans*,School of Information Systems and Management Science, Griffith University, Gold Coast.

https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=b59798c55cf3e5ec47d4d0f8c4eb41caac3ee99a

Appendix

Internship Proposal

Topic

"Measuring Credit Risk: A Quantitative Analysis of Credit Performance & CRM Testing Methodologies"

Submitted by

Name: Humayra Anjum

ID: 19304046

Supervisor

Name: Abu Saad Md. Masnun Al Mahi, PhD

Designation: Assistant Professor

Date: Saturday, March 23, 2024

Objectives: The objective of this report is to provide fundamental understanding of credit risk management performance and to evaluate the progress area of activity of Charm Limited. Better understanding of credit management activities, in particular credit policy and practices, credit appraisal, credit-processing steps, credit management, financing in various sectors, and recovery, is the aim of this report. It also evaluates Charm Limited's credit risk management strategies. Evaluation of the credit risk management strategies employed by, comparison of the current credit approval and monitoring procedure, and identification and recommendation of areas for enhancement of the current loan approval, maintenance, and monitoring procedures in Charm Limited's CRM are also included.

Background Information: Credit risk management is a critical function within organizations that provide credit. It involves identifying, assessing, and mitigating the risk of financial loss due to a borrower's failure to repay a loan or meet contractual obligations. The process encompasses a variety of strategies and tools, such as credit scoring models, risk-based pricing, diversification, and collateral management, to evaluate the creditworthiness of borrowers and set appropriate credit limits. Effective credit risk management helps organizations maintain financial stability, comply with regulatory requirements, and optimize their risk-return profile. It requires a blend of quantitative analysis, such as statistical models and stress testing, and qualitative judgment, incorporating factors like market conditions and borrower behavior. The evolution of technology, including big data analytics and machine learning, has further enhanced the precision and efficiency of credit risk management practices.

Preliminary Methodology: To accomplish this research, methods like analysing, making generalizations and conclusions would be used. Combining theory and knowledge would help to establish a theoretical foundation to achieve goal. We would study the financial statements of Charm Limited, a private limited company that works for water treatment plant. Based on the analysis, conclusions and recommend ways would be made to help the business's financial and economic analysis better.

Significance of the Issue: The research is significant because it would give useful information about the company's credit risk condition and directions that could help Charm Limited understand their risk better as well as ways to mitigate the risk. - The report holds significance in aiding the organization to increase their revenue, improve their management practices, and make efficient use of resources.

CHARM LIMITED
INCOME STATEMENT

Descriptions	2022	2021	2020	2019
[illegible]	161,111,369.68	90,351,043.68	30,085,446.00	66,068,321.66
[illegible]	115,261.00	113,880.00	161,890.00	405,411.50
GROSS PROFIT	160,996,108.68	90,237,163.68	29,923,573.00	67,658,910.00
[illegible]	53,525,917.00	21,313,159.00	27,147,180.00	2,196,164.00
[illegible]	-	-	-	-
[illegible]	-	-	-	-
Total operating income	214,222,245.68	111,551,165.68	57,070,753.00	69,855,074.60
[illegible]	926,940.00	632,499.00	327,497.00	740,103.00
[illegible]	2,610,754.00	773,608.00	685,243.00	925,799.00
[illegible]	20,774,207.00	20,741,020.00	10,894,250.00	11,059,005.00
[illegible]	12,217,800.00	7,092,502.00	6,782,078.00	3,491,044.00
[illegible]	2,735,940.00	1,720,341.00	491,619.00	843,179.00
[illegible]	96,282,600.00	9,168,670.00	8,400,604.00	9,480,504.00
[illegible]	26,442,100.00	1,918,495.00	1,454,094.00	1,490,581.00
Audit fees	7,605,725.00	1,258,250.00	1,258,250.00	1,228,928.00
[illegible]	4,045,807.00	1,953,473.00	9,990,227.00	990,540.00
[illegible]	14,221,033.00	32,043,453.00	5,989,653.00	7,298,960.00
Total operating expenses	191,651,791.00	78,059,892.00	46,682,411.00	38,469,818.40
Net Operating Income (EBIT)	22,570,454.68	33,291,873.68	10,208,342.00	31,385,256.20
[illegible]	19,491,837.00	17,601,837.00	1,769,595.00	20,945,424.00
[illegible]	-	-	-	-
[illegible]	-	-	-	-
[illegible]	-	-	-	-
Profit before tax and reserve (EBT)	2,878,617.68	15,690,736.68	8,438,747.00	10,409,832.00
Current tax	-	-	-	-
Deferred tax	-	-	-	-
Income Tax Expense	1,489,524.00	1,733,724.00	1,387,426.00	1,699,012.00
[illegible]	-	-	-	-
EAT	1,389,093.68	13,956,012.68	7,051,321.00	8,710,820.00
EPS	0.05	69.68	35.25	43.60
Total Share Outstanding	413,998,460.00	410,998,460.00	413,998,460.00	410,998,460.00
[illegible]	46.00	70.30	63.40	44.70

CHARM LIMITED
BALANCE SHEET

Descriptions	2022	2021	2020	2019
Cash	[illegible]	[illegible]	[illegible]	[illegible]
In hand	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Balance with other banks and financial institutions [illegible]	0.00	0.00	0.00	0.00
Money at call and short [illegible]	0.00	0.00	0.00	0.00
Investment in shares & securities	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Loans and advances	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total assets	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0.00	0.00	0.00	0.00
[illegible]	0.00	0.00	0.00	0.00
[illegible]	0.00	0.00	0.00	0.00
Other liabilities	[illegible]	[illegible]	[illegible]	[illegible]
Total Liabilities	[illegible]	[illegible]	[illegible]	[illegible]
Shareholder's equity	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Share Premium	0.00	0.00	0.00	0.00
[illegible]	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Capital Reserve	0.00	0.00	0.00	0.00
[illegible]	0.00	0.00	0.00	0.00
[illegible]	0.00	0.00	0.00	0.00
[illegible]	0.00	0.00	0.00	
Total liabilities and shareholders' equity	[illegible]	[illegible]	[illegible]	[illegible]
Book Value Per Share	[illegible]	[illegible]	[illegible]	[illegible]