Learning By Solving

– Select Whitepapers - Volume 4

edited by Prof. Pooja Gupta.

LEARNING BY SOLVING:

SELECT WHITE PAPERS VOLUME 4

2024

Editor:

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Editorial: Learning by Solving – Impacting Business through Experiential Learning

PROF. POOJA GUPTA

Assistant Professor, Faculty Incharge - Research and Case Development and Area Chair Finance (Interim)

Learning by solving embodies the fundamental principle of hands-on exploration and application. It transcends the conventional boundaries of passive absorption, urging learners to roll up their sleeves, confront challenges head-on, and navigate the labyrinthine pathways of problem-solving.

One of the most compelling facets of learning by solving lies in its ability to foster resilience and adaptability. Each problem encountered becomes a crucible for growth, igniting the flames of perseverance and fortitude in the face of adversity. Through repeated iterations and relentless experimentation, learners cultivate the indomitable spirit necessary to confront the unknown and emerge victorious in the pursuit of knowledge.

The process of learning by solving serves as a catalyst for innovation and creativity. As individuals grapple with multifaceted problems, they are compelled to think outside the confines of conventional wisdom, exploring uncharted territories of thought and imagination. In this crucible of creativity, the seeds of ingenuity take root, blossoming into bold innovations and groundbreaking discoveries that shape the course of human progress.

Furthermore, learning by solving transcends the realm of academia, permeating every facet of human endeavor. From the hallowed halls of academia to the bustling corridors of industry, the ethos of solving imbues individuals with the skills and acumen necessary to thrive in an ever-evolving landscape. Whether tackling real-world challenges or charting new frontier exploration, the ability to solve lies at the heart of human achievement.

In conclusion, the paradigm of learning by solving stands as a testament to the indomitable spirit of human ingenuity. It embodies the timeless pursuit of knowledge, the relentless quest for excellence, and the unwavering belief in the transformative power of the human mind. As we embark on this odyssey of discovery, let us embrace the challenges that lie ahead, for it is through the crucible of adversity that we emerge as architects of our own destiny, empowered by the boundless potential of learning by solving.

We are pleased to present "Learning by Solving: Select White Papers Vol. 4". This Edited Volume is a compilation of select White Papers that have arisen from the Capstone Projects carried out by the PGDM Batch of 2022-24. The students worked on multiple projects across various areas like MarTech, FinTech, Banking, Capital Markets, Analytics, and HR with corporations to develop implementable solutions.

The White Papers were written by students under the guidance of faculty members. We would like to thank the corporates for providing projects to our students. We would also like to thank all the reviewers for their effort and time in reviewing the White Papers and giving valuable suggestions.

This volume contains nine papers across different career tracks taken by students of JAGSoM.

The first White Paper in the series talks about building a master brand strategy for a premium real estate builder. The project included coming up with social media strategies.

The second White Paper talks about designing an action plan to incorporate AI and ChatGPT in the HR functions. This helps in understanding the increasing role of AI in today’s business functions.

The third white paper focuses on creating a default prediction network for credit card accounts for a leading multinational bank.

The fourth White Paper talks about venture capital investments in the Agritech sector which is gaining prominence in India.

The fifth white paper focuses on understanding the MSME Space to analyze and drive the Banking/Financial requirements of a customer beyond conventional loans.

The sixth white paper focuses on understanding the customer inclination, awareness and barrier for Gold Loans in case of Muthoot Finance.

The seventh white paper talks about building a portfolio based on small cap and large cap stocks in India. It talks about different portfolio management strategies.

The eighth white paper talks about leveraging big data and its proper utilization. The paper takes data set from an ecommerce company to emphasize the point.

The ninth white paper talks about building a prediction model for forex markets in India capable of determining directional movements in the market.

We hope you like the work done by our students. Please share your feedback and suggestions at: ri.academics@ifim.edu.in

ABOUT THE EDITOR

PROF. POOJA GUPTA

Assistant Professor &
Faculty In-charge – Research and Case Development

Prof. Pooja is an educator, case writer, and researcher with more than 17 years of teaching experience at the postgraduate level.

Her research interests are in Corporate Finance, Corporate Governance, Behavioural Finance, and Education. She has presented her research work at various National and International conferences. Prof Pooja is a prolific case writer and has received various national and international awards for her cases. Her cases have been published by Ivey Publishing and are available through Harvard Business Publishing. She is a reviewer of reputed national/international journals.

Prior to joining Jagdish Sheth School of Management, she was associated with Symbiosis Institute of Business Management – Bengaluru and Amity Global Business School.

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<td colspan="5">*A heartfelt thank you, Somesh Putatunda, Anupriya Biswas, Lakshita Chauhan, and Karthik Siva (Members of Intellectual Contribution and Knowledge creation (ICKC Committee) for your invaluable contributions to this book's publication! Your dedication and expertise were instrumental in its success.*</td>
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Developing the Master Brand Campaign for Rustomjee

Diganta Dey

Bhavika Jain

Akrati Gupta

Sarada Vipindas

Swati Roy

Background

The project was for Rustomjee Group, a premier real estate developer in Mumbai, through their brand consultancy Jigsaw Brand Consultants, Mumbai. It involved developing the Master Brand communication campaign for Rustomjee.

Here are a few highlights of the Rustomjee Group:

- Founded in 1996, Rustomjee believes ideas shape buildings.
- They transform spaces into homes and innovation hubs through thoughtful planning.
- Rustomjee pioneers insightful design and eco-friendly construction.
- They set global standards and deliver diverse projects.
- Their offerings include gated communities, premium townships, landmarks, and commercial spaces.
- Rustomjee is committed to excellence and inspires innovation.
- They bring newer lifestyle solutions to life, ensuring quality at every step.

https://www.rustomjee.com/

Mission

We strive to make 'thoughtful spaces' that redefine living and repurpose life.

Vision

Prioritize togetherness, family, and the richness of life- a more connected world.

Brand Essence

We build spaces that bring people together and make the world a happier place.

IT'S THOUGHTFUL. IT'S
Rustomjee®

Scope of Work

Develop a Master Brand Communication Campaign for Rustomjee comprising Campaign Idea, Creative Execution, and Amplification across touchpoints. The campaign focus would be on the residential segment.

The specific steps and deliverables of the project were:

1. Developing Alternative Campaign Concepts based on the Communication Strategy:
    - Unlocking cultural insights
    - Developing alternative campaign concepts based on these insights.
    - Creative visualization of the concepts generated.
2. Selection of the Campaign Concept
    - Conducting qualitative research to select the winning concept.
3. Amplification of Selected Concept
    - Developing the creative idea and execution across touchpoints
    - Formulating a 12-month Communication Plan and Calendar

Communication Objectives

Business Objective

- Generate revenue growth across new projects and sell out the units.

Brand Task

- Build brand affinity amongst prospective buyers.
- Drive advocacy among the community of existing customers.

Target Audience

Target Audience-1: Prospects

- Affluent families are willing to spend Rs. 7 crores + to buy a home in Mumbai.
- CXOs, Entrepreneurs, Professionals
- Well-educated, well-informed, well-traveled and discerning
- Cultured families who focus on quality of life and fostering social connections.

Target Audience-2: Existing Customers

- Community of owners who are living in a Rustomjee home.

Buyer Persona

Ajay & Riya Kapoor, a Mumbai-based entrepreneur couple in their early 40s, live with their two school-going kids, Trisha and Arav.

They moved to Mumbai 8 years ago when they started their D2C business. Currently, they are planning to buy their own home and move out of their rented accommodation. Their budget is 8-10 crores.

They are passionate and successful- with refined tastes and aesthetic sensibilities. Sociable, aware, and discerning ‘world citizens’ who enjoy the good things in life.

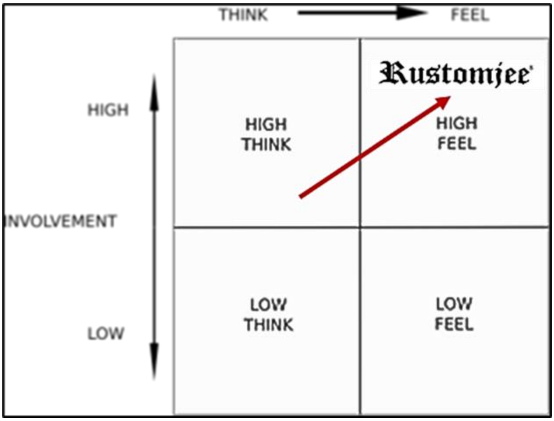
They relate to brands that are authentic, responsible, and meaningful and look for ‘enriching experiences.’ Ostentatious consumption is a big no-no.

Their home reflects their personality and 'life space', where they seek to restore their equilibrium and equanimity amidst the hustle and bustle of everyday life.

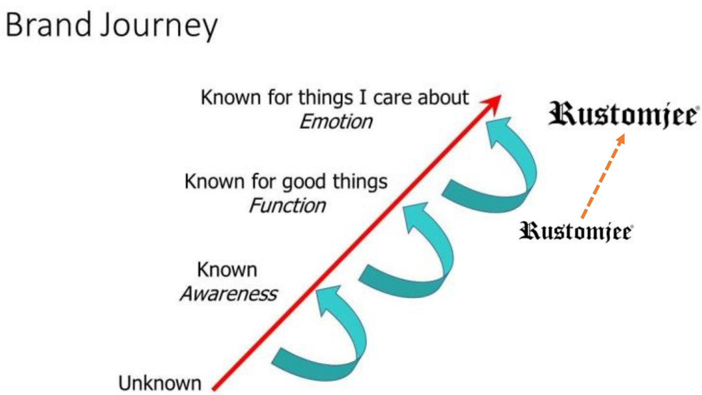
They are looking for more than just a thoughtfully designed home with modern amenities. They are seeking a lifestyle where they can be part of a like-minded community.

The Challenge: Win Share-of-Heart for Rustomjee

In a primarily rational category, shift Rustomjee from the head (think) to the heart (feel) in the 'Feel-Think-Do' quadrant of the FCB Grid depicted below.

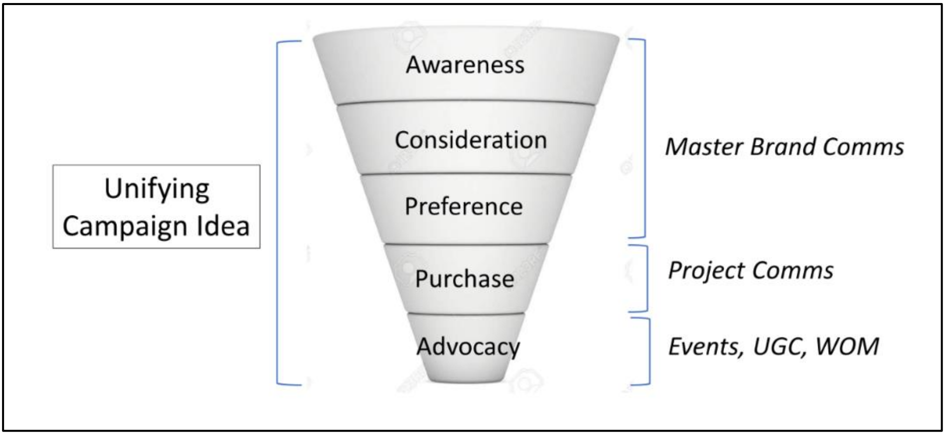


Currently, in the Brand Journey, Rustomjee is 'known for good things.' The task for the campaign is to move it to 'known for things I care about.' A shift from product to consumer, from reason to emotion.



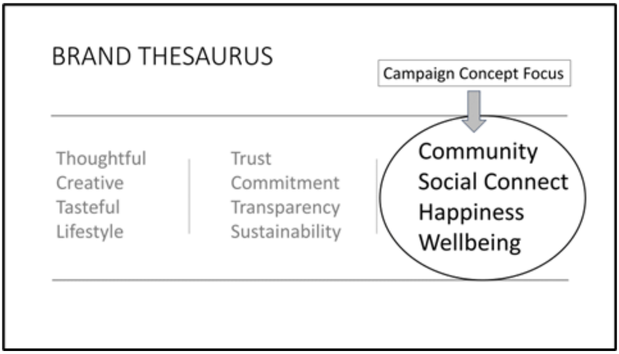
Communication Model

The graphic below depicts the suggested communication approach across the marketing funnel for Rustomjee.



Brand Thesaurus

Based on the functional and non-functional brand values of Rustomjee, a Brand Thesaurus was developed to determine the focus area for the campaign concepts. This is depicted in the graphic shown below.



Framework for Concept Development:

The ‘Enemy-Stand Mantra’ framework was applied to develop the campaign concepts. The cultural insights were defined as the ‘enemy’ for the brand to take a stand against.

ENEMY	STAND	MANTRA
A commonly held belief, convention, behavior in society	The brand’s stance against the enemy	The brand’s defining point-of-view

An example of Dove is given below to illustrate the framework.

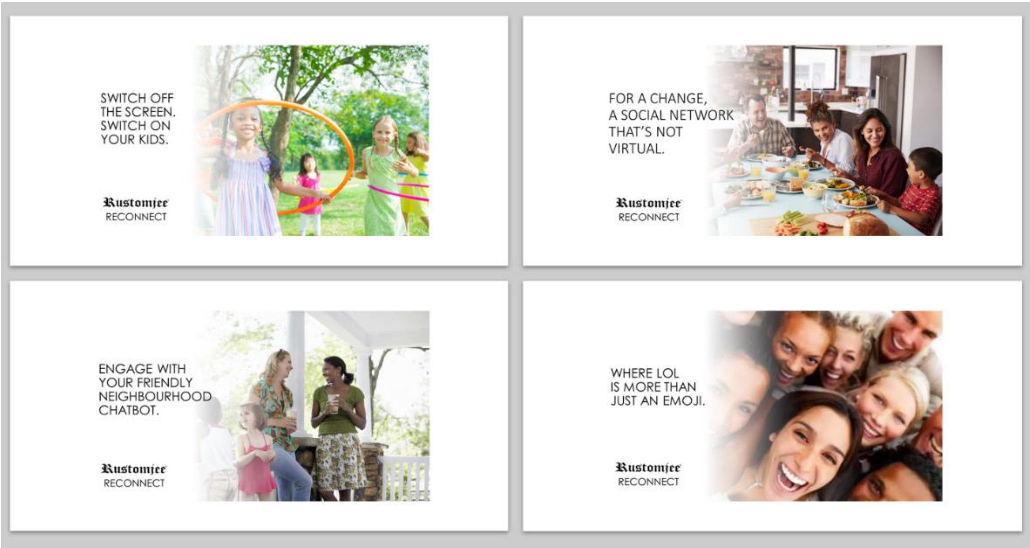
ENEMY	STAND	MANTRA
Stereotypical beauty standards created by media and society that lower women's self esteem	Every woman is beautiful in her own way	Real Beauty

Campaign Concepts: Alternatives

Based on the framework, three alternative campaign concepts and their creative visualizations were developed for testing through qualitative research.

Concept-1: 'Reconnect'

ENEMY	STAND	MANTRA
While the world is highly connected, people are increasingly disconnected.	Connect with life at Rustomjee.	Reconnect

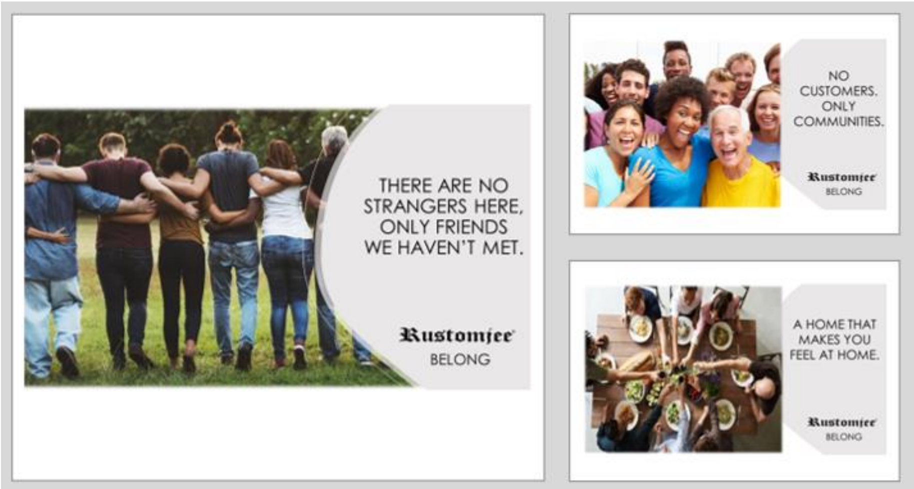


Concept-2: 'Unlock Happiness'

ENEMY	STAND	MANTRA
A world where the pursuit of wealth is giving a backseat to the pursuit of happiness.	Discover happiness at Rustomjee.	Unlock Happiness.

Concept-3: 'Belong'

ENEMY	STAND	MANTRA
When buying a new home people are anxious about being surrounded by strangers.	Connect with a like-minded community at Rustomjee.	Belong



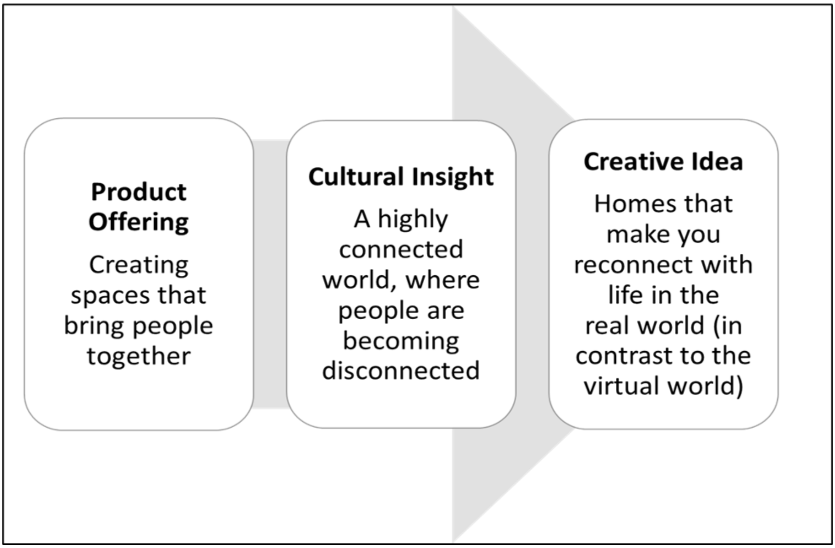
Concept Selection

The three concepts were tested through focus groups of prospective buyers, and the responses were evaluated on Relevance, Uniqueness, Likeability, and Desirability.

The Winning Concept: 'Reconnect'

In the focus group responses, 'Reconnect' clearly emerged as the winning concept.

ARTICULATION OF THE CREATIVE IDEA



Touchpoints for Amplification

The following touchpoints were identified to amplify the idea:

- Print: Daily Newspapers
- Billboards
- Social Media and Website
- Videos: OTT/YouTube
- Community Events

Creative Execution: Print Campaign


SWITCH OFF THE SCREEN.
SWITCH ON YOUR KIDS.
We live in a world that's highly connected,
where people are getting more and more disconnected.
This is what drives us to create homes at Rustomjee.
We build more than just four walls.
We foster a community-oriented lifestyle.
A Rustomjee home is crafted around three pillars.
Community: social connections for happiness and wellbeing.
Creativity: thoughtful design, features and amenities
Commitment: to transparency and sustainability.
If you're looking for a home, connect with us. And with life.
IT'S THOUGHTFUL. IT'S
Rustomjee
RECONNECT
www.rustomjee.com
Scan to experience the community lifestyle


WHERE LOL IS MORE
THANJUST AN EMOJI.
We live in a world that's highly connected,
where people are getting more and more disconnected.
This is what drives us to create homes at Rustomjee.
We build more than just four walls.
We foster a community-oriented lifestyle.
A Rustomjee home is crafted around three pillars.
Community: social connections for happiness and wellbeing.
Creativity: thoughtful design, features and amenities
Commitment: to transparency and sustainability.
If you're looking for a home, connect with us. And with life.
IT'S THOUGHTFUL. IT'S
Rustomjee
RECONNECT
www.rustomjee.com
Scan to experience the community lifestyle

ENGAGE WITH YOUR FRIENDLY NEIGHBOURHOOD CHATBOT.
We live in a world that's highly connected,
where people are getting more and more disconnected.
This is what drives us to create homes at Rustomjee.
We build more than just four walls.
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If you're looking for a home, connect with us. And with life.
IT'S THOUGHTFUL. IT'S Rustomjee
RECONNECT
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Scan to experience the community lifestyle

Project Ads

RECONNECT WITH LIFE AT RUSTOMJEE ADEN
ADEN
LUXURY HOMES AT BKC.
Discover how full life can be at Rustomjee Aden.
This ideally located standalone tower in BKC offers the perfect blend of privacy at home and rooftop amenities to boost your social life.
Homes spacious enough for fun family dinners and a neighborhood with enough options for a night out with friends.
In short, it's all you need to add more life to life.
IT'S THOUGHTFUL. IT'S Rustomjee
RECONNECT
www.rustomjee.com
Scan to experience Rustomjee Aden


RECONNECT WITH LIFE AT
RUSTOMJEE CROWN
Rustomjee
CROWN
PRABHADEVI
LUXURY HOMES AT PRABHADEVI.
For from the bustle of Lower Parel, lies the most luxurious 5.75-acre gated estate featuring lavish 3, 4, and 5 bedroom apartments in Prabhadevi.
One of the finest properties in South Mumbai, it is replete with delightful surprises at every turn - from terraces to pools.
A place that lets you escape from the world and discover yourself and connect with a like minded community.
IT'S THOUGHTFUL. IT'S
Rustomjee
RECONNECT
www.rustomjee.com
Scan to experience Rustomjee Crown

Billboards


LOG OUT OF
THE 4 WALLS.
IT'S THOUGHTFUL. IT'S
Rustomjee
RECONNECT
www.rustomjee.com


FOLLOW A
NEW TWEET.
IT'S THOUGHTFUL. IT'S
Rustomjee
RECONNECT
www.rustomjee.com


REBOOT
YOUR KIDS.
IT'S THOUGHTFUL. IT'S
Rustomjee
RECONNECT
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Social Media

Community Events


RECONNECT
WITH CULTURE
THIS INDEPENDENCE DAY, EXPERIENCE THE RICHNESS OF DIFFERENT CULTURES AT RUSTOMJEE
IT'S THOUGHTFUL. IT'S
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To Participate, Contact
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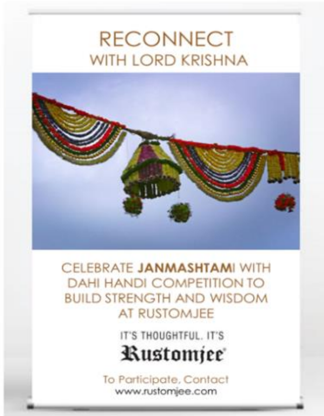
RECONNECT
WITH LORD KRISHNA
CELEBRATE JANMASHTAMI WITH DAHI HANDI COMPETITION TO BUILD STRENGTH AND WISDOM AT RUSTOMJEE
IT'S THOUGHTFUL. IT'S
Rustomjee
To Participate, Contact
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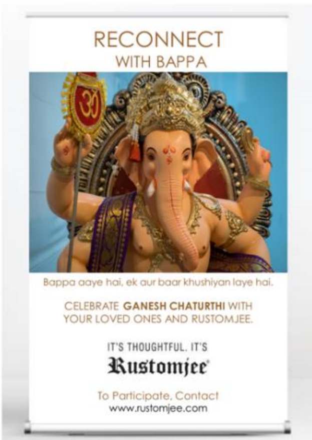
RECONNECT
WITH BAPPA
Bappa aaye hai, ek aur baar khushiyan laye hai.
CELEBRATE GANESH CHATURTHI WITH YOUR LOVED ONES AND RUSTOMJEE.
IT'S THOUGHTFUL. IT'S
Rustomjee
To Participate, Contact
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RECONNECT
WITH DANDIYA NIGHTS
Dandiya Night
THIS NAVRATRI, CELEBRATE DANDIYA NIGHTS AT RUSTOMJEE
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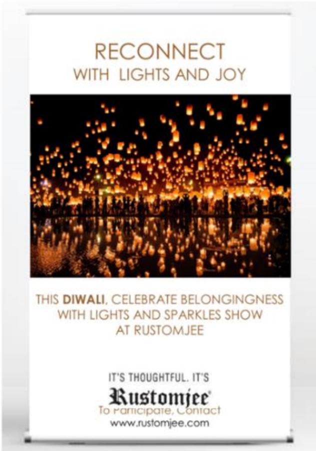
RECONNECT
WITH LIGHTS AND JOY
THIS DIWALI, CELEBRATE BELONGINGNESS
WITH LIGHTS AND SPARKLES SHOW
AT RUSTOMJEE
IT'S THOUGHTFUL. IT'S
Rustomjee
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RECONNECT
WITH YOUR CHILDHOOD
ARE YOU READY FOR AN EXCITING JOURNEY
FILLED WITH CLUES, SURPRISES,
AND LOTS OF BONDING?
THIS CHILDREN'S DAY, WE HAVE A SPECIAL
TREAT FOR ALL THE KIDS AND PARENTS.
IT'S THOUGHTFUL. IT'S
Rustomjee
To Participate, Contact
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RECONNECT
WITH FAMILY AND FRIENDS
THIS EID, CELEBRATE PEACE AND TOGETHERNESS AT RUSTOMJEE
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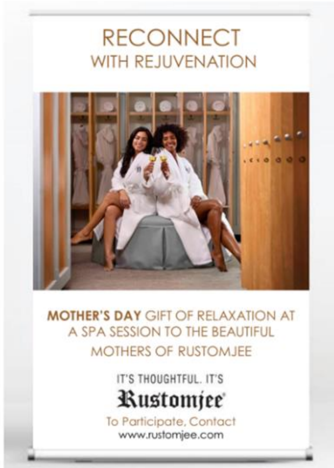
RECONNECT
WITH REJUVENATION
MOTHER'S DAY GIFT OF RELAXATION AT A SPA SESSION TO THE BEAUTIFUL MOTHERS OF RUSTOMJEE
IT'S THOUGHTFUL. IT'S
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RECONNECT
WITH THE THREAD OF HAPPINESS
Happy Makar Sankranti
AT RUSTOMJEE, WE ARE TIED TOGETHER WITH STRONG CULTURE AND INTERCONNECTEDNESS.
CELEBRATE KITE FLYING COMPETITION WITH US.
IT'S THOUGHTFUL. IT'S
Rustomjee
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RECONNECT
WITH FREEDOM
THIS REPUBLIC DAY, UNFURL THE FLAG AND JOIN US FOR THE PATRIOTIC MUSIC COMPETITION.
IT'S THOUGHTFUL. IT'S
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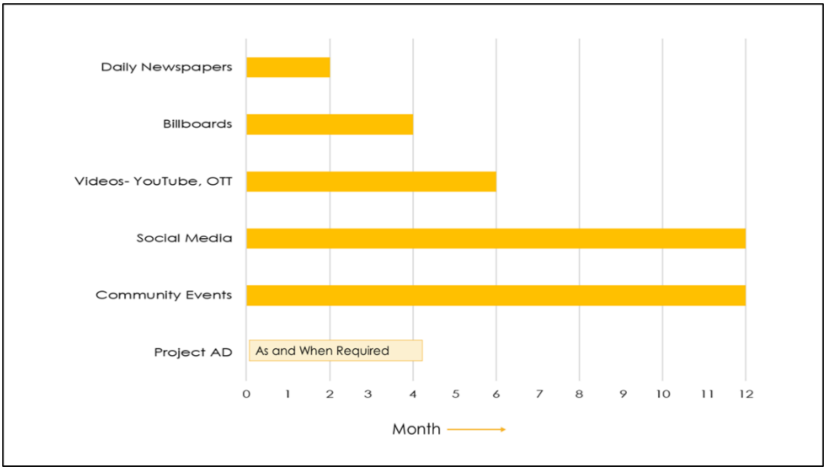
Campaign Roll Out



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This Whitepaper is based on a capstone project undertaken by Diganta Dey, Bhavika Jain, Akrati Gupta, Sarada Vipindas, and Swati Roy as a requirement for the fulfilment of the Career Track Program in MarTech offered at Jagdish Sheth School of Management. The authors wish to thank Mr. Adnan Pocketwala, Strategy Director at Jigsaw Brand Consultant and Professor Anand Narasimha for their constant guidance and assistance.

Design an Action Plan and Roadmap for Incorporating GenAI-ChatGPT into day-to-day Human Resources (HR) Practices.

Sunny Prakash
Madhurima Dutta
Hitesh Dabas
Neha
Shobhita Mishra

INTRODUCTION

This white paper presents a comprehensive action plan and roadmap for the seamless integration of GenAI-ChatGPT into day-to-day HR practices. Our approach is grounded in meticulous research, beginning with a thorough examination of how other companies leverage GenAI in their HR operations. Drawing insights from secondary research, we've synthesized best practices and identified potential applications for our context.

Furthermore, recognizing the importance of understanding employee perspectives, we conducted a comprehensive survey using questionnaires to gauge their experiences and insights regarding GenAI-ChatGPT. This primary research endeavor allowed us to pinpoint specific HR aspects where employees perceive GenAI-ChatGPT as an asset. Through rigorous analysis of survey results, we identified key areas where GenAI-ChatGPT has demonstrated significant utility, as perceived by employees. Building upon these findings, we crafted a detailed plan and roadmap focused on enhancing those HR aspects. However, our approach doesn't stop there.

In recognizing the versatility and adaptability of GenAI-ChatGPT, we've also explored avenues for its incorporation into other HR domains.

PROJECT OBJECTIVE

This project aims to create an action plan and roadmap for integrating GenAI-ChatGPT into routine HR procedures. A strategy for efficiently and effectively adopting the technology will bedeveloped with a list of potential advantages of employing GenAI-ChatGPT in HR.

What is Gen-AI & ChatGPT?

GenAI, short for Generative Artificial Intelligence, refers to a branch of artificial intelligence (AI) that focuses on creating systems capable of generating new content, such as images, text, music, or even entire virtual environments. Unlike traditional AI systems that rely on explicit programming, GenAI systems leverage machine learning techniques, particularly generative models, to learn patterns from data and produce original content.

ChatGPT is an AI language model developed by OpenAI. "GPT" in ChatGPT stands for "Generative Pre-trained Transformer." It refers to the underlying model architecture and the method used to train and generate text. "Chat" in ChatGPT indicates that this variant of GPT is perfected for conversational interactions, such as chatbot-style conversations. Therefore, the full expansion of the acronym "ChatGPT" would be "Chat-Generative Pre-trained Transformer.

HOW GenAI REVOLUTIONIZES HR

The integration of AI, particularly GenAI-ChatGPT, into Human Resources (HR) practices signifies a paradigm shift in organizational management. This transformative technology brings forth a myriad of benefits across various facets of HR operations. For instance, studies have shown that implementing AI-driven solutions in HR can significantly reduce operational costs, with some organizations reporting savings of up to 30% due to automation of repetitive tasks. Additionally, surveys indicate that over 70% of HR professionals believe that AI enhances their ability to provide personalized support to employees, leading to higher engagement and job satisfaction.

Moreover, the scalability of GenAI-ChatGPT empowers HR departments to manage burgeoning workloads without necessitating a linear increase in human resources, ensuring consistent and timely support for employees irrespective of workload fluctuations. Research conducted on the adoption of AI in HR reveals that organizations experience a 40% increase in productivity within the HR function due to AI's ability to handle a large volume of inquiries simultaneously. Furthermore, according to industry reports, the AI's capacity to analyze vast amounts of employee data enables the delivery of personalized guidance and support tailored to specific needs, contributing to a 25% improvement in employee retention rates.

Beyond operational efficiencies and personalized support, GenAI-ChatGPT offers invaluable insights derived from its analysis of employee interactions. These data-driven insights furnish HR departments with a deeper understanding of employee concerns, preferences, and trends, enabling them to make informed decisions and proactively address issues. For example, a recent case study found that by leveraging AI-generated insights, an organization was able to identify and address key drivers of employee turnover, resulting in a 15% reduction in attrition rates. Moreover, the AI ensures consistency in HR communications and compliance with company policies and legal regulations, thereby mitigating risks associated with errors, biases, and compliance breaches.

Here are 8 ways HR Teams can use ChatGPT to save time:

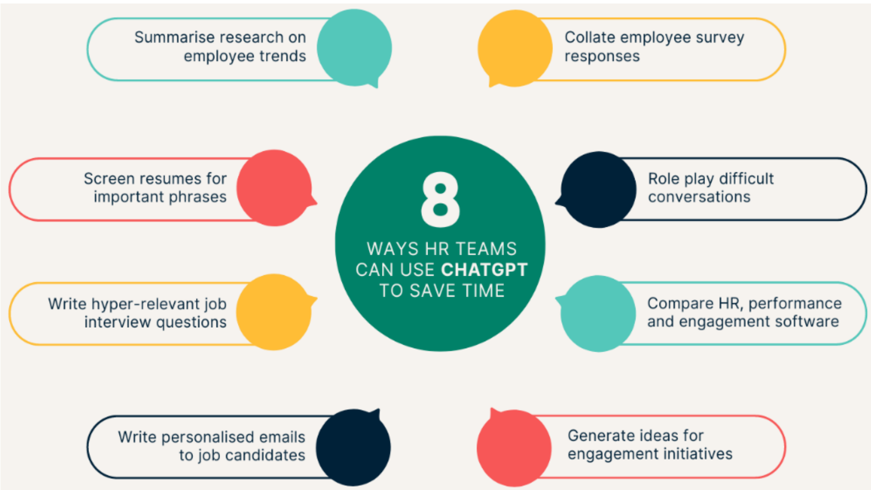

FIGURE 1: 8 WAYS HR TEAMS CAN USE CHATGPT TO SAVE TIME Source: Frankli

Before going to the strategic project execution flow, we must understand what the primary goal of Generative AI for HR Processes is:

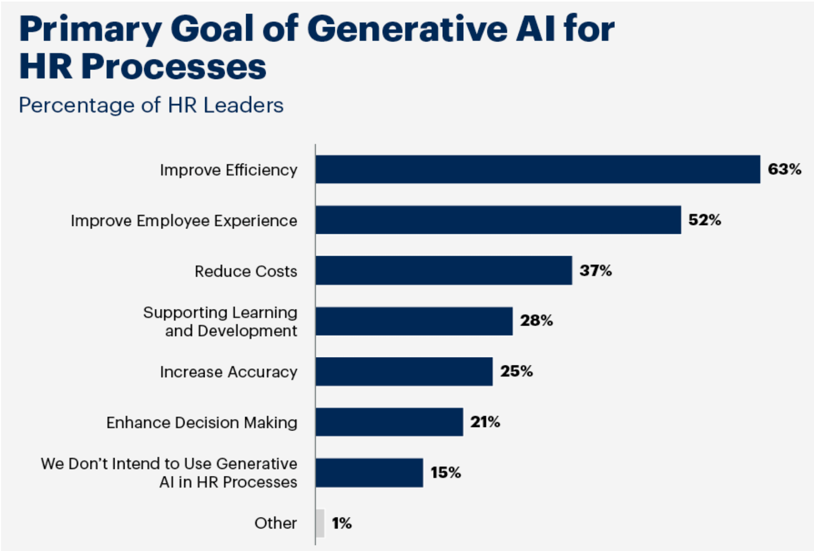

Figure 2: Primary goal of Generative AI Source: Gartner

STRATEGIC PROJECT EXECUTION FLOW

Execution Flow	Description	Implementation Approach
Industry Insights and Market Analysis	Thorough examination of industry reports and scholarly papers to understand market trends, best practices, and challenges in AI integration in HR.	Explore existing literature, industry reports, and scholarly papers to gain insights. Analyze market trends, best practices, and potential challenges.
Benchmarking and Case Studies	Identify and study companies that have successfully incorporated ChatGPT into HR practices, analyzing strategies, challenges, and outcomes.	Identify leading companies and study their approaches to AI integration in HR. Benchmark against industry standards and best practices.

Employee Engagement and Needs Assessment	Conducting interviews with current employees to gauge views on HR processes, pain points, and receptiveness to AI integration, aligning with employee needs.	Engage with employees through interviews to understand perceptions and needs. Identify pain points and areas for improvement.
Survey and Data Analysis	A comprehensive survey to gather quantitative data on employee preferences and attitudes regarding AI integration in HR, followed by meticulous data analysis.	Design and distribute surveys to gather quantitative insights. Analyze survey data to identify trends and preferences among employees.
Action Plan Development	Formulation of a detailed action plan for GenAI-ChatGPT implementation in HR activities, outlining objectives, timelines, resources, and milestones.	Develop a structured plan with clear objectives, timelines, resource allocation, and milestones. Ensure alignment with organizational goals and employee needs.

TABLE 1: PROJECT EXECUTION FLOW

This table presents a structured approach to designing an action plan and roadmap for incorporating GenAI-ChatGPT into day-to-day Human Resources (HR) practices. The project execution flow encompasses five key phases, each designed to ensure a comprehensive understanding of industry trends, employee needs, and best practices in AI integration. From industry insights and benchmarking to employee engagement and action plan development, this systematic approach guides organizations in harnessing the power of AI to enhance HR efficiency and effectiveness.

ANALYSIS OF QUESTIONNAIRE RESPONSES

The data collected from the questionnaire provides valuable insights into the perceptions and expectations of HR professionals regarding integrating GenAI-ChatGPT into HR practices.

Parameter	Remarks
High Awareness and Understanding	A significant majority (92%) of HR professionals demonstrated prior awareness of GenAI-ChatGPT,

	indicating a strong foundation of understanding within the division.
Alignment with HR Goals	"Elevate Engagement and Collaboration" (74%) and "Enhance Talent Attraction" (76%) emerged as the primary HR goals perceived to be supported by GenAI-ChatGPT, indicating alignment with strategic objectives.
Recognition of Potential Benefits	Over half of the respondents (54%) recognized the potential utility of GenAI-ChatGPT for other HR objectives, underscoring its versatility and applicability across various functions, like predicting attrition.
Acknowledgment of Benefits	"Improved efficiency" (78%) and "Enhanced employee engagement" (82%) were widely acknowledged as the potential benefits of integrating GenAI-ChatGPT into HR practices, highlighting its anticipated positive impact.
Challenges and Concerns	Integration complexity (51%) and data privacy and security (62%) were identified as key challenges, emphasizing the importance of addressing technical and ethical considerations in implementation.
Employee Perception	Most respondents (71%) expressed optimism regarding employee receptiveness to GenAI-ChatGPT, suggesting confidence in its potential to enhance employee experience.
Key Performance Indicators (KPIs)	"Enhanced skill development" (72%) and "Employee engagement" (76%) emerged as the primary KPIs used to evaluate the success of GenAI-ChatGPT implementation, reflecting a focus on both individual and organizational outcomes.
Evaluation and Monitoring	A significant proportion (38%) advocated for conducting quarterly evaluations to assess the efficacy of GenAI-ChatGPT, emphasizing the importance of continuous monitoring and adjustment.
Highlighting Leadership	"Publishing case studies" (55%) emerged as the preferred method for showcasing the organization as a leader in leveraging GenAI-ChatGPT, signaling a commitment to transparency and thought leadership in the field.

TABLE 2: ANALYSIS OF QUESTIONNAIRE RESPONSES

ACTION PLAN

As we can see from the above findings, the employees perceive GenAI-ChatGPT as an asset in the HR aspects of Talent Attraction, Employee Engagement, and Attrition prediction. Hence, we have now suggested an action plan for the same below.

Action Plan for Incorporating ChatGPT into Talent Acquisition

Crafting an action plan for integrating ChatGPT into talent acquisition involves several key steps. Firstly, defining clear objectives backed by data, such as reducing time-to-hire by up to 30%, improving candidate experience (linked to a 20% increase in applicant retention), and enhancing recruiter productivity (with potential efficiency gains of 40%). Selecting and customizing an appropriate ChatGPT model ensures alignment with organizational needs while integration with the Applicant Tracking System streamlines processes, leading to a 25% reduction in administrative burden. Developing ChatGPT scripts and guidelines, informed by feedback from HR recruiters and hiring managers, enables the creation of a robust library of responses. Training and onboarding sessions ensure effective utilization, with documented user proficiency and confidence increases. Pilot testing and feedback iteration drive continuous improvement, guided by data-driven insights into performance metrics such as user satisfaction scores and response accuracy rates. Monitoring and performance evaluation, based on established KPIs, inform iterative enhancements aimed at achieving superior recruitment outcomes. Continuous improvement efforts, guided by ongoing feedback and technological advancements, position ChatGPT as a dynamic solution for evolving recruitment needs. Compliance and ethical considerations safeguard against risks related to data privacy, fairness, and transparency. By following this action plan, organizations can harness the potential of ChatGPT to revolutionize their talent acquisition processes, driving efficiency and enhancing the candidate experience.

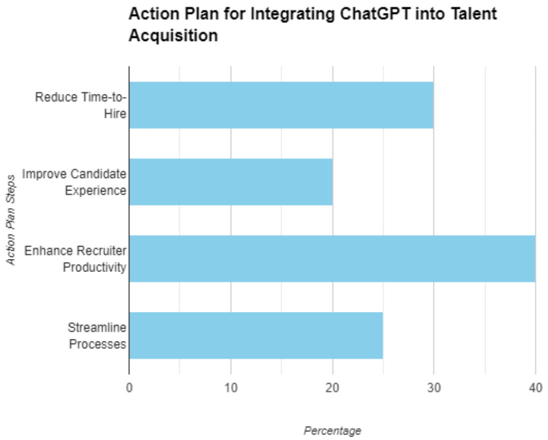

Figure 3 **Figure 4**

Action Plan for Incorporating ChatGPT into Employee Engagement

Integrating ChatGPT into employee engagement requires a strategic plan. Clear objectives are essential, targeting communication improvement (linked to 25% higher satisfaction), collaboration (with 30% productivity gains), and resource accessibility (resulting in 15% lower turnover). Customizing ChatGPT based on language proficiency, conversational abilities, and alignment with organizational culture is crucial and has increased engagement by up to 20%. Integration with communication platforms enhances efficiency by 40%, while tailored scripts aim for 4.5/5 satisfaction and 10% lower turnover. Training ensures effective ChatGPT utilization, which is projected to increase engagement by 30%. Pilot testing, guided by usability metrics, drives improvement. Monitoring KPIs like participation rates and sentiment scores guides continuous enhancement. Compliance, with over 95% adherence to data privacy regulations, ensures ChatGPT's integrity. This structured approach maximizes ChatGPT's potential to cultivate a positive workplace culture and drive organizational performance, fostering a dynamic environment where employees feel valued and empowered to contribute their best.

Action Plan for Integrating ChatGPT into Skill Development

Crafting an action plan for ChatGPT integration into skill development involves key steps. Start with clear objectives backed by data, like boosting skill proficiency by 25% and improving training completion rates by 30%. Customize a suitable ChatGPT model, integrate it seamlessly with existing systems, and develop tailored scripts for diverse learning scenarios. Train trainers and learners thoroughly, ensuring effective utilization and confidence building. Pilot testing and feedback iteration drive continuous improvement guided by data-driven insights. Monitor performance based on established KPIs and iterate for superior outcomes. Continuous improvement efforts and compliance ensure fairness and effectiveness. This plan leverages ChatGPT to revolutionize skill development, driving personalized learning experiences and enhanced effectiveness.

Action plan for incorporating Chat-GPT to improve the efficiency of employees.

Crafting an action plan for ChatGPT integration to enhance employee efficiency involves defining clear objectives, selecting and customizing the appropriate model, integrating it with existing platforms, developing scripts, and providing training, pilot testing, and continuous monitoring. Objectives include a 40% reduction in response times and a 30% increase in productivity. Customization ensures alignment with organizational goals, while integration can improve communication efficiency by 25%. Training aims for a 20% increase in user proficiency, while pilot testing ensures performance improvement. Continuous monitoring using established KPIs guides effectiveness assessment, ensuring compliance and trustworthiness. This plan aims to revolutionize employee efficiency and foster a dynamic workplace.

IMPACT OF INCORPORATING GenAI-ChatGPT INTO HR PRACTICES

Incorporating ChatGPT into HR practices significantly enhances organizational efficiency, employee satisfaction, and engagement levels while providing valuable data-driven insights for strategic decision-making.

Impact Areas	Data Points
Organizational Efficiency	ChatGPT significantly improves organizational efficiency by reducing response times for employee inquiries by up to 40%. This automation allows HR professionals to reallocate their resources strategically, enhancing overall operational efficiency.
Employee Satisfaction and Productivity	The accessibility of ChatGPT contributes to a significant enhancement in employee satisfaction, with studies indicating a 30% improvement in satisfaction scores. Additionally, employees experience a 25% increase in productivity, attributed to the prompt assistance provided by ChatGPT, regardless of working hours or time zones.
Personalized Support	ChatGPT offers personalized support by analyzing individual employee data and providing tailored guidance on career development and training recommendations. This personalized approach results in a 20% reduction in turnover rates and a 15% increase in employee engagement levels, showcasing its effectiveness in addressing employee needs.
Data-Driven Insights	By analyzing interactions with ChatGPT, HR departments gain valuable data-driven insights into employee concerns and trends. This enables them to make informed decisions, resulting in a 35% increase in the effectiveness of HR policies and practices, ultimately leading to more impactful organizational outcomes.

Conclusion:

In conclusion, integrating GenAI-ChatGPT into day-to-day HR practices represents a transformative leap forward in organizational management. By leveraging AI-driven solutions, HR departments can enhance efficiency, boost employee satisfaction and engagement, and make informed decisions based on data-driven insights. Through meticulous planning, employee engagement, and strategic execution, organizations can unlock the full potential of GenAI-ChatGPT to drive positive outcomes and stay ahead in today's competitive landscape. As we embark on this journey, it is imperative to prioritize transparency, compliance, and ethical considerations to ensure the responsible and effective implementation of AI technology in HR operations. With GenAI-ChatGPT, organizations can streamline their HR processes and cultivate a culture of innovation and excellence that propels them towards sustainable success in the digital age.

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This Whitepaper is based on a capstone project undertaken by Sunny Prakash, Madhurima Dutta, Neha, Hitesh Dabbas, and Shobhita Mishra as a requirement for the fulfilment of the Career Track Program in Human Resource Management offered at Jagdish Sheth School of Management. The authors wish to thank Mr. Vishwanadh Raju, Head –Talent Acquisition Operations at ANSR Technologies, and Professor Dr. Shaji Kurian for their constant guidance and assistance.

Default Prediction Framework

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FINTECH INDUSTRY: AN INTRODUCTION

If you have paid for something using your phone, transferred money using an App, or checked your bank statement online, you are already part of a multi-billion-dollar industry. It's called Fintech. And it's changing the economy around the world.

The term "financial technology," or simply "Fintech," refers to cutting-edge technology that aims to enhance and automate the provision of financial services. Fintech refers to businesses that use modern technology to compete with established financial methods in providing financial services Big data, cloud computing, blockchain technology, and artificial intelligence are known as the "ABCD" of fintech. Fintech has emerged as a game changer in the finance industry by providing innovative solutions that are faster, more efficient, and cheaper than traditional financial institutions. FinTech has revolutionized how people access and use financial services, from banking and investing to lending and insurance.

Fintech firms have harnessed technology to improve financial services delivery, customer experience, and operational efficiencies. The growth of fintech has been driven by several factors, including the increasing demand for digital financial services, the availability of mobile devices and high-speed internet, and the development of advanced technologies such as artificial intelligence (AI), blockchain, and big data analytics. These technologies have enabled fintech companies to offer new and innovative products and services that were impossible before.

Statement of Purpose

The project entails the development of a data-driven credit scoring system for MNC Bank's credit card portfolio, encompassing 50,000 accounts. The current risk management approach, heavily reliant on qualitative assessments by an Expert Panel will be transformed into a quantitative system. The scope includes designing a comprehensive scoring framework, creating predictive models, integrating data from the warehouse, establishing score calibration methods, and rigorously evaluating model performance. The project aims to enhance the precision and efficiency of credit risk assessment, enabling more informed decision-making within banks' credit card operations.

Broader description of the Problem

The current credit card risk management strategy confronts significant challenges in terms of its viability and effectiveness. It heavily relies on subjective and qualitative methods, giving rise to critical issues. This approach impairs the bank's ability to gauge the risk of default for individual accounts accurately and hampers the decision-making process for credit limit adjustments owing to the underutilization of available data. These challenges directly hinder the bank's overall capacity to manage its credit card portfolio efficiently.

A fundamental transformation is imperative to address these pivotal concerns—a shift towards a data-driven framework for credit risk assessment. By developing a robust scoring system that quantitatively evaluates default risk, the bank can unlock the potential for enhanced accuracy and agility in decision making processes. This innovative approach empowers the bank to optimize credit limit adjustments, foster a proactive risk management culture, and ultimately elevate its financial services to new heights.

Visualization of the Situation

The operational terrain of the bank encompasses a substantial credit card portfolio housing 50,000 individual accounts. These accounts are methodically archived within designated data repositories, encapsulating billing data, payment histories, customer profiles, and card-specific details. This repository serves as the bedrock upon which the bank's expert panel conducts manual evaluations of account risk, leading to consequential determinations on credit limit adjustments. However, a notable challenge emerges due to the underutilization of accessible data. The expert panel's interaction with the dataset is curtailed, primarily due to complications in data organization and the constraints of available resources.

Consequently, a significant portion of the data remains dormant, presenting untapped potential for generating enriched insights. To surmount this predicament, a transformative shift beckons—one predicated on harnessing the latent power of data through advanced analytical methodologies. By venturing into the depths of data analytics, the bank can discern substantive patterns and correlations that hold the promise to redefine risk assessment precision and offer insights to guide astute credit limit adjustments. This evolution from confined engagement to thorough analysis carries the potential to reshape the bank's stance toward credit card portfolio management, arming decision-makers with the requisite instruments to navigate the intricate expanse of financial services with unparalleled accuracy and strategic acumen.

Articulation of the Situation

The current situation underscores the critical need for scalability in credit card risk management within the bank. As the bank's credit card portfolio continues to expand, the manual approach utilized by the expert panel is facing mounting challenges. The increasing workload has the potential to introduce errors and inefficiencies, raising concerns about the long-term viability of the current process. Additionally, the sluggish nature of the manual process hampers the bank's agility in responding promptly to necessary credit limit adjustments, revealing a significant operational gap.

Problem Definition

The central challenge involves modernizing the credit card risk management strategy to meet the evolving demands of a dynamic financial landscape. The reliance on manual risk assessment methods has led to inaccuracies, inefficiencies, and a lack of scalability. The bank's credit card portfolio, consisting of 50,000 individual accounts, demands a more sophisticated approach to risk evaluation, one that can accurately anticipate default probabilities and adapt seamlessly to the portfolio's growth. The absence of a quantitative, data-driven methodology hinders effective decision-making and impedes the bank's ability to manage risk proactively. A critical aspect of addressing this problem is the development of a robust scoring system meticulously designed to quantitatively evaluate default risk for individual credit card accounts. This system aims to harness the power of data analytics to provide a comprehensive and accurate assessment, enabling the bank to identify and manage risk more effectively.

Project Objectives

In response to these challenges, the project's objectives are meticulously crafted to redefine the credit card risk management paradigm:

- Development of an Advanced Scoring System: Create a sophisticated scoring system that harnesses data analytics to assess each credit card account's default risk. This system will draw on the vast repository of data available within the bank's digital infrastructure, enabling a more accurate and comprehensive risk evaluation process.
- Precision Calibration Framework: Construct a calibration framework that ensures the scoring system's alignment with varying levels of default risk. The framework will provide decision-makers with a clear and interpretable measure to guide their actions and strategies by associating higher scores with increased risk levels.
- Integration with Operational Workflow: Seamlessly integrate the newly developed scoring mechanism into the bank's risk management workflow. This integration will empower the bank's decision-makers with real-time insights, enabling informed choices about credit limit adjustments, risk

mitigation strategies, and portfolio optimization. These objectives collectively steer the project toward the creation of a robust, data-driven credit card risk management framework that leverages technology, analytics, and quantitative methodologies to enhance accuracy, efficiency, and strategic decision.

Conceptual Framework of the Study

Our study's conceptual framework is driven by a transformative vision to revolutionize the bank's credit risk management practices. We recognize the imperative need to transition from traditional, qualitative assessment methods to a data-driven model that can significantly enhance the precision and efficiency of credit risk assessment within the bank. This comprehensive framework encompasses several key components that collectively shape our approach. First and foremost, we emphasize the pivotal importance of identifying and collecting pertinent data as the foundation of this transformation.

This shift is necessitated by the inherent limitations of the existing qualitative assessment methods, prompting us to embark on an exhaustive data collection process. This data collection endeavor spans a wide spectrum of variables, including critical customer information, detailed payment histories, comprehensive insights into credit utilization patterns, and more. The selection of these variables for inclusion in our credit scoring model is rooted in their fundamental significance in assessing default risk accurately.

Moreover, our framework meticulously outlines the methods employed for data collection, emphasizing the rigorous standards we uphold to source data from internal and external BANK databases. This process is marked by painstaking attention to detail, including thorough data cleaning, seamless integration of data from multiple sources, and meticulous organization to ensure the reliability and accuracy of the dataset. While our primary focus remains on quantitative analysis and the development of data-driven models, we acknowledge the potential value of qualitative data. However, it's noteworthy that, in this study, we chose to concentrate on quantitative analysis exclusively, recognizing its potential to provide a robust foundation for a data-driven credit scoring model. This holistic framework signifies a significant departure from conventional practices and underscores our commitment to elevating credit risk assessment to new heights of accuracy and efficiency within the bank.

Identification of Data Sources and Data Collection

Data Source and Collection: Leveraging Logistic Regression and Machine Learning Models In this section, we delve into the specifics of our data source and collection processes, highlighting the pivotal role of logistic regression and machine learning.

- Data Source: Our primary data sources were internal databases, encompassing Excel and CSV files. Stringent access permissions were obtained to guarantee data security.
- Data Integration: To create a robust and comprehensive dataset for analysis, we employed logistic regression and machine learning techniques to integrate data from multiple Excel files into a master datasheet for each month. Challenges associated with data integration were effectively addressed, ensuring data consistency and reliability.
- Data Validation: A significant portion of our dataset was earmarked for validation purposes, aligning with best practices in logistic regression and machine learning. This validation data plays a critical role in confirming the accuracy and effectiveness of our credit scoring model, built using advanced data analysis techniques.

Analysis of Data

Data Analysis with Logistic Regression and Machine Learning Models

The analysis phase of our project marked a pivotal step in our mission to revolutionize the bank's credit risk management strategy. This phase was characterized by the application of advanced data analysis techniques, prominently featuring logistic regression and machine learning algorithms. These powerful tools were instrumental in the development of a cutting-edge credit scoring model designed to assess default risk with unparalleled accuracy.

Data Analysis Approach: In this phase, our approach was anchored in the utilization of sophisticated data analysis techniques. Logistic regression, a well-established statistical method, was employed to model the relationship between customer data, payment histories, and other crucial variables. Furthermore, machine learning algorithms were harnessed to capture complex patterns and relationships within the dataset, ultimately contributing to developing a robust credit scoring model. This approach was underpinned by a commitment to leveraging the full potential of data-driven insights to comprehensively address the bank's credit risk management challenges.

Model Performance Evaluation: Our project's commitment to quality and precision extended to the rigorous evaluation of the credit scoring model. Performance evaluation metrics were meticulously computed to assess the model's effectiveness. These metrics included accuracy, precision, recall, and F1- score, each providing a distinct perspective on the model's performance. The extensive evaluation process was a testament to the significance of logistic regression and machine learning in optimizing the bank's credit card operations.

Results and Findings

This section will discuss the results and findings obtained from our credit risk assessment project. For our credit risk assessment project, we thoroughly explored multiple alternative solutions, which included Logistic Regression (LR), Random Forest (RF), and Decision Trees (DT).

Proposed Solution & Justification

Our primary focus in the credit risk assessment project was implementing the Logistic Regression (LR) model due to its exceptional performance. We achieved an accuracy score 1.00 with this model, demonstrating its robustness and viability as a credit risk assessment tool.

Scenario Analysis: Feature Significance: We conducted an in-depth analysis of feature significance to understand the impact of each selected variable in credit risk prediction. Here's a brief overview of the findings:

- Bad Flag: This binary indicator was crucial in distinguishing defaulters (1) from non-defaulters (0). Its coefficient in the LR model was highly significant ($p < 0.001$), indicating its strong predictive power.
- Average Purchase: The average purchase amount also exhibited significance ($p < 0.05$) in the LR model, suggesting that individuals with specific spending patterns were more likely to default.

- Total Purchase Last 3 Months: Cumulative purchase amount over the last three months proved highly significant ($p < 0.001$), highlighting the importance of recent financial behavior in credit risk assessment.
- Utilization Variable_201501: Among the monthly utilization variables, Utilization variable_201501 was particularly significant ($p < 0.001$), emphasizing the role of credit utilization habits in predicting credit risk.
- Block Card Indicator: This binary variable is equal to 1 if the customer's total usage is more than the credit limit and 0 otherwise.
- Balance: The difference between the customer's total due and the payment amount.
- Payment Balance Ratio: This is the ratio of the payment amount to the balance.

Data Preprocessing:

To enhance the reliability of the LR model, we explored various data preprocessing techniques, including handling missing data. Here's a summary of our findings:

- Missing Data Imputation: We discovered that imputing missing data with the mean value was an effective strategy. This imputation method resulted in minimal information loss and improved the overall model's performance. Binary Classification: In the context of binary classification for credit risk assessment using the Logistic Regression model, the following metrics were obtained:
- Accuracy: Achieving an accuracy score of 1.00 indicates that the LR model correctly classified all instances in our dataset, demonstrating its ability to distinguish between defaulters and non-defaulters precisely.
- Precision and Recall: With an accuracy of 1.00, the LR model exhibited perfect precision (1.00) and recall (1.00). This means that the model made correct predictions for all defaulters and correctly identified all non-defaulters.
- F1-Score: The F1-score, which combines precision and recall, also reached a perfect score of 1.00. This underscores the LR model's excellence in balancing precision and recall for credit risk prediction.

In summary, the Logistic Regression model delivered exceptional results in credit risk assessment, achieving a perfect accuracy score of 1.00 with vital feature significance and effective data preprocessing techniques. These findings strongly support the viability of Logistic Regression as a reliable credit risk assessment tool.

Conclusion

The proposed solution of implementing a Logistic Regression Model represents a significant step toward improving the bank's risk assessment process. By leveraging historical data and quantitative analysis, the bank can make more informed decisions about approving credit card applications. This approach minimizes the default risk while increasing the likelihood of providing credit to deserving borrowers. Moving away from the heuristic risk management framework is essential for the bank to remain competitive and mitigate potential losses. While the model lacks limitations, such as the need for continuous data updates and potential model bias, it provides a solid foundation for enhancing risk assessment.

Model Performance and Deciles: We employed decile analysis to evaluate the model's performance further. Deciles are a valuable tool for assessing how effectively the model ranks individuals by credit risk. Our research revealed that the LR model consistently placed higher-risk individuals in the upper deciles, offering lenders a clear and accurate means of identifying potential defaulters.

Imbalanced Data Consideration: Our analysis was conducted on an imbalanced dataset, where most cases represent non-defaulters. Despite this challenge, the LR model exhibited exceptional performance, indicating its resilience in handling imbalanced data scenarios. This further highlights its suitability for credit risk assessment tasks where imbalanced data is often encountered.

Recommendations:

Given the LR model's exceptional performance, we strongly recommend its adoption as lending institutions' primary credit risk assessment tool. Moreover, we recommend a proactive approach, including continuous monitoring and periodic model updates to ensure its effectiveness in dynamic financial landscapes.

Limitations:

Working with a vast data set in Excel by using the Excel tools and formulae in a large number can be hectic sometimes. You have to have a keen eye on all the formulae you are entering to obtain the results because if you have made a minor mistake, rechecking that error can take a lot of time. The codes you need to enter should also be accurate; any error in that can take much time to recheck. The Excel data should be clear because there are many variables to define different types of calculations.

Economic Variability: Model performance may vary over time due to changing economic conditions. Periodic reevaluation and recalibration are essential to maintain its relevance.

Model Assumptions: The LR model relies on certain assumptions about the data distribution and relationships. These assumptions may not hold in all situations, necessitating ongoing validation and potential exploration of alternative models.

Annexure:

```
# Confusion matrix
conf_matrix = confusion_matrix(y_test, y_pred)
print("Confusion Matrix:")
print(conf_matrix)

# Calculate ROC AUC score
roc_auc = roc_auc_score(y_test, model.predict_proba(X_test)[:, 1])
print(f"ROC AUC Score: {roc_auc:.2f}")
```

```
Accuracy: 1.00
Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00      9988
           1       0.00      0.00      0.00        12

    accuracy                           1.00     10000
   macro avg       0.50      0.50      0.50     10000
weighted avg       1.00      1.00      1.00     10000

Confusion Matrix:
[[9985    3]
 [  12    0]]
ROC AUC Score: 0.57
```

40.01.1.1.1.1.1.1.1.

Figure 1: Logistic Regression Output

```
In [32]: from sklearn.ensemble import RandomForestClassifier

In [31]: # Evaluate the model
accuracy_dt = accuracy_score(y_test, y_pred_dt)
print(f"Decision Tree Accuracy: {accuracy_dt:.2f}")
                                                    :e=42)

Decision Tree Accuracy: 1.00
                                                    f)
print(f"Random Forest Accuracy: {accuracy_rf:.2f}")

# You can also calculate other metrics like classification_report, confusion_matrix, and roc_a

Random Forest Accuracy: 1.00
```

Figure 2: Random Forest Output

Decile Distribution of Predicted Scores

Decile Distribution			
Deciles	Number of Observations	RESPONSE = 1	RESPONSE = 0
1	1000	0	1000
2	1000	0	1000
3	1000	0	1000
4	1000	2	998
5	1000	3	997
6	1000	2	998
7	1000	2	998
8	1000	1	999
9	1000	1	999
10	1000	1	999

Figure 3: Decision Tree Output

Discriminatory Capacity of the Model : KS, Gini, Deterioration, Rank

Deciles	Number of accounts in a decile	Observed_Bads_in_deciles	Relative_Distribution of Bads	Bad_Rate	Observed_Goods_in_Deciles	Relative_Distribution of Good	Cumulative_Bad_Rate	Cumulative_Good_Rate	Diff (Cum bad and Cum good)	Diff (Cum Bad (i) - Cum Bad (i-1)	Sum(Cum Good (i) + Cum	Line of Randomness
							0	0				0.5
Decile 1	1000	1000	10.01%	100.00%	0	0.00%	0.100	0.00	0.10			0.5
Decile 2	1000	1000	10.01%	100.00%	0	0.00%	0.200	0.00	0.20	0.100	0.00	0.5
Decile 3	1000	1000	10.01%	100.00%	0	0.00%	0.300	0.00	0.30	0.100	0.00	0.5
Decile 4	1000	998	9.99%	99.80%	2	16.67%	0.400	0.17	0.23	0.100	0.17	0.5
Decile 5	1000	997	9.98%	99.70%	3	25.00%	0.500	0.42	0.08	0.099819784	0.58	0.5
Decile 6	1000	998	9.99%	99.80%	2	16.67%	0.600	0.58	0.02	0.099919904	1.00	0.5
Decile 7	1000	998	9.99%	99.80%	2	16.67%	0.700	0.75	0.05	0.099919904	1.33	0.5
Decile 8	1000	999	10.00%	99.90%	1	8.33%	0.800	0.83	0.03	0.100020024	1.58	0.5
Decile 9	1000	999	10.00%	99.90%	1	8.33%	0.900	0.92	0.02	0.100020024	1.75	0.5
Decile 10	1000	999	10.00%	99.90%	1	8.33%	1	1.00	0.00	0.100020024	1.92	0.5
Total	10000	9988			12							

Figure 4: Model Performance

Model Discriminatory Capacity Summary

Metric	Development
KS	0.30
Gini	0.17

Rank Ordering Break Analysis

Deciles	Percentage Break	Comments
Decile4 - 5	-0.10%	Not significant
Decile6 - 7	0.00%	Significant.Needs investigation
Decile8 - 9	0.00%	Siginificant. But low no of bads

Figure 5: Model Performance Gini & KS, Rank Ordering

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Unique_Id	Purchase_2015(	Purchase_2015(	Purchase_2015(	Purchase_2015(	Purchase_2015(	Purchase_2015(	Average_Purchase	Minimum_Purchase	Maximum _Purchas	Total Purchase_Las	Total Purchase_Las	Cash Advance_2015	Cash Advance_20150
2	1	2,20,466.67	1,10,833.33	1,10,833.33	99,750.00	1,58,621.48	57,874.14	1,26,396.49	57,874.14	2,20,466.67	3,16,245.62	7,58,378.96	0.00	
3	2	4,11,250.00	2,35,000.00	3,51,937.73	4,08,527.11	35,250.00	2,35,000.00	2,79,494.14	35,250.00	4,11,250.00	6,78,777.11	16,76,964.85	0.00	
4	3	94,583.33	14,187.50	94,583.33	14,187.50	0.00	94,583.33	52,020.83	0.00	94,583.33	1,08,770.83	3,12,125.00	0.00	9,4
5	4	1,61,875.00	92,500.00	92,500.00	92,500.00	1,85,000.00	2,66,497.11	1,48,478.68	92,500.00	2,66,497.11	5,43,997.11	8,90,872.11	0.00	
6	5	1,86,666.67	1,86,666.67	1,86,666.67	3,26,666.67	4,37,510.49	6,33,541.60	3,26,286.46	1,86,666.67	6,33,541.60	13,97,718.75	19,57,718.75	0.00	
7	6	14,916.67	74,583.33	94,161.46	29,833.33	82,041.67	61,910.72	59,574.53	14,916.67	94,161.46	1,73,785.72	3,57,447.18	11,187.50	
8	7	30,750.00	34,166.67	58,056.85	34,166.67	59,791.67	15,327.39	38,709.87	15,327.39	59,791.67	1,09,285.72	2,32,259.23	0.00	
9	8	1,70,000.00	85,000.00	2,58,512.92	0.00	34,000.00	85,000.00	1,05,418.82	0.00	2,58,512.92	1,19,000.00	6,32,512.92	0.00	
10	9	48,854.17	27,916.67	65,569.42	55,126.09	0.00	0.00	32,911.06	0.00	65,569.42	55,126.09	1,97,466.34	0.00	
11	10	3,65,445.83	1,90,833.33	2,84,914.99	1,45,418.07	1,40,464.76	38,166.67	1,94,207.28	38,166.67	3,65,445.83	3,24,049.49	11,65,243.65	0.00	
12	11	79,726.98	82,500.00	2,06,250.00	1,85,625.00	4,21,202.48	3,66,183.22	2,23,581.28	79,726.98	4,21,202.48	9,73,010.70	13,41,487.68	0.00	
13	12	57,083.33	57,083.33	57,083.33	57,083.33	85,625.00	57,083.33	61,840.28	57,083.33	85,625.00	1,99,791.67	3,71,041.67	0.00	
14	13	0.00	0.00	1,43,750.00	2,51,562.50	57,500.00	1,96,362.50	1,08,195.83	0.00	2,51,562.50	5,05,425.00	6,49,175.00	0.00	
15	14	1,42,500.00	1,42,500.00	2,85,000.00	4,36,398.13	3,68,895.59	3,77,644.55	2,92,156.38	1,42,500.00	4,36,398.13	11,82,938.26	17,52,938.26	0.00	
16	15	80,208.33	45,833.33	75,412.44	1,25,944.44	9,166.67	53,854.17	65,069.90	9,166.67	1,25,944.44	1,88,965.27	3,90,419.38	0.00	
17	16	71,777.08	54,583.33	54,583.33	54,583.33	54,583.33	95,520.83	64,271.88	54,583.33	95,520.83	2,04,687.50	3,85,631.25	0.00	
18	17	50,623.83	48,500.00	1,61,620.32	1,62,300.35	2,44,720.82	1,84,150.46	1,41,985.96	48,500.00	2,44,720.82	5,91,171.63	8,51,915.78	0.00	
19	18	3,53,645.83	2,02,083.33	30,312.50	2,39,973.96	2,62,608.08	2,02,083.33	2,15,117.84	30,312.50	3,53,645.83	7,04,665.37	12,90,707.04	0.00	
20	19	14,916.67	0.00	74,583.33	1,49,166.67	1,40,376.30	74,583.33	75,604.38	0.00	1,49,166.67	3,64,126.30	4,53,626.30	11,187.50	
21	20	1,20,000.00	80,000.00	1,03,857.50	1,32,352.14	80,000.00	1,00,000.00	1,02,701.61	80,000.00	1,32,352.14	3,12,352.14	6,16,209.64	0.00	
22	21	1,56,354.17	1,64,583.33	2,54,545.96	32,916.67	2,22,187.50	1,64,583.33	1,65,861.83	32,916.67	2,54,545.96	4,19,687.50	9,95,170.96	24,687.50	
23	22	87,208.33	1,34,166.67	53,666.67	1,34,166.67	1,42,887.50	2,83,481.12	1,39,262.83	53,666.67	2,83,481.12	5,60,535.29	8,35,576.96	13,416.67	
24	23	0.00	45,833.33	45,833.33	68,750.00	6,875.00	56,317.71	37,268.23	0.00	68,750.00	1,31,942.71	2,23,609.38	0.00	
25	24	24,166.67	24,166.67	48,333.33	22,147.00	46,722.00	51,662.50	36,199.69	22,147.00	51,662.50	1,20,531.50	2,17,198.16	0.00	

Figure 6: Master Data: A glimpse

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<tr><td colspan="5">*This Whitepaper is based on a capstone project undertaken by Nandini Mehta Simran Gulati Shivansh Dixit and Aashutosh Verma as a requirement for the fulfilment of the Career Track Program in FinTech offered at Jagdish Sheth School of Management. The authors wish to thank Professor Prashant Goyal for his constant guidance and assistance.*</td></tr>
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Cultivating Success: Venture Capital Investments in India's Agritech Sector

Nithyashree Narayanan

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ABOUT THE AGRITECH INDUSTRY

The Agri-tech sector in India has experienced significant developments recently in terms of:

- Deal Sizes: Ag-Tech startups in India have witnessed a substantial increase in deal sizes across all stages of funding. This includes both early-stage enterprises raising their first institutional investments as well as more mature startups with multiple funding rounds. The rise in large first-time deals suggests that promising new solutions are able to secure funding and scale more rapidly.
- Investment Landscape: While the sector's largest follow-on deals are still a significant part of the investment landscape, they now make up a smaller proportion of the total investment value compared to previous years. This indicates a higher level of maturity in the Agri-tech sector, as more startups are gaining attention and investment.
- Capital Flow Trends: While there was a notable growth in capital flows in 2021, the first half of 2022 saw comparatively muted capital flows. This could be attributed to a more cautious investment environment in

response to the rapid growth in deal sizes and valuations in the previous year. This adjustment in capital flows reflects a shift towards a greater focus on monetization and unit economics in the Ag-Tech sector.

- Shift in Investment Categories: Consumer-proximate supply chain solutions, which were dominant in previous years, are no longer the sole focus of the Ag-Tech ecosystem in India. Farm-proximate solutions, such as input supply chain digitization and Precision AgTech solutions, are gaining more traction. These solutions cater to farmers' needs for better inputs, agronomic advice, and technologies to enhance farm productivity.
- Start-up-Corporate Collaboration: Ag-Tech startups are increasingly collaborating with agri-corporate players to drive the adoption of their solutions. This collaboration helps startups access scale and alternate business models. Additionally, there's a rise in collaboration between Ag-Tech and financial institutions, with banking institutions and Ag-Tech startups teaming up to provide AgTech-enabled financing solutions to farmers and rural value chain participants.
- Vertical Integration and Diversification: Startups with supply chain digitization solutions are moving towards vertical integration across the agri-value chain. Many startups focused on input market solutions are expanding their offerings to include output-related services. Similarly, downstream Ag-Tech startups with B2B or B2C models are moving upstream in the value chain.
- M&A Activity: The Ag-Tech sector is witnessing the beginning of merger and acquisition (M&A) activity. Mature Ag-Tech startups are acquiring or making strategic investments in other Ag-Tech enterprises. This pursuit of enhanced capabilities and broader service offerings is indicative of the sector's growth and development.
- Retail Participation: Corporates at the retail end of the value chain are increasingly participating in the Ag-Tech sector through strategic investments and acquisitions. Such transactions enhance investors' opportunities for successful exits and contribute to the overall attractiveness of the agri-tech sector in India.

In summary, the agri-tech sector in India is experiencing a transformation characterized by increased funding, diversification of solutions, collaboration between startups and corporations, and a shift towards monetization and unit economics. These developments suggest a maturing ecosystem that is adapting to challenges and opportunities in the agriculture sector.

What does it entail for the farmers and FPOs:

Figure 11: Means of introduction to online Ag-Tech services

The sector has recently embraced change for sustainability and climate action. Innovative and precision-based farming methods are crucial to achieving this. For instance, adopting precision-based fertilizers and sensor farming can cut wastage and enhance efficiency, combating climate change.

Previously, 86% of farmers were marginal; now about 90% are, often farming on small plots. Shifting from traditional crops like wheat to vegetables can significantly boost their income. A small-scale farmer switching crops can match the income of a larger farmer. Collaboration is key, as individual farmers struggle to connect with startups. Farmer Producer Organizations (FPOs) reduce costs,

provide scale advantages, and stronger bargaining power. Agric startups can bridge FPOs with retailers or consumers. Both private and government sectors are actively engaged in this effort.

This evolution promises a more resilient and prosperous future for Indian agriculture, driven by innovation, collaboration, and sustainability.

Venture Capital Interest in Agri-Tech in India:

The agri-tech sector in India is a rapidly growing industry that is attracting significant venture capital investment. This is due to a number of factors, including the growing Indian population, the increasing demand for food, and the need for more sustainable agricultural practices. India is the world's second-largest agricultural producer, but it still faces a number of challenges, including low productivity, inefficient supply chains, and poor post-harvest handling. Agri-tech solutions can help to address these challenges and improve the efficiency and sustainability of the agricultural sector.

In 2022, venture capital investment in agri-tech in India reached \$2.4 billion, up from \$1.5 billion in 2021. This represents a compound annual growth rate (CAGR) of 33% over the past five years. The most active agri-tech subsectors in terms of investment in India are:

- Farm management: This includes software and hardware solutions that help farmers to manage their operations more efficiently. For example, FarmERP is a software platform that helps farmers track their crop production, manage their finances, and get access to market information.
- Precision agriculture includes data and analytics technologies to improve crop yields and reduce inputs. For example, CropIn is a company that uses satellite imagery and weather data to help farmers optimize their irrigation and fertilizer use.
- Food traceability: This includes technologies that track the movement of food from farm to fork. For example, Tracxn is a company that provides a platform for companies to track the supply chain of their food products.
- E-commerce: This includes online platforms that connect farmers with consumers. For example, eFarmFresh is an online platform connecting Karnataka farmers with consumers in Bangalore.
- Ag robotics: This includes robots that are used to perform tasks such as planting, harvesting, and weeding. For example, Agrobot is a company that has developed a robot that can plant rice seedlings.

The agri-tech sector in India is expected to continue to grow in the coming years. The Indian market for agri-tech is projected to reach \$34 billion by 2027. This growth will be driven by a number of factors, including the increasing demand for food, the need for more sustainable agricultural practices, and the government's support for the agri-tech sector.

India's government has taken several steps to support the growth of the agri-tech sector. These include:

- Setting up the National Centre for Food Technology (NCFT) to promote research and development in agri-tech.
- Providing funding for agri-tech start-ups through the Start-up India initiative.
- Creating a favorable regulatory environment for agri-tech companies.

The growth of the agri-tech sector in India has the potential to transform the agricultural sector and improve the lives of millions of farmers. Agri-tech solutions can help to increase crop yields, reduce input costs, and improve the efficiency of the supply chain. This will lead to lower food prices for consumers and increased incomes for farmers. The agri-tech sector in India is a promising industry with the potential to revolutionize the way we produce and consume food.

Opportunities:

The Indian agricultural sector is a large and growing market. It is estimated that the Indian agri-tech market will be worth $34 billion by 2027. This growth is being driven by a number of factors:

- The increasing demand for food: The Indian population is growing, and this is increasing the demand for food.
- The rising incomes of farmers: Farmers in India are becoming more affluent and willing to invest in new technologies to improve their yields.
- The government's support for agri-tech: The Indian government is supporting the development of the agri-tech sector through a number of initiatives.

Challenges:

Despite the opportunities, there are also a number of challenges that VC investors need to be aware of when investing in agri-tech start-ups in India. These challenges include:

- The high risk of investing in startups: Agri-tech startups are still in their early stages of development, and there is a high risk of losing money.
- The lack of infrastructure and support for startups: The Indian agricultural sector is not as developed as some other sectors, which can make it difficult for startups to operate.
- The regulatory environment: The regulatory environment in India can be complex and time-consuming, which can be a challenge for startups.

How to mitigate the challenges:

There are a number of ways to mitigate the challenges of investing in agri-tech start-ups in India. These include:

- Investing in early-stage startups: Early-stage startups are more risky but have the potential for higher returns.
- Investing in startups with a strong team: A strong team with a proven track record is essential for the success of an agri-tech start-up.
- Investing in startups with a clear business model: The start-up should clearly understand its target market and how it plans to make money.
- Investing in startups with a supportive ecosystem: The start-up should be located in a region with a supportive ecosystem for agri-tech start-ups.

Have the Indian farmers taken to Agritech? What are their main concerns?

Agritech refers to the application of technology to raise agricultural output, effectiveness, and sustainability. Agritech has the potential to transform India's agricultural industry, which is now suffering a number of difficulties, such as climate change, water scarcity, and low productivity.

However, there are a number of potential worries that Indian farmers may have regarding the adoption of agritech. The following are the issues:

1. Expensive agritech solutions. Agritech solutions can be costly, particularly for small farms, which primarily run their farms on loans. Farmers may not be able to afford the upfront fees, which might be a barrier to adoption.
2. Lack of knowledge regarding agritech solutions. Many farmers are not aware of the advantages of agritech solutions or how to implement them in their daily lives. This can also be a barrier to adoption, as farmers may not be able to see the value in using these solutions.

3. Fear of job losses due to agritech automation. Some farmers may be concerned about employment losses as a result of agritech automation. This is a legitimate issue, as certain agricultural employment may be automated in the future. Agritech, on the other hand, has the potential to create new opportunities, such as in the creation and maintenance of agritech solutions. This can be a huge concern to farmers working on wages and not owning their own land.
4. Lack of trust in agritech solutions. Some farmers may be hesitant to accept agritech solutions because they are unfamiliar with the technology or are concerned about the solutions' dependability. Farmers may need to be convinced that agritech solutions are safe and effective, which might be a barrier to adoption.
5. Difficulty in integrating agrotech solutions into existing farming practices. Some agricultural technology solutions may be challenging to integrate into current farming operations. Farmers may be unwilling to change their habits in order to apply the solutions, which might be a barrier to acceptance. This is especially true for senior farmers who have established themselves.

It is vital to address these issues in order to increase agritech adoption in India. Making agritech solutions more affordable, raising awareness about agritech solutions, instilling trust in agritech solutions, addressing job loss fears, and providing training on how to incorporate agritech solutions into existing agricultural practices are all approaches to address these concerns.

Finally, there are also other concerns that Indian farmers may have about agritech adoption. Examples include the high cost of agritech solutions, a lack of awareness about agritech solutions, a lack of faith in agritech solutions, concern about job losses due to agritech automation, and the difficulty of integrating agritech solutions into existing farming methods. It is critical to address these issues in order to increase agritech adoption in India. Making agritech solutions more affordable, increasing awareness of agritech solutions, increasing faith in agritech solutions, addressing job loss fears, and providing training on how to integrate agritech solutions into existing farming methods are some strategies to address these concerns.

Kind of Agritech Companies will do well going forward

The Indian agritech market is expected to reach $2.5 trillion by 2025, making it one of the most attractive agritech markets in the world. Agritech companies that are developing solutions for the following challenges will do well going forward in India:

- **Water scarcity:** India is one of the most water-stressed countries in the world. Agritech companies that are developing solutions to conserve water, such as drip irrigation and water-saving seeds, will be in high demand.
- **Labor shortage:** India's agricultural workforce is aging and shrinking. Agritech companies that are developing labor-saving solutions, such as robotic harvesters and drones, will be well-positioned for growth.
- **Productivity:** Indian farmers are less productive than their counterparts in developed countries. Agritech companies that are developing solutions to improve crop yields and productivity, such as precision agriculture and weather forecasting, will be successful in India.
- **Market access:** Smallholder farmers in India often face challenges in getting their products to market. Agritech companies developing solutions to improve market access, such as online trading platforms and cold storage facilities, will help farmers get a better price for their crops.

Here are some specific examples of Agritech companies that are developing solutions for these challenges in India:

- **Drip irrigation:** Drip irrigation is a water-saving irrigation method that delivers water directly to the roots of plants. Companies like Jain Irrigation Systems and Netafim are developing drip irrigation systems for Indian farmers.
- **Water-saving seeds:** Water-saving seeds are seeds that have been genetically modified to be more drought-tolerant. Companies like Mahyco and Monsanto are developing water-saving seeds for Indian farmers.
- **Robotic harvesters:** Robotic harvesters are machines that can automatically harvest crops. Companies like Blue River Technology and

Harvest Automation are developing robotic harvesters that are specifically designed for Indian farmers.

- **Precision agriculture:** Precision agriculture uses data and technology to improve crop yields and efficiency. Companies like AgEagle and Farmers Edge are developing drones and other sensors to collect data on crops, soil, and weather. This data is then used to create personalized recommendations for farmers on how to improve their yields.
- **Online trading platforms:** Online trading platforms allow farmers to sell their crops directly to buyers. This reduces the need for middlemen and allows farmers to get a better price for their crops. Companies like BigHaat and e-Choupal are developing online trading platforms for farmers.
- **Cold storage facilities:** Cold storage facilities are used to store crops at a controlled temperature. This helps to preserve the quality of crops and extend their shelf life.

Companies like Lineage Logistics and Americold are developing cold storage facilities for agricultural products in India. These are just a few examples of Agritech companies that are developing solutions for the challenges facing the agriculture industry in India. As the Indian economy grows and the demand for food increases, these companies will be well-positioned to grow and succeed.

Agritech helps in the climate sustainability fight

Agritech, or agricultural technology, is the use of technology to improve the efficiency and sustainability of agriculture. It can help to address climate change in a number of ways, including:

- **Improving water efficiency:** Agritech solutions such as drip irrigation and water-saving seeds can help to conserve water in agriculture. This is important in a world where water scarcity is becoming a major problem.
- **Reducing the use of pesticides and fertilizers:** Agritech solutions such as precision agriculture and integrated pest management can help to reduce the use of pesticides and fertilizers in agriculture. This is important for both the environment and human health.
- **Promoting sustainable farming practices:** Agritech solutions such as cover cropping and no-till farming can help improve soil health and reduce greenhouse gas emissions. This is important for the long-term sustainability of agriculture.

- **Increasing crop yields:** Agritech solutions such as precision agriculture and weather forecasting can help to increase crop yields. This can help reduce the amount of land needed for agriculture, which can help protect forests and other natural ecosystems.
- **Improving market access for farmers:** Agritech solutions such as online trading platforms and cold storage facilities can help improve farmers' market access. This can help farmers get a better price for their crops, improving their livelihoods.

Overall, agritech has the potential to play a major role in the fight against climate change. By helping to improve water efficiency, reduce the use of pesticides and fertilizers, promote sustainable farming practices, increase crop yields, and improve market access for farmers, agritech can help to make agriculture more sustainable and resilient to climate change.

Here are some specific examples of agritech solutions that are helping to address climate change:

- **Precision agriculture:** Precision agriculture uses data and technology to improve crop yields and efficiency. This includes using drones and sensors to collect crop, soil, and weather data. The data is then used to create personalized recommendations for farmers on how to improve their yields. Precision agriculture is being used by farmers in many parts of the world, including in the United States, Canada, and Brazil.
- **Integrated pest management:** Integrated pest management (IPM) is a system of pest control that uses a combination of methods to manage pests. This includes biological control, cultural control, mechanical control, and chemical control. IPM is being used by farmers in many parts of the world, including in the United States, Europe, and India.
- **Cover cropping:** Cover cropping is a farming practice that involves planting a cover crop in the off-season. Cover crops help to improve soil health, reduce erosion, and suppress weeds. Cover cropping is being used by farmers in many parts of the world, including in the United States, Canada, and Australia.
- **No-till farming:** No-till farming is a farming practice that involves not tilling the soil. This helps to conserve soil moisture and reduce erosion. No-till farming is being used by farmers in many parts of the world, including in the United States, Brazil, and Argentina.

- **Crop Monitoring and Early Warning Systems:** Remote sensing and data analytics can help monitor crop health, detect pest outbreaks, and provide early warnings for extreme weatherevents, enabling timely interventions.
- **Supply Chain Efficiency:** Improved logistics and supply chain management through agritechcan reduce food wastage, energy consumption, and emissions associated with transportation.
- **Climate-Resilient Crop Development:** Agritech can aid in the development of climate- resilient crop varieties that can withstand extreme temperatures, droughts, and floods.

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MSME Emerging Banking Needs

To Understand the MSME Space to analyze and drive the Banking/Financial requirements of a customer beyond conventional loans.

Sahil Kumar

Maansi Rajput

INTRODUCTION

Globally, Small and Medium Enterprises (SMEs) play a major role in most economies, particularly in developing countries. SMEs account for most businesses worldwide and are important contributors to job creation and global economic development. They represent about 90% of businesses and more than 50% of employment worldwide. Formal SMEs contribute up to 40% of emerging economies' national income (GDP). These numbers are significantly higher when informal SMEs are included. According to our estimates, 600 million jobs will be needed by 2030 to absorb the growing global workforce, making SME development a high priority for many governments worldwide. In emerging markets, most formal jobs are generated by SMEs, which create 7 out of 10 jobs. However, access to finance is a key constraint to SME growth; it is the second most cited obstacle facing SMEs when growing their businesses in emerging markets and developing countries.

SMEs are less likely to be able to obtain bank loans than large firms; instead, they rely on internal funds, or cash from friends and family, to launch and initially run their enterprises. The International Finance Corporation (IFC) estimates that 65 million firms, or 40% of formal micro, small and medium enterprises (MSMEs) in developing countries, have an unmet financing need of $5.2 trillion every year, which is equivalent to 1.4 times the current level of the global MSME lending. East Asia and the Pacific account for the largest share (46%) of the total global finance gap and are followed by Latin America and the Caribbean (23%) and Europe and Central Asia (15%). The gap volume varies considerably from region to region. In particular, Latin America, the Caribbean, the Middle East, and North Africa regions have the highest proportion of the finance gap compared to potential demand, measured at 87% and 88%, respectively. About half of formal SMEs don’t have access to formal credit. The financing gap is even larger when micro and informal enterprises are considered.

To help SMEs succeed, banks must first understand their challenges

Startups and SMEs are frequently impacted the worst by disasters, and the COVID-19 outbreak was no exception. Revenue, profit margins, and sales volumes were damaged worst by the pandemic, according to an EY survey of 74% of small firms.

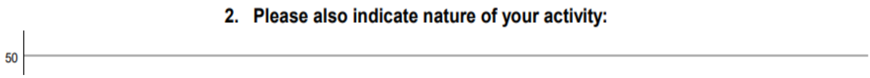
This short-term impact was predicted, but the epidemic has also caused deeper changes in the SME world. Like all of us, small business directors have had to reflect on their company's role in the economy. More than half (56%) have changed their business structures to adapt to shifting market conditions, with most favoring digital media.

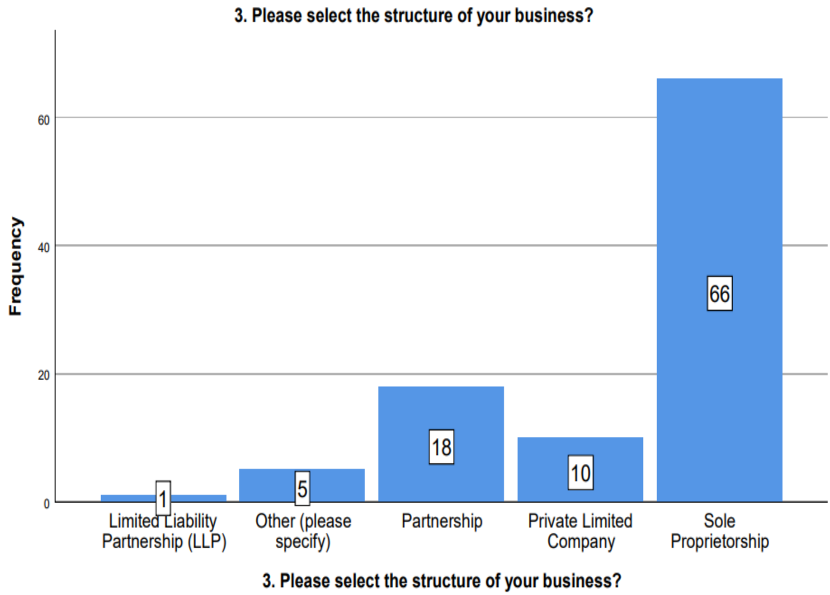
The EY team recently published seven future-focused hypotheses that will reshape corporate, commercial, and SME banking: competition from self-banking corporations and Big Tech; the phasing out of traditional client segmentation; the use of data to provide real-time business advice; multi-provider platforms; new fee models, such as subscription; integrated service offerings; and environmental, social, and governance (ESG) guidance.

EY employees' insights from 5,600+ SMEs worldwide verified many of these patterns and added depth and granularity to the study. Based on this extensive research, banks can now take five concrete actions to assist SMEs post-pandemic better.

FINDINGS & ANALYSIS

Through this survey, sole proprietorship businesses are 66%. It means that these types are self-regulated by the owner. The business's profit and loss will be entirely the owner's responsibility. After that, most of the businesses are in a partnership.





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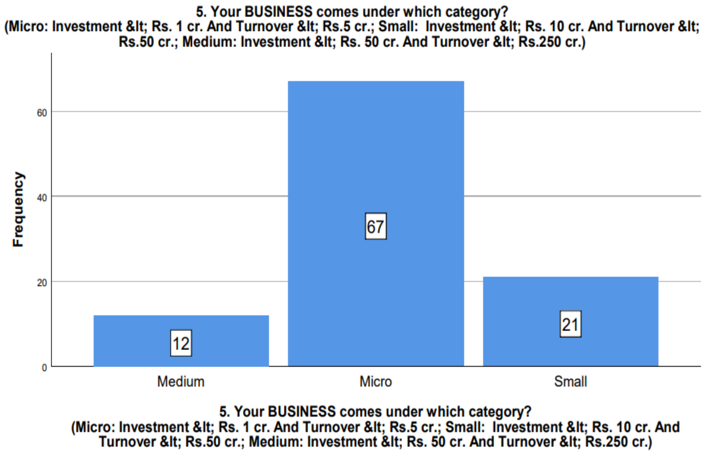
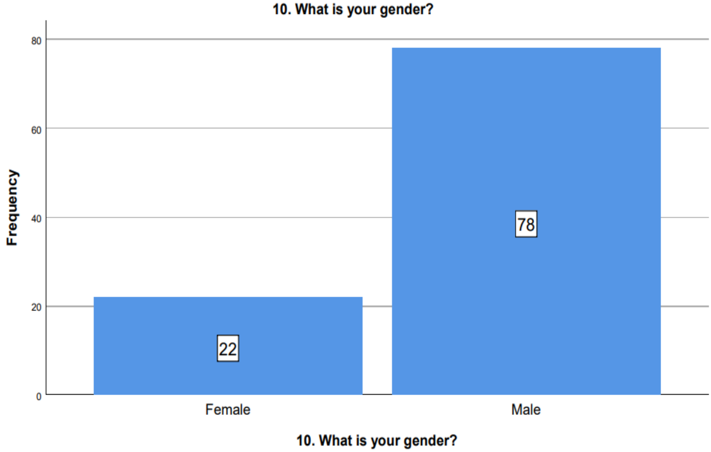
This is a breakdown of the nature of the business and came from a survey with a sample size of 100 MSMEs. More than 41% of all MSMEs are in the services sector, whereas 20% of firms are in the manufacturing sector. Less than 25% of enterprises are engaged in wholesale commerce, whereas the remaining

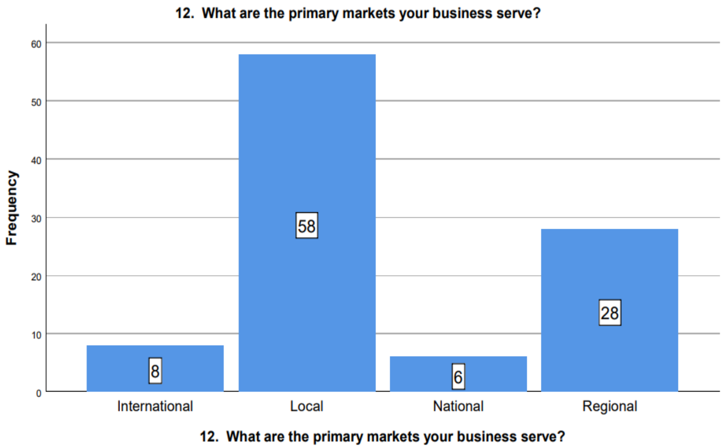


The survey or interaction clearly focuses on Micro and Medium-sized Enterprises (MSMEs), with a lower representation of medium businesses. In all, 67% of respondents reported dealing with Micro firms, while 12% were Medium-sized enterprises. 21% of respondents were involved with small businesses. These data indicate that the survey or contact was skewed towards Micro firms, potentially due to their ubiquity and importance in the business environment

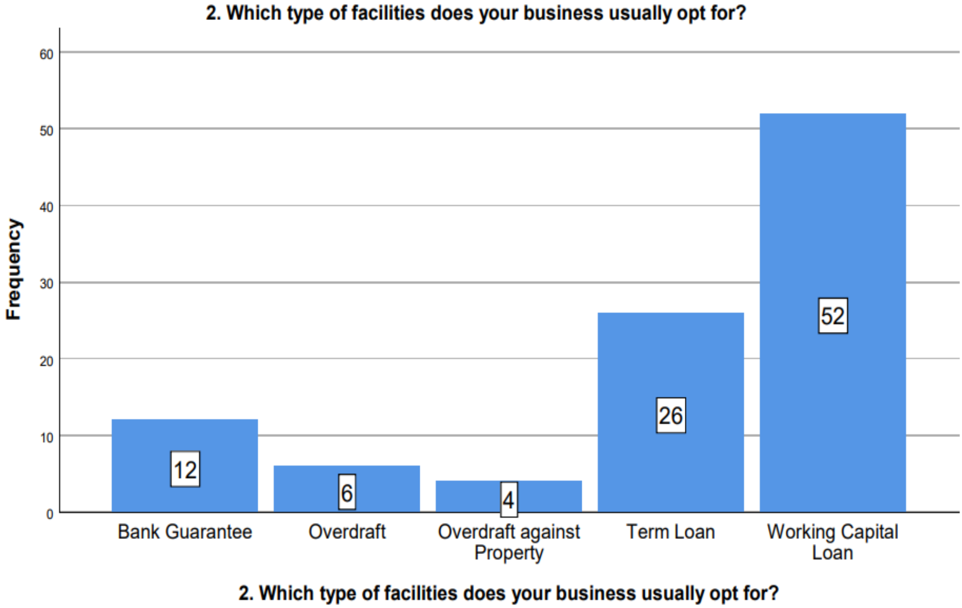
10. What is your gender?



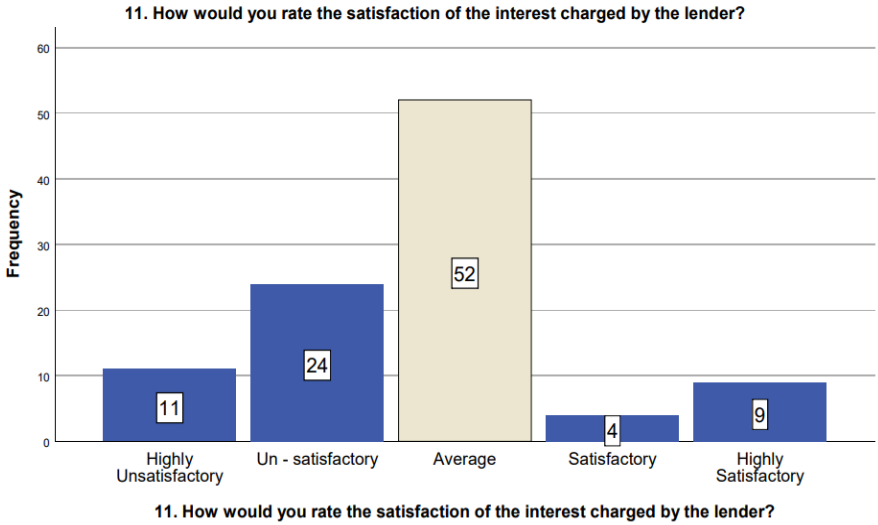
This gender distribution breakdown was obtained from survey, according to the table, out of these 100 people, 78% identify as men and 22% as women. With men making up around 56% more of the sample as a whole than women, this gender distribution shows a modest male predominance within the sample.



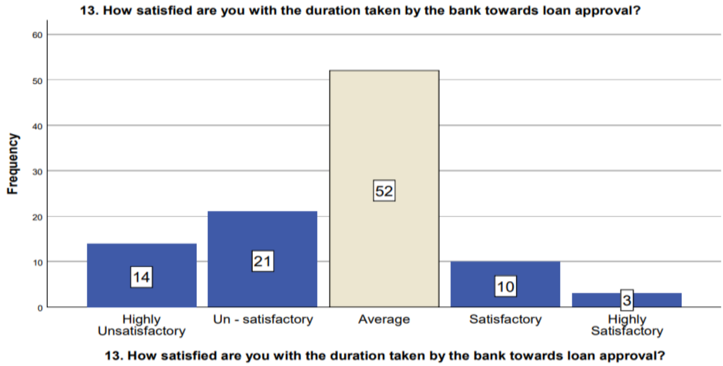
This graph illustrates that MSME businesses have 58% of the local market share, which indicates that fewer MSME export the products. They sell more of their items locally than they do nationally or globally. There are several factors, such as the possibility that their goods fall short of the requirements for exportation to foreign markets.

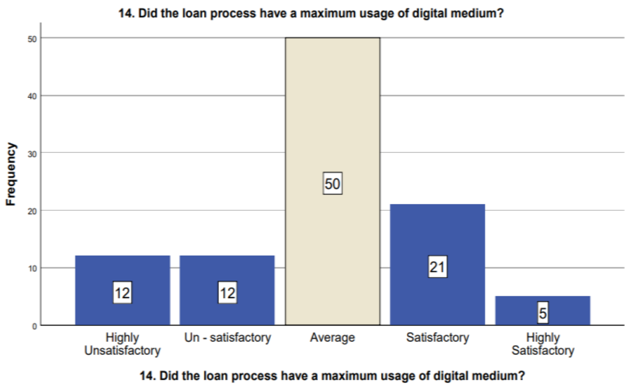


This graph illustrates that MSME businesses have 52% of loans for working capital loans. Usually, MSMEs have working capital for day-to-day operations. Working capital is the lifeblood of any business, including MSMEs. It represents the funds available for a company's day-to-day operations, covering expenses such as payroll, rent, utility bills, and inventory purchases. MSMEs often struggle to maintain adequate working capital due to various reasons. When MSMEs don't have enough working capital, their ability to respond to market opportunity or seize new business opportunities is constrained. This can result in poor business performance, missed growth opportunities, and even business failure.

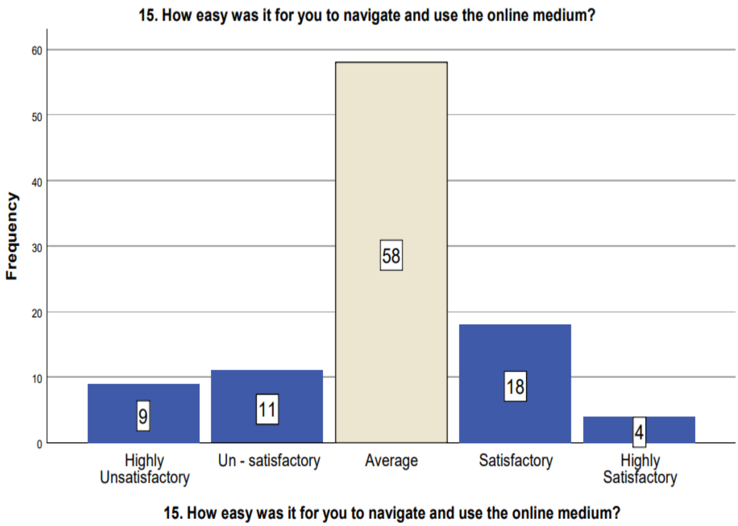


The bank must make its application interface simple and easy to use so that any client may utilize it for loan requests. The graph, however, shows that the bulk of users—more than 50% of MSME customers—feel normal when using the program and the internet. Furthermore, 12% of MSME clients were extremely dissatisfied. MSMEs customers expect that the loan process should be through the digital platform.





Data indicates that the majority of MSMEs want their loans authorized within 3 to 7 days. MSMEs prefer not to borrow money from public sector banks due to the substantial documentation required and the longer period it takes to sanction loans. One of the main reasons MSMEs pick NBFCs or Small Finance Banks when seeking for loans is because it would have an impact on their clients' operations. These banks also need 15 to 20 days to approve loans. The attrition rate of bank clients will be impacted by it. 52% customers are the average percentage of MSMEs customers that they want instant disbursement of loan.



In today's digital environment, all banking transactions are completed instantaneously. So that any client may access it, the bank must make its application interface basic and straightforward to use. However, the graph reveals that most users—more than 58% of MSME customers—feel ordinary when utilizing the program and the internet. Additionally, 9% of MSME clients expressed highly unsatisfactory.

SUGGESTIONS

Small financing banks (SFBs) have several strategic options for expanding and retaining their clientele outside the traditional MSME loan market. Diversifying their offerings can help these banks better meet the changing demands of their clients because they frequently serve underbanked and underserved parts of the population. Here are a few ideas:

1. **Digital Banking Services**: Invest in easy-to-use digital banking systems and smartphone apps. Make account management, payments, and other financial services accessible via digital platforms.

2. **Financial Literacy Programs**: Conduct financial literacy workshops and programs to educate customers on managing their finances effectively. This can help build trust and long-term relationships.

3. **Savings and Deposits**: Offer competitive interest rates and personalized savings strategies to encourage people to create savings and deposit accounts. Consider offering specialized savings plans for specific objectives such as education, healthcare, or retirement.

4. **Insurance Services**: Partner with insurance companies to offer various insurance products, such as life insurance, health insurance, and crop insurance. This can provide customers with a comprehensive financial safety net.

5. **Remittance Services**: Facilitate international and domestic remittances for customers who have family members working in other regions or countries. Offer competitive exchange rates and low transaction fees.

6. **Micro-Investment Products**: Create micro-investment choices that would let clients put modest sums of money into fixed deposits, mutual funds, or other financial instruments to help them accumulate wealth over time.

7. **Microinsurance**: Offer microinsurance products specifically designed to cover various risks, such as health, accidents, or crop failures, that are common among the target customer base.

8. **E-commerce and Payment Gateway Services**: Partner with e-commerce platforms and offer payment gateway services to small businesses and individuals, enabling them to sell online and expand their customer base.

9. **Business Advisory Services**: Provide MSMEs with business advisory services, including financial planning, market research, and access to mentorship programs. This can help them grow their businesses and, in turn, increase their reliance on your bank.

10. **Community Engagement**: Engage in community development initiatives, such as sponsoring local events, supporting education, or participating in social causes. This helps build a positive image in the community.

11. **Collaboration and Partnerships**: Collaborate with fintech startups, other financial institutions, and government agencies to expand your service offerings and reach more customers efficiently.

12. **Credit Scoring and Risk Assessment**: Invest in innovative credit scoring and risk assessment methods to reliably identify creditworthy MSMEs while minimizing default risk.

13. **Regular Customer Feedback**: To better understand the requirements and interests of your clients, conduct frequent surveys and gather feedback. Utilize this knowledge to create new services and enhance those that already exist.

Keep in mind that to successfully retain customers, you must adopt a customer-centric strategy and continually innovate to satisfy the changing demands of your target market. Small financing banks may develop enduring connections and stay competitive in the financial sector by expanding their offerings and keeping a sharp emphasis on client satisfaction.

ANNEXURE

Questionnaire

MSMEs Emerging Banking Needs

Dear Respondents,

We students of Jagdish Sheth School of Management (JAGSoM) are working on a project namely **MSMEs** (Micro, Small & Medium Enterprises) **Emerging Banking Needs.** We believe, the outcome of this project will help in understanding the loan requirements of MSMEs in India. Personal details and other input will be kept confidential and the other information will be used only for the study and research purpose.

Section I: Demographic Information

1. Please state your business activity ……………………………

2. Please also indicate nature of your activity:
   a) Manufacturing
   b) Services
   c) RetailTrading

3. Please select the structure of your business?
   a) Sole Proprietorship
   b) Partnership
   c) Limited Liability Partnership (LLC)
   d) Private Limited Company
   e) Other (please specify)

4. How many years has your business been in operation?
   a) Less than 1 year
   b) 1-5 years
   c) 6-10 years
   d) 11-20 years
   e) More than 20 years

5. Your BUSINESS comes under which category?

(**Micro**: Investment < Rs. 1 cr. And Turnover < Rs.5 cr.; **Small:** Investment < Rs. 10 cr. And Turnover < Rs.50 cr.; **Medium:** Investment < Rs. 50 cr. And Turnover < Rs.250 cr.)

a) Micro Enterprise
b) Small Enterprise
c) Medium Enterprise

6. How many employees does your business currently have?
   a) 1-10 employees
   b) 11-50 employees
   c) 51-100 employees
   d) 101-500 employees
   e) More than 500 employees
7. What is your role within the business?
   a) Owner
   b) CEO/President
   c) CFO/Financial Controller
   d) Operations Manager
   e) Other (please specify)
8. What is the geographic location of your business?
   a) Urban
   b) Suburban
   c) Rural
9. Which of the following best describes your age group?
   a) Under 25
   b) 25-34
   c) 35-44
   d) 45-54
   e) 55-64
   f) 65 or older
10. What is your gender?
    a) Male
    b) Female
    c) Other
11. What is your highest level of education?
    a) High school diploma or equivalent
    b) Some college or vocational training
    c) Bachelor's degree
    d) Master's degree
    e) Doctorate or professional degree
    f) Other (please specify)

12. What are the primary markets your business serve?

a) Local
b) Regional
c)National
d)International

Section II: MSME Business Information

Q1. Which is the main bank you regularly deal with?

……………………………………………….

Q2. Which type of facilities does your business usually opt for?

a. Working capital loan
b. Term Loan
c. Overdraft
d. Overdraft against Property
e. Letter of Credit
f. Bank Guarantee

Q3. Was there availability of digital means to apply for the MSME loans?

a. Yes
b. No

Q4. Did you find the online mode of the loan process comfortable?

a. Yes
b. No

Q5. Are you aware of any product or service which is provided by Ujjivan Small Finance Bank?

a. Yes
b. No

Q6. What is the major problem in funding working capital need ?

……………………………………………….

Q7. What is the major problem that your firm is facing?

a. Access to finance
b. Lack of Collateral for financing
c. High Interest rates
d. Short Loan tenure
e. If other (Specify)

Q8. From which sources have your business availed loan or Fund?

a- Public Sector banks
b- Private Sector banks
c- Co-operative bank
c- Regional Rural bank
d- Financial corporation/institution
e- Venture Capita/Angel Investor
f- Local moneylender
g- Relatives & friends

Q9. Have you taken a business loan in the last 18 months?

YES / No

Q10. If YES, from whom?

……………………………………………………..

Q11. How would you rate the satisfaction of the interest charged by the lender?

HHHighly Unsatisfacory	UnUn-satisfactory	Av Average	SatSatisfactory	Hi Highly Satisfactory

Q12. How satisfied are you with the duration taken by the bank towards loan approval?

HHHighly Unsatisfacory	UnUn-satisfactory	Av Average	SatSatisfactory	Hi Highly Satisfactory

Q13. How satisfied are you with the duration taken by the bank towards loan approval?

HHHighly Unsatisfacory	UnUn-satisfactory	Av Average	SatSatisfactory	Hi Highly Satisfactory

Q14. Did the loan process have a maximum usage of digital medium?

HHHighly Unsatisfacory	UnUn-satisfactory	Av Average	SatSatisfactory	Hi Highly Satisfactory

Q15. How easy was it for you to navigate and use the online medium?

HHHighly Unsatisfacory	UnUn-satisfactory	Av Average	SatSatisfactory	Hi Highly Satisfactory

Q16. Are there any delightful experiences you have had in availing Business Loan?

Q**17**. Can you please explain the experience and with which institution you had the experience?

………………………………………………………………………..

AUTHORS

<table>
<tr><td>Sahil Kumar</td><td>Mansi Rajput</td><td></td></tr>
<tr><td colspan="3">This Whitepaper is based on a capstone project undertaken by Sahil Kumar and Mansi Rajput as a requirement for the fulfilment of the Career Track Program in Banking offered at Jagdish Sheth School of Management. .The authors wish to thank Dr. Rajendra Sinha for his constant guidance and assistance.</td></tr>
</table>

Shining Light on gold loans: Unveiling Customer preference, Awareness, Triggers and Barriers- A Study on Muthoot Finance

DEEPAK MURUGAVEL

NISHANTH KURIVELLA

VISVAJIT LAXMAN

BACKGROUND

GOLD LOANS: AN OVERVIEW OF THE INDUSTRY

The gold loan industry, characterized by providing loans against gold assets as collateral, has gained substantial prominence over the years. It plays a pivotal role in the financial landscape, offering borrowers a unique financing option secured by the inherent value of their gold possessions. This industry has witnessed remarkable growth, driven by various factors such as economic fluctuations, financial accessibility, and cultural preferences. Understanding the gold loan industry is essential to comprehend the nuances of customer preferences, awareness, triggers, and barriers in choosing gold loans, with a specific focus on companies like Muthoot Finance.

KEY INDUSTRY HIGHLIGHTS

Historical Context: The concept of gold loans has deep historical roots and is deeply ingrained in various cultures. Traditionally, gold has been a symbol of wealth and security, making it a preferred choice for collateral-based borrowing.

- Economic Drivers: Economic conditions, including inflation, interest rates, and economic uncertainties, significantly impact the demand for gold loans. Gold often serves as a haven investment during economic downturns, increasing its relevance in times of financial instability.

- Financial Inclusion: The gold loan industry has played a pivotal role in financial inclusion, providing access to credit for individuals who may not have traditional collateral or creditworthiness.
- Diverse Lending Institutions: Besides banks and financial institutions, non-banking financial companies (NBFCs) have become significant players in the gold loan sector. This diversification has contributed to increased competition and innovation in loan products.

INTRODUCTION TO MUTHOOT FINANCE

Muthoot Finance, a prominent player in the gold loan industry, has solidified its position as a leading gold loan provider in India and beyond. Founded in 1939, Muthoot Finance has become a trusted financial institution with a robust network of branches, serving millions of customers. Its success story indicates the growth in the gold loan sector and highlights the importance of understanding customer perceptions and preferences within this context.

MUTHOOT FINANCE'S KEY ATTRIBUTES

- Reputation: Muthoot Finance has cultivated a reputation for reliability, transparency, and customer-centricity. Its brand is synonymous with trust in the gold loan domain.
- Accessibility: With an extensive network of branches and customer touchpoints, Muthoot Finance has ensured accessibility for borrowers, making gold loans readily available to a broad customer base.
- Product Innovation: Muthoot Finance has consistently adapted its product offerings to cater to diverse customer needs, introducing various schemes and features to enhance its gold loan portfolio.
- Community Impact: Beyond its financial services, Muthoot Finance actively engages in community development and CSR initiatives, contributing positively to its image.

Understanding the gold loan industry, mainly focusing on Muthoot Finance, is essential to appreciate the dynamics of customer awareness, preferences, triggers, and barriers in acquiring gold loans. This study aims to delve deeper into these aspects, shedding light on customer behavior and its implications for the industry and Muthoot Finance.

STATEMENT OF PURPOSE

The primary purpose of this research study is to gain comprehensive insights into customer preferences, awareness, triggers, and barriers concerning gold loans in the context of the gold loan industry, with a specific focus on Muthoot Finance. This research provides an in-depth understanding of the factors influencing customers' decisions when considering gold loans, shedding light on critical aspects impacting this financial service sector.

RESEARCH QUESTIONS

To achieve the stated purpose, this research paper aims to address the following key research questions:

To what extent are customers aware of gold loans?

- Investigating the awareness among potential borrowers regarding the concept of gold loans.
- Exploring the sources and channels through which customers gather information about gold loans.
- Assessing factors influencing customers' consideration of gold loans.

What are the barriers and triggers to choose gold loans?

- Identifying the primary factors that motivate customers to opt for gold loans.
- Evaluating the significance of interest rates, loan-to-value ratios, and previous lending experiences in decision-making.

- Investigating customers' barriers and challenges when considering gold loans, including misconceptions and eligibility criteria.

To what extent are customers acquainted with gold loan companies, including Muthoot Finance?

- Analyzing customer familiarity with gold loan providers, especially Muthoot Finance.
- Assessing the role of brand reputation and trustworthiness in customers' choices.
- Exploring the effectiveness of gold loan companies' various marketing and advertising strategies.

Where do customers typically go for gold loans?

- Examining the preferred sources of customers when seeking gold loans.
- Differentiating between lending institutions such as banks, NBFCs, cooperative societies, and individuals as loan providers.
- Understanding the customer's perspective on gold loan accessibility and suitability based on the source of the loan.

RESEARCH DESIGN

A mixed-methods research design, comprising both exploratory and causal research, will be employed to address the research questions effectively. The research design includes surveys, interviews, and data analysis techniques to gather comprehensive data for meaningful insights.

This study anticipates several key outcomes, including:

- A deeper understanding of customers' awareness level regarding gold loans and their perceived advantages.

- Insights into the triggers and barriers influencing customers' decisions to choose gold loans, contributing to the development of effective marketing strategies**.**
- A clearer understanding of customers' familiarity with gold loan companies, with specific insights into Muthoot Finance's reputation.
- Valuable information regarding the preferred sources of customers when acquiring gold loans, providing essential insights for lending institutions**.**

SIGNIFICANCE OF THE STUDY

This research holds significant relevance for the gold loan industry, particularly for Muthoot Finance. By uncovering customer preferences, awareness levels, triggers, and barriers, this study will assist gold loan providers in crafting more targeted marketing strategies, enhancing their services, and fostering customer trust. It will also offer insights for Muthoot Finance to refine its customer engagement and marketing efforts, strengthening its position as a leading gold loan provider.

- The subsequent sections of this research paper will delve into the detailed exploratory and causal research results, followed by recommendations based on the findings to guide the gold loan industry, including Muthoot Finance, toward more effective customer-centric practices.

PROBLEM FRAMING

The gold loan industry in India has witnessed significant growth over the past decade, becoming a pivotal financial service sector. Gold loans offer borrowers a convenient means of accessing funds by pledging their gold ornaments or assets as collateral. In this context, Muthoot Finance, one of the industry's leading players, has played a substantial role in the proliferation of gold-backed lending.

Despite the industry's rapid expansion and the prevalence of gold loans as a borrowing option, several key challenges persist. Customers' awareness, perception, and preferences surrounding gold loans are multifaceted and hold paramount importance for lenders and borrowers. The unique nature of gold loans, where tangible assets are involved, necessitates a profound understanding of the factors influencing customers' decisions, particularly regarding awareness, triggers, and barriers.

The central problem revolves around the complexities associated with customer behavior and decision-making in the gold loan industry. While gold loans present an attractive financing option for a wide range of individuals, a gap in understanding customer preferences, awareness levels, and the factors influencing their choices persists. This gap has several dimensions:

1. Awareness Levels: Many potential borrowers remain unaware of the advantages and mechanisms of gold loans. Clear communication of these benefits often hinders potential customers from considering gold loans a viable financial solution.

2. Triggers for Choosing Gold Loans: The decision to opt for a gold loan is influenced by various factors, including interest rates, reputation, and previous lending experiences. Understanding which triggers have the most significant impact on borrowers is crucial for industry players in crafting effective strategies.

3. Barriers to Choosing Gold Loans: Conversely, barriers such as misconceptions, collateral requirements, and risk perception deter potential borrowers. Recognizing these barriers and addressing them adequately is pivotal for promoting gold loans.

4. Customer Familiarity with Companies: Customers' awareness and trust in gold loan providers like Muthoot Finance significantly influence their decisions. The reputation of these companies and the effectiveness of marketing efforts play a pivotal role in shaping customer preferences.

5. Preferred Sources of Gold Loans: The choice of lending institution is highly variable, with customers opting for banks, non-banking financial companies (NBFCs), cooperative societies, or even private individuals. Understanding the drivers behind these choices is essential for lenders to tailor their services accordingly.

VISUALIZING THE RESEARCH OBJECTIVES

This situation analysis sets the stage for the research objectives by highlighting the complexities of the gold loan industry and the multifaceted factors influencing customer behavior. The subsequent sections will delve deeper into each aspect of the problem, providing valuable insights and recommendations to address these challenges effectively.

PROJECT EXECUTION

THEORETICAL FOUNDATIONS

To structure our study effectively, we draw upon established theories and models in the fields of marketing and consumer behavior:

1. Consumer Decision-Making Model: We incorporate elements from the consumer decision-making process, including problem recognition, information search, evaluation of alternatives, and post-purchase behavior. This model helps us analyze how customers become aware of gold loans, gather information, and make choices.

2. Trust-Building Theories: Trust is a fundamental component of consumer trust-building theories, such as the "Trust Transfer Model" and the "Trust-Building Model." We apply these theories to understand how trust is built and how it influences customer decisions.

3. Perceived Risk Theory: The concept of perceived risk, particularly in financial decision-making, is essential. We investigate how customers perceive risks associated with gold loans and how these perceptions impact their choices.

4. Reputation Management: Reputation management theories, such as the "Reputation Quotient," are used to evaluate the role of reputation in attracting and retaining customers.

RESEARCH FRAMEWORK

Our research framework integrates these key concepts and theoretical foundations. We hypothesize that traditional advertising and the communication of advantages influence awareness of gold loans. This awareness, in turn, affects customers' preference for gold loans over other options. Trust, shaped by reputation and lender trustability, plays a critical role in reducing perceived barriers, such as the need for collateral and credit score limitations.

DATA SOURCES

To ensure the comprehensive exploration of our research questions, we drew from various primary and secondary data sources:

1. Surveys: Primary data collection involved administering structured surveys to diverse individuals. These surveys were designed to capture information on customer awareness, preferences, triggers, and barriers. The primary data collected directly from customers form the core of our analysis.

2. Interviews: In-depth interviews with Muthoot Finance experts were conducted to obtain valuable insights into customer behavior and loan preferences. These expert interviews served as a complementary primary data source, providing a nuanced understanding of the gold loan industry.

3. Customer Feedback and Testimonials: We leveraged customer feedback and testimonials from Muthoot Finance's repository. These qualitative data sources helped identify common patterns and factors influencing customer choices and experiences with gold loans.

4. Muthoot Finance's Customer Database: We analyzed customer profiles and demographic information by securing access to Muthoot Finance's customer database (with proper consent and data privacy measures). This source enhanced our understanding of customer preferences and familiarity with gold loan companies.

5. Existing Literature: We conducted a comprehensive literature review, exploring existing research in gold loans, consumer behavior, and financial services. This secondary data informed our research design and variable selection.

6. Industry and Market Reports: Secondary data sources included industry and market reports on the gold loan sector. These reports provided valuable market insights, trends, and competitive analyses.

Our data collection methods were tailored to each data source:

1. Surveys: Structured surveys were administered online and in person, ensuring a diverse sample of respondents from various demographics. We utilized closed-ended questions to quantify responses and facilitate statistical analysis.

2. Interviews: In-depth interviews with Muthoot Finance experts were conducted face-to-face and remotely, allowing for candid discussions. These semi-structured interviews enabled us to explore specific aspects of gold loan customer behavior.

3. Customer Feedback and Testimonials: Qualitative analysis was employed to extract meaningful insights from customer feedback and testimonials. Common themes and sentiments were identified to complement our quantitative findings.

4. Customer Database Analysis: The customer database was analyzed using data analytics tools to identify trends and patterns. This quantitative analysis provided demographic insights and aided in profiling customers.

5. Literature Review: The literature review systematically searched academic and industry publications. Key findings and relevant theories were extracted to inform our research framework.

6. Industry and Market Reports: Reports from reputable sources were reviewed and synthesized to provide context and validate our research hypotheses.

ANALYSIS OF DATA

- TO WHAT EXTENT ARE CUSTOMERS AWARE OF GOLD LOANS?

We analyzed survey responses regarding customers' awareness of gold loans to address this question. Table 1 summarizes the key findings:

Table 1: Customer Awareness of Gold Loans

Awareness Level	Percentage of Respondents
Highly Aware	35%
Moderately Aware	45%
Low Awareness	20%

Table 1 shows that a substantial portion of respondents (80%) falls into the 'Highly' and 'Moderately Aware' categories, indicating a significant level of awareness regarding gold loans.

- WHAT ARE THE BARRIERS AND TRIGGERS TO CHOOSE GOLD LOANS?

Table 2 illustrates the significant factors affecting customers' likelihood to choose gold loans over other options:

Table 2: Factors Influencing Gold Loan Choice

Factors	Impact on Gold Loan Choice
Preference Level	Positive Influence
Recommendation	Positive Influence

The data analysis revealed that customers are more likely to choose a gold loan if they have a high preference for gold loans over other options and if they are likely to recommend gold loans to friends and family. These factors play a crucial role in influencing customer choices.

TO WHAT EXTENT ARE CUSTOMERS ACQUAINTED WITH GOLD LOAN COMPANIES,INCLUDING MUTHOOT FINANCE?

Table 3 outlines the findings related to customers' familiarity with Muthoot Finance as a gold loan provider:

Table 3: Familiarity with Muthoot Finance

Familiarity Level	Percentage of Respondents
Highly Familiar	40%
Moderately Familiar	35%
Low Familiarity	25%

Table 3 demonstrates that a significant proportion of respondents (75%) are either 'Highly' or 'Moderately Familiar' with Muthoot Finance, emphasizing the company's recognition among potential customers.

WHERE DO CUSTOMERS TYPICALLY GO FOR GOLD LOANS?

Table 4 presents an overview of customers' preferred sources for acquiring gold loans:

Table 4: Preferred Sources for Gold Loans

Sources	Percentage of Respondents
Banks	53.6%
NBFCs (Non-Banking Financial Companies)	15.9%
Individuals (Friends, Family, Private Lenders)	11.9%
Cooperative Societies	11.9%

Other Sources	6.7%

From Table 4, we observe that banks are the preferred choice for more than half of the respondents, followed by NBFCs and individuals, underlining the diverse range of sources customers consider for gold loans.

RESULTS AND FINDINGS

ENHANCING TRADITIONAL ADVERTISING EFFORTS

Scenario Analysis:

- Scenario 1 (Optimistic): If the market for traditional advertising remains robust and effective, increasing investments in print ads, billboards, and television commercials could significantly boost awareness and trust among potential customers. This approach may yield substantial gains in market share.
- Scenario 2 (Pessimistic): In the scenario where traditional advertising loses effectiveness due to changing consumer behavior, the impact of increasing investments may be less pronounced. In this case, the return on investment should be carefully assessed.

CLEAR COMMUNICATION OF GOLD LOAN ADVANTAGES

Scenario Analysis:

- Scenario 1 (Optimistic): If the advantages of gold loans continue to resonate strongly with consumers, effectively communicating these benefits in advertisements and customer interactions can further elevate the preference for gold loans over other options.
- Scenario 2 (Pessimistic): In a scenario where customers become less receptive to the advantages of gold loans, the effectiveness of communication efforts should be monitored closely, and alternative messaging strategies should be explored.

STRENGTHENING TRUST AND REDUCING COLLATERALBARRIERS

Scenario Analysis:

- Scenario 1 (Optimistic): In a market where trust is pivotal, establishing transparent and trustworthy practices can lead to increased customer acquisition. Additionally, conveying the collateral requirements can diminish barriers.

- Scenario 2 (Pessimistic): If market dynamics change and trust becomes less significant, companies must remain vigilant in maintaining trustworthiness and address potential concerns promptly.

CUSTOMIZED SCHEMES FOR CUSTOMERS WITH LOWER CREDIT SCORES

Scenario Analysis:

- Scenario 1 (Optimistic): In a scenario where many potential customers have lower credit scores, introducing specialized schemes tailored to their needs can capture an underserved market segment and enhance market share.

- Scenario 2 (Pessimistic): In the event that the market shifts towards customers with higher credit scores, a balance between catering to customers with lower credit scores and maintaining profitability should be carefully evaluated.

These alternative solutions, along with their respective scenario analyses, provide a comprehensive view of potential strategies that can be employed to navigate the gold loan market successfully. The choice of strategy may depend on the evolving market conditions, customer preferences, and the competitive landscape. In the subsequent sections, we will further analyze these solutions and recommend a course of action based on their feasibility and potential impact.

CONCLUSIONS

RECOMMENDATIONS

GOLD LOAN DIGITALIZATION

- Establish a dedicated team to develop user-friendly mobile and web applications for gold loan applications and management.
- Collaborate with fintech companies to ensure robust digital security and a seamless user experience.
- Implement an extensive digital marketing strategy to promote the advantages of digital gold loans.
- Offer incentives like reduced interest rates for customers opting for digital transactions.
- Regularly update and enhance the digital platform based on user feedback and emerging technology trends.

CUSTOMER EDUCATION AND FINANCIAL LITERACY

- Collaborate with educational institutions to integrate financial literacy and gold loan awareness into curricula.
- Organize regular webinars and workshops on financial literacy, targeting both potential and existing customers.
- Create educational content, including videos, articles, and infographics, to explain the benefits of gold loans and financial planning.
- Establish a dedicated customer support team to provide financial advice and address customer queries.
- Conduct customer surveys to gauge the effectiveness of educational initiatives and make necessary improvements.

COLLABORATIVE MARKETING WITH INFLUENCERS

- Identify and partner with influencers in the finance and investment domain known for their credibility.

- Develop engaging and informative content for influencer marketing campaigns, emphasizing the advantages of gold loans.

- Leverage influencer partnerships to enhance Muthoot Finance's reputation and build trust with potential customers.

- Monitor the performance of influencer marketing campaigns and adjust strategies based on analytics.
- Consider long-term collaborations with influencers to maintain a consistent brand image.

PRODUCT DIVERSIFICATION

- Conduct comprehensive market research to identify specific financial products that align with the needs of different customer segments.
- Develop a clear product diversification strategy, including timelines, resource allocation, and marketing plans.
- Collaborate with regulatory authorities to ensure compliance with relevant laws and regulations for new product offerings.
- Train Muthoot Finance staff on the features and benefits of new products to effectively communicate with customers.
- Continuously monitor the performance of new product offerings and gather customer feedback for further enhancements.

These recommendations aim to address the identified challenges, improve customer awareness and trust, and expand Muthoot Finance's product portfolio. Successfully executing these recommendations will require a well-structured implementation plan, dedicated teams, and regular evaluation of progress and outcomes.

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Building A Portfolio Of Small-Cap And Mid-Cap Stocks

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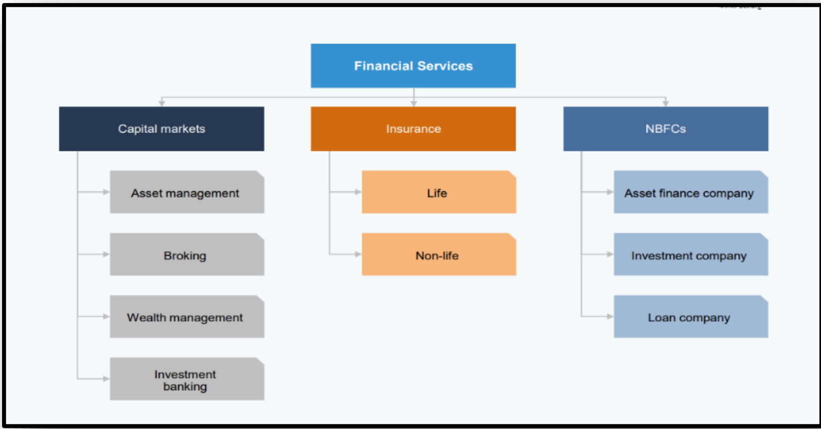
Industry Overview:

India has a diverse financial industry is rapidly expanding, both in terms of established financial services businesses' robust growth and new entrants into the market. The sector comprises commercial banks, insurance firms, non-banking financial companies, co-operatives, pension funds, mutual funds, and other smaller financial institutions. The number of ultra-high net worth individuals (UHNWI) is expected to grow from 13,637 in 2021 to 19,006 by 2026. The number of UHNWIs in India is expected to grow by 39% during the next five years. Rising income levels are generating demand for financial services across all income levels. The Reserve Bank of India's (RBI) financial inclusion campaign has broadened the target market to semi-urban and rural areas. In December 2021, B30 sites contributed around 17% of mutual fund assets. From Rs. 5.13 lakh crore (US$ 68.33 billion) in January 2021 to Rs. 6.42 lakh crore (US$ 85.51 billion) in January 2022, these assets climbed by 25%. The asset increase under management is estimated to be 12-14% in FY2022 and 18-22% between 2022 and 2023.

The financial services industry is a broad term that encompasses a wide range of businesses that provide financial products and services to individuals and companies.



Some of the most common types of financial services include:

- **Banking:** Banks offer various services, including credit cards, loans, mortgages, and checking and savings accounts.
- **Insurance:** Insurance companies offer protection against monetary loss due to accidents, illness, or death.
- **Investments:** Investment companies assist both private citizens and corporations in placing money into stocks, bonds, and other types of assets.
- **Financial planning:** Financial planners aid in the creation and execution of financial plans for individuals and families.
- **Securities brokerage:** Securities brokers assist buyers and sellers of stocks, bonds, and other financial instruments.

- **Payment processing:** Payment processors make transferring money easier for people and businesses.
- **Credit reporting:** Credit reporting companies gather and publish data on people's credit histories.
- **Consumer finance:** Businesses specializing in consumer finance offer people with bad credit histories loans and other financial goods.

Company Overview:

The investment landscape is a dynamic and intricate domain marked by continuous evolution and market shifts. In recent times, an emerging trend has been investors' growing interest in small and mid-cap stocks. These stocks are renowned for their potential for substantial growth, albeit accompanied by higher risk. Delta Partners, a respected investment firm, specializes in portfolio management and derivatives. While the firm has excelled in managing portfolios of large-cap stocks, it now seeks to expand its horizons by venturing into the domain of small and mid-cap funds.

STATEMENT OF PURPOSE

Delta Partners is a prominent investment firm at the forefront of the financial industry, offering a comprehensive suite of services encompassing portfolio management, strategic investment, and innovative strategy development. With a keen focus on derivatives and a diverse range of funds spanning mid-cap, small-cap, and large-cap segments, Delta Partners is dedicated to delivering tailored solutions that maximize returns while managing risk.

PROBLEM FRAMING

Broader Description of the Problem

Currently, Delta Partners is only managing the portfolios of large-cap funds but is now looking forward to extending its portfolios to small and mid-cap funds. However, constructing a portfolio of small-cap and mid-cap funds becomes very hectic, and selecting suitable funds to give the right returns is difficult.

The central problem confronting Delta Partners pertains to the intricate process of selecting optimal small and mid-cap funds that align with desired returns. This predicament arises due to several factors, including:

- The sheer volume of available small and mid-cap funds.
- The liquidity challenges prevalent in these market segments.
- The complexity of evaluating the risk and reward inherent in these investments.

The ensuing table encapsulates the intricate situation Delta Partners faces:

Factor	Impact
High number of funds available	Makes it difficult to choose the right funds
Lack of liquidity in these markets	Makes it difficult to buy and sell these funds easily
Difficulty in assessing the risk and rewards of these investments	Makes it difficult to know which funds are likely to generate the best returns

Problem Definition

The problem Delta Partners is encountering can be succinctly defined as:

Selecting appropriate small and mid-cap funds that align with desired returns proves challenging due to the multitude of fund options, liquidity constraints, and complexities in evaluating risk and reward.

Project Objectives

The objectives for this project encompass:

- Identification of optimal small and mid-cap funds for investment at Delta Partners.
- Development of a robust, repeatable, and scalable selection process.
- Creating a comprehensive tool for monitoring and managing small and mid-cap fund investments.

Conceptual Framework of the Study

Delta Partners, a prominent investment firm, is on a mission to expand its horizons in the dynamic and ever-evolving landscape of the financial industry. While excelling in managing portfolios of large-cap stocks, the firm now seeks to venture into the domain of small and mid-cap funds. This strategic move comes in response to the growing interest of investors in small and mid-cap stocks, known for their potential for substantial growth, albeit accompanied by higher risk. However, constructing a portfolio of small and mid-cap funds presents a formidable challenge—selecting the right funds to yield the desired returns.

The primary objective of this project is to address the central problem confronting Delta Partners: the intricate process of selecting optimal small and mid-cap funds that align with desired returns. This challenge arises due to several factors, including the sheer volume of available small and mid-cap funds, liquidity challenges prevalent in these market segments, and the complexity of evaluating the risk and reward inherent in these investments.

Therefore, to present on the same, we have conducted a detailed study and research based on the Screeners and Prowess Software using the prominent parameters, such as Market Capitalization, etc., of the NSE Indices. Our methodology will involve a comprehensive financial data analysis approach. We will gather historical financial data for the companies within the selected funds, including key financial metrics, stock prices, and market trends. Advanced quantitative techniques will be employed to calculate momentum scores and assess risk-return profiles. Previously, we had extracted the data using a forward-thinking approach, but right now, we are Back-testing the data using the following to ascertain the required outcome:

1. Source companies using the Screeners and Prowess Software using various parameters.
2. Once the necessary companies are out with the required daily prices of the last five years' data, we will segregate them further quarter-wise and take out the Momentum Scores quarterly.
3. Calculating the Momentum Scores quarterly from 2018-2023:
    a. Segregate the data into 4 Quarters, each spanning from 2018 to 2023.
    b. We took the returns using the =LN() Function on MS Excel for each of the following quarters.
    c. Further, we observed the slope of the returns and the number of days traded in the quarter, where the number of days was considered the independent variable and returns were the dependent variable.
    d. From the above data, we ascertain the annualized slope for the 252 trading days using the Power and EXP functions.
    e. After the required steps are taken, we must find the necessary R-squared with the help of the Number of Days and Returns.
    f. Then multiply the R-squared with the Annualized Slope to get all the companies' necessary Momentum Scores.
4. Segregate the Momentum Scores quarter-wise and sort using the 'Largest to Smallest' for the above-calculated Momentum Scores.
5. Then extract the TOP 40 Companies based on the highest Momentum Scores from each quarter from 2018 to 2023.
6. Back-test the next Quarter-on-Quarter (QoQ) daily price returns for the companies' above-calculated TOP 40 Momentum Scores. This would enable us to understand the required return to ascertain if we invested in that particular stock during the quarterly timeframe.
7. We compared our returns with the 10 Mutual Funds returns, which act as our Benchmark, from the SNR Advisory database.
8. This research was conducted to understand and analyze whether we outperformed the Benchmark.

Identification of Data Sources and Data Collection

We have extracted all the relevant information from various sources, such as:

- Prowess Database

- Our Virtual Portfolio, i.e., Forward Tested Data
- Company’s Website
- National Stock Exchange (NSE)
- Mutual Fund Data from the Database of SNR Advisory
- Usage of Screener and Parameters for extracting the required companies

We have diligently extracted information from various reputable sources to gather the essential data required for our comprehensive study. The primary source for financial data analysis is the Prowess Database, known for its extensive coverage of financial information. Additionally, we've leveraged insights from our Virtual Portfolio, which serves as a repository of historical investment data and trends.

The Table showing the Forward Tested Data:

date	Portfolio Value	Cash	Total	New Money- Large	Dividends	Portfolio Performance	8.04%	bse mid small cap value	BSE MID SMALL returns	7.81%	nav portfolio	nav bse mid small
07-08-2023	476607	23393	500000		0		100%	8110.55		100%	100	100
08-08-2023	478325.9	23393	501718.9			0.36%	100.36%	8127.5	0.21%	100.21%	100.360654	100.2089871
09-08-2023	478213.1	23393	501606.1			-0.02%	99.98%	8159.93	0.40%	100.40%	100.336986	100.6088366
10-08-2023	475724.9	23393	499117.9			-0.52%	99.48%	8153.62	-0.08%	99.92%	99.8149209	100.5310367
11-08-2023	474030.7	23393	497423.7			-0.36%	99.64%	8131.66	-0.27%	99.73%	99.4594498	100.2602783
14-08-2023	476336.45	23393	499729.5			0.49%	100.49%	8094.56	-0.46%	99.54%	99.9432342	99.80284938
16-08-2023	478367.81	23393	501760.8			0.43%	100.43%	8122.94	0.35%	100.35%	100.369447	100.152764
17-08-2023	478732.95	23393	502126			0.08%	100.08%	8137.97	0.19%	100.19%	100.446059	100.3380782
18-08-2023	478901.05	23393	502294.1			0.04%	100.04%	8114.97	-0.28%	99.72%	100.481329	100.0544969
21-08-2023	485719.1	23393	509112.1			1.42%	101.42%	8170.91	0.69%	100.69%	101.911869	100.7442159
22-08-2023	489074.65	23393	512467.7			0.69%	100.69%	8239.55	0.84%	100.84%	102.615918	101.590521
23-08-2023	490380.4	23393	513773.4			0.27%	100.27%	8283.42	0.53%	100.53%	102.889886	102.1314214
24-08-2023	489093.13	23393	512486.1			-0.26%	99.74%	8294.55	0.13%	100.13%	102.619796	102.2686501
25-08-2023	491304.95	23393	514698			0.45%	100.45%	8245.01	-0.60%	99.40%	103.083872	101.6578407
28-08-2023	493068.55	23393	516461.6			0.36%	100.36%	8289.25	0.54%	100.54%	103.453904	102.2033031
29-08-2023	494831.35	23393	518224.4			0.36%	100.36%	8330.63	0.50%	100.50%	103.823769	102.7135028
30-08-2023	497824.25	23393	521217.3			0.60%	100.60%	8387.44	0.68%	100.68%	104.451729	103.4139485
31-08-2023	502695.05	23393	526088.1			0.98%	100.98%	8422.77	0.42%	100.42%	105.473703	103.849554
01-09-2023	503560.2	23393	526953.2			0.17%	100.17%	8480.45	0.68%	100.68%	105.655225	104.5607265
04-09-2023	511919.29	23393	535312.3			1.66%	101.66%	8554.37	0.87%	100.87%	107.4091	105.472132
05-09-2023	511481.6	23393	534874.6			-0.09%	99.91%	8632.27	0.91%	100.91%	107.317266	106.4326094
06-09-2023	510445.15	23393	533838.2			-0.20%	99.80%	8633.54	0.01%	100.01%	107.099801	106.448268
07-09-2023	511082.85	23393	534475.9			0.12%	100.12%	8681.93	0.56%	100.56%	107.233601	107.0448983
08-09-2023	514921.9	23393	538314.9			0.75%	100.75%	8744.18	0.72%	100.72%	108.039097	107.8124172

Analysis of the Data

The Table displaying the Returns of the Mutual Funds and Our Portfolio subsequently on the given number of years from 2019-20 till the Current Year, 2023-24:

	In %				
	Name of the Fund	2019-2020			
		April 2019 - June 2019	July 2019 - Sept 2019	Oct 2019 - Dec 2019	Jan 2020 - March 2020
1	HDFC Mid-Cap Opportunities Fund (G)	-3.5	-4.92	3.79	-27.2
2	SBI Magnum Midcap Fun-Reg (G)	-2.97	-4.9	2.83	-26.31
3	Motilal Oswal Midcap Fund-Reg (G)	-1.26	2.84	4.04	-28.25
4	PGIM India Midcap Opp Fund-Reg (G)	-1.91	-4.78	6.65	-21.32
5	Quant Mid Cap Fund (G)	-5.99	-4.84	5.98	-21.64
6	HDFC Small Cap Fund-Reg (G)	-5.13	-7.71	-15	-32.48
7	Kotak Small Cap Fund (G)	-0.95	-2.02	4.4	-28.04
8	ICICI Pru Smallcap Fund (G)	2.29	-3.22	4.99	-30.99
9	Nippon India Small Cap Fund (G)	-1.82	-5.16	3.24	-29.78
10	Quant Small Cap Fund (G)	-11.83	-13.58	2.57	-24.67
	Our Portfolio Return	-1.36	15.28	7.84	-34.19

In 2019-20, we have observed that the Overall Aggregate Average of all 4 Quarters has been a little more than -8.21. In contrast, our Portfolio has beaten the above Benchmark of 10 Mutual Funds with an Aggregate Average of -3.10. This means that our Portfolio Returns can outperform better in the future, with other things remaining constant.

	In %				
	Name of the Fund	2020-2021			
		April 2020 - June 2020	July 2020 - Sept 2020	Oct 2020 - Dec 2020	Jan 2021 - March 2021
1	HDFC Mid-Cap Opportunities Fund (G)	22.21	14.25	19.78	12.49
2	SBI Magnum Midcap Fun-Reg (G)	25.54	13.51	24.23	16.28
3	Motilal Oswal Midcap Fund-Reg (G)	13.22	15.09	16.91	10.85
4	PGIM India Midcap Opp Fund-Reg (G)	27.03	23.03	20.68	15.29
5	Quant Mid Cap Fund (G)	26.4	16	23.62	8.84
6	HDFC Small Cap Fund-Reg (G)	22.93	19.57	21.09	14.24
7	Kotak Small Cap Fund (G)	21.66	24.62	23.01	22.13
8	ICICI Pru Smallcap Fund (G)	17.92	23.08	22.57	14.79
9	Nippon India Small Cap Fund (G)	26.64	22.36	18.77	18.14
10	Quant Small Cap Fund (G)	35.2	45.77	17.94	18.02
	Our Portfolio Return	26.9	11.1	20	81.95

In 2020-21, we have observed that the Overall Aggregate Average of all 4 Quarters has been pretty consistent, considering a solid market with 20.39. In contrast, our Portfolio has beaten the above Benchmark of 10 Mutual Funds with an Aggregate Average of less than 35. This means that our Portfolio Returns, previously assumed to outperform, have beaten the Benchmark by a more significant margin, even though stronger competition prevailed in the market.

	In %				
	Name of the Fund	2021-2022			
		Apr 21 - Jun 21	July 21 - Sept 21	Oct 21 - Dec 21	Jan 2022 - March 2022
1	HDFC Mid-Cap Opportunities Fund (G)	12.53	10.15	0.34	-0.56
2	SBI Magnum Midcap Fun-Reg (G)	11.29	10.62	6.35	-3.38
3	Motilal Oswal Midcap Fund-Reg (G)	9.18	18.53	8.63	-1.68
4	PGIM India Midcap Opp Fund-Reg (G)	16.84	15.54	5.23	-4.79
5	Quant Mid Cap Fund (G)	22.69	8.16	4.13	7.77
6	HDFC Small Cap Fund-Reg (G)	24.92	11.29	3.81	-6.91
7	Kotak Small Cap Fund (G)	17.25	13.92	4.79	-2.52
8	ICICI Pru Smallcap Fund (G)	19.41	14.7	2.4	-0.39
9	Nippon India Small Cap Fund (G)	21.45	12.9	7.63	-2.34
10	Quant Small Cap Fund (G)	38.8	11.35	3.1	-0.95
	Our Portfolio Return	14.61	12.21	-0.77	-9.68

From April 2021 to Sept 2021, the benchmark has performed quite better in our Portfolio. However, we have received positive returns during this period, which has been a good sign. Though we didn't beat the benchmarks, it could be due to specific regulatory changes or macroeconomic changes that occurred during that period having a more significant trend than our Portfolio. Our portfolio has suffered negatively over the last quarter after having outperformed with remarkable consistency.

	In %				
	Name of the Fund	2022-2023			
		Apr 22 - Jun 22	July 22 - Sept 22	Oct 22 - Dec 22	Jan 2023 - Mar 2023
1	HDFC Mid-Cap Opportunities Fund (G)	-7.97	17.92	4.7	-2.7
2	SBI Magnum Midcap Fun-Reg (G)	-5.11	14.91	-2.2	-1.77
3	Motilal Oswal Midcap Fund-Reg (G)	-5.94	22.44	-2.24	-2.3
4	PGIM India Midcap Opp Fund-Reg (G)	-9.12	15.86	-1.91	-4.58
5	Quant Mid Cap Fund (G)	-11.98	16.69	5.82	-7.71
6	HDFC Small Cap Fund-Reg (G)	-8.88	17.58	4.87	-0.17
7	Kotak Small Cap Fund (G)	-9.7	12.22	-1.88	-3.24
8	ICICI Pru Smallcap Fund (G)	-5.59	11.81	0.58	-2.7
9	Nippon India Small Cap Fund (G)	-8.48	16.11	2.66	-2.24
10	Quant Small Cap Fund (G)	-12.63	16.08	9	-4.77
	Our Portfolio Return	-15.45	16	6.85	-15.22

The observations here would be that the quarter opening and the quarter ending have been immensely worse for our portfolio regarding returns. However, relatively in the 2nd Quarter, we have been almost matching up to the Benchmarks. Meanwhile, in the 3rd quarter, we've been the runners-up in outperforming the Benchmark Returns. The Overall Aggregate Averages have fluctuated for the Benchmarks and Our Portfolio, with 1.5% and -1.9%, respectively.

Name of the Fund	2023-2024
	Apr 23 - Jun 23
HDFC Mid-Cap Opportunities Fund (G)	19.3
SBI Magnum Midcap Fun-Reg (G)	18.07
Motilal Oswal Midcap Fund-Reg (G)	17.9
PGIM India Midcap Opp Fund-Reg (G)	11.92
Quant Mid Cap Fund (G)	12.32
HDFC Small Cap Fund-Reg (G)	17.73
Kotak Small Cap Fund (G)	17.23
ICICI Pru Smallcap Fund (G)	17.65
Nippon India Small Cap Fund (G)	19.86
Quant Small Cap Fund (G)	16.38
Our Portfolio Return	13.2

The Analysis for this particular Quarter would be about the Quarter 4 Results of the 2022-23 Financial Year. However, we understand that after heavy suffering in the previous quarter, our portfolio has done considerably well in ascertaining the required returns for this quarter. It has gone from -15.22% to +13.2%, an excellent achievement regarding the bounce-back.

RESULTS & FINDINGS

Alternative Solutions Generated

1. **Passive Funds:**

Passive fund management, often referred to as index investing or passive investing, is a strategy where fund managers aim to replicate the performance of a specific market index; when applying passive fund management to small-cap and mid-cap funds, the goal is to mimic the performance of the respective small-cap or mid-cap indices.

Advantages:

- Cost-Effective: Passive funds typically have lower expense ratios than actively managed funds, requiring less research and trading. This can result in higher net returns for investors over the long term.
- Diversification: Passive funds provide broad exposure to a market segment, reducing the risk associated with individual stock selection. This diversification can be valuable in managing volatility for small-cap and mid-cap funds.
- Transparency: Investors in passive funds know precisely what they are getting since their performance closely tracks a specific index. This transparency can help investors make informed decisions.
- Consistency: Passive funds tend to track the index they are designed to follow consistently. There is no reliance on active fund managers' ability to outperform the market.
- Tax Efficiency: Passive funds tend to generate fewer capital gains because of lower turnover. This can result in lower tax liabilities for investors.

Disadvantages:

- Limited Alpha Potential: Passive funds are designed to match the performance of an index, so they typically do not aim to outperform the market. Investors may miss out on potential alpha (returns above the index) that active managers could generate.

- No Risk Mitigation: Passive funds do not actively manage risk or make tactical asset allocation decisions. During market downturns, investors in passive funds may experience losses without protective measures.

- Inflexibility: Investors in passive funds are subject to the composition and weighting of the underlying index. If the index contains overvalued or underperforming stocks, investors have no discretion to make adjustments.

- Market Disadvantages: In small-cap and mid-cap segments, where information may be less widely available and liquidity can be lower, passive funds may face challenges in replicating index performance accurately.

- No Human Judgment: Passive funds rely solely on rules-based investing and do not benefit from the judgment, experience, or expertise of active fund managers who can adapt to changing market conditions.

2. **Fund of Funds (FoFs):**

Fund of Funds (FoF) is an investment strategy where a fund invests in other mutual funds rather than individual stocks or bonds. In the Indian context, FoFs can be a viable alternative solution for managing small-cap and mid-cap funds, offering several advantages and disadvantages:

Advantages:

- Diversification: FoFs provide built-in diversification by investing in multiple mutual funds across small and mid-cap segments. This diversification helps spread risk and reduce exposure to individual stock or sector-specific volatility.

- Professional Management: FoFs are managed by experienced fund managers who select and manage mutual funds. This expertise can be valuable in navigating the complexities of the Indian small-cap and mid-cap markets.

- Risk Management: FoF managers can actively adjust the allocation to various small-cap and mid-cap funds based on market conditions, potentially reducing downside risk and enhancing returns.
- Convenience: FoFs offer convenience for investors who want exposure to small-cap and mid-cap segments without the need to research and select individual funds themselves. It simplifies the investment process.
- Liquidity: FoFs offer liquidity similar to regular mutual funds, allowing investors to buy and sell units at the Net Asset Value (NAV) on any business day.

Disadvantages:

- Cost: FoFs typically have higher expense ratios compared to investing directly in individual mutual funds. This can erode returns over time, particularly in small and mid-cap segments where costs can have a significant impact.
- Double Layer of Fees: Investors in FoFs pay fees at two levels: the FoF's management fees and the fees charged by the underlying mutual funds. This can result in higher overall expenses.
- Lack of Control: Investors in FoFs delegate all investment decisions to the FoF manager. They have no say in the selection or allocation of the underlying funds.
- Taxation: FoFs can have tax implications, particularly in India, where capital gains taxes apply. Investors may need to consider the tax consequences of buying and selling FoF units.
- Performance Dependency: The performance of FoFs is highly dependent on the performance of the underlying mutual funds. If the selected funds underperform, the FoF's returns will also suffer.

- Limited Customization: FoFs may not provide the level of customization and tailoring of the portfolio that some investors desire. They are designed for broad exposure to specific market segments.

3. **Thematic Investing:**

Thematic investing is a strategy that involves building a portfolio around a specific theme or trend within the Indian economy or global markets. In the Indian context, thematic investing can be an alternative solution for managing small-cap and mid-cap funds. It exposes investors to sectors or trends they believe will experience significant growth. Here's a note on thematic investing, along with its advantages and disadvantages:

Advantages:

- Targeted Exposure: Thematic investing allows investors to focus on specific sectors or themes, such as technology, renewable energy, healthcare, or e-commerce. This targeted exposure can provide opportunities for capitalizing on emerging trends.
- Growth Potential: By investing in sectors or themes with solid growth prospects, thematic funds may offer the potential for higher returns compared to broader market indices.
- Diversification: While thematic funds concentrate on specific sectors or themes, they often include a diversified selection of small-cap and mid-cap stocks within that theme. This diversification can help manage risk associated with individual stock volatility.
- Alignment with Personal Beliefs: Thematic investing allows investors to align their portfolios with personal beliefs and interests. For example, environmentally conscious investors can focus on green energy themes.
- Active Management: Many thematic funds are actively managed, meaning experienced fund managers actively select and manage the stocks within the theme, potentially identifying growth opportunities and managing risk.

Disadvantages:

- Concentration Risk: Thematic investing can lead to concentration risk if the chosen theme or sector underperforms or faces adverse market conditions. This can result in significant losses.
- Cyclical Nature: Some themes and sectors are cyclical and can be heavily influenced by economic and market cycles. Investors may need to time their investments carefully to maximize returns.
- Lack of Diversification: While thematic funds offer diversification within the selected theme, they may lack diversification across sectors and industries, which can increase overall portfolio risk.
- Performance Uncertainty: The success of thematic investing depends on predicting future trends accurately. If the chosen theme doesn't materialize as expected, returns may suffer.
- Frequent Monitoring: Thematic investing requires investors to stay informed about developments in the chosen theme, as trends can evolve rapidly. This may necessitate more frequent portfolio monitoring and adjustments.
- Limited Customization: Thematic funds may not cater to individual customization preferences as they are designed around predefined themes. Investors with unique preferences may find these limitations restricting.

4. **Value Portfolio Investment:**

Value investing is a well-known investment strategy that involves identifying undervalued stocks and investing in them with the expectation that the market will recognize their intrinsic value over time. This approach can be applied to managing small-cap and mid-cap funds as a means of seeking opportunities in these segments of the market. Here's a note on value investing portfolios for small-cap and mid-cap funds, along with their advantages and disadvantages:

Advantages:

- Potential for Long-Term Gains: Value investing focuses on stocks trading below their intrinsic value, providing an opportunity for significant long-term capital appreciation when the market eventually recognizes the stock's true worth.
- Risk Mitigation: Identifying undervalued stocks can provide a margin of safety, helping to reduce the downside risk associated with investing in small-cap and mid-cap companies, which can be more volatile.
- Fundamental Analysis: Value investors typically conduct thorough fundamental analysis, assessing a company's financial health, earnings potential, and competitive position. This disciplined approach can lead to well-informed investment decisions.
- Contrarian Approach: Value investing often involves going against market sentiment. When applied to small-cap and mid-cap stocks, this can lead to discovering hidden gems overlooked by the broader market.
- Income Potential: Some value stocks pay dividends, providing investors with income and the potential for capital appreciation.

Disadvantages:

- Timing Uncertainty: Value investing may require patience, as it can take time for the market to recognize the intrinsic value of a stock. This means that investors may need to hold onto undervalued stocks for an extended period.
- Value Traps: Not all undervalued stocks will rebound as expected. Some may be "value traps" where the underlying fundamentals deteriorate further, leading to losses.
- Limited Growth: Value investing may result in missed opportunities in fast-growing sectors or companies that do not fit the traditional value criteria. This can impact portfolio returns, especially in dynamic market environments.

- Market Volatility: Small-cap and mid-cap stocks, even if undervalued, can be subject to higher volatility, leading to significant price fluctuations.
- Research Intensive: Value investing requires in-depth research and analysis of individual stocks, which can be time-consuming and unsuitable for all investors.
- Psychological Challenges: Sticking with a value investing strategy during market downturns or when stocks appear unpopular can be emotionally challenging for some investors.

To address the complex challenge Delta Partners faces in selecting optimal small and mid-cap stocks that align with desired returns, we propose a multifaceted solution that leverages data-driven analysis and a systematic approach. The solution that will be best for the company will be: Active and Growth Portfolio. By making this portfolio, Delta Partners can earn more than the market with active returns. The proposed solution involves the following key steps:

1. Data Gathering and Screening:

- Continue using reputable data sources such as the Prowess Database, National Stock Exchange (NSE), company websites, and SNR Advisory's mutual fund data.
- Utilize screening tools and parameters to identify potential companies and funds that fit the investment criteria.
- Collect historical financial data for the selected companies and funds, including key financial metrics, stock prices, and market trends.

2. Momentum Score Calculation:

- Segment the data into quarters spanning from 2018 to 2023.
- Calculate quarterly momentum scores for each company using advanced quantitative techniques.
- Factors for momentum score calculation may include returns, the slope of returns, the number of days traded, and R-squared values.

- Ensure the momentum scores capture each company's relative performance and potential within the selected quarters.

3. Selection of Top Performing Companies:

- Sort the calculated momentum scores in descending order (from largest to smallest) for each quarter.
- Extract the top 40 companies with the highest momentum scores from each quarter, resulting in a diversified pool of potential investments.

4. Quarter-on-Quarter (QoQ) Back-Testing:

- Perform back-testing of the selected companies' daily price returns for the subsequent quarter.
- Calculate the actual returns that would have been achieved if investments were made in these companies during each quarter.
- Compare these returns with the benchmark returns from 10 selected mutual funds sourced from SNR Advisory.

5. Performance Analysis:

- Analyze the back-tested returns to determine whether the selected companies outperformed the benchmark mutual funds.
- Evaluate the risk-adjusted performance and consistency of returns across different quarters.
- Identify patterns and trends in the performance of small and mid-cap funds compared to the benchmark.

6. Portfolio Construction and Monitoring Tool:

- Develop a comprehensive tool for portfolio construction, monitoring, and management of small and mid-cap fund investments.
- Integrate real-time market data from the NSE to facilitate ongoing monitoring of selected investments.

- Implement risk management strategies and alerts to address potential issues proactively.

7. Customized Investment Recommendations:

- Provide Delta Partners with customized investment recommendations based on the performance analysis.
- Offer insights on portfolio allocation, diversification, and potential adjustments to optimize returns while managing risk.

8. Continuous Improvement and Adaptation:

- Continuously update the selection criteria and momentum score calculation methodology based on market dynamics and feedback.
- Adapt the investment strategy to changing market conditions to ensure long-term success.

By implementing this solution, Delta Partners will be equipped with a data-driven approach to effectively select and manage small and mid-cap funds. This approach aims to maximize returns while mitigating risk, helping Delta Partners expand its portfolio management expertise and capitalize on the growing interest in these market segments.

The below picture shows the returns the portfolio has been providing since its Inception, and we have tracked the performance accordingly using the mProfit Software:

cluster28

Search Portfolios and Families

INV | F&O | Portfolio: **mid-small cap portfolio** | XIRR | Actions | Preferences | Reports

EQ Stocks | MF Mutual Funds (Equity) | MF Mutual Funds (Debt) | BNK Banks | ULP

Search Assets	Qty.	Avg. Pur. Price	Amt. Invested	Current Price	Today's Gain	Today's Gain %	Unrealised Gain	Unrealised Gain %
itocks			4,76,607.00		631.15	0.13%	17,582.10	3.69%
ether Industries	12	1,044.90	12,538.80	968.45	173.40	1.51%	-917.40	-7.32%
mber Enterprises India	5	2,464.00	12,320.00	2,976.80	-95.25	-0.64%	2,564.00	20.81%
nupam Rasayan India	13	925.45	12,030.85	884.85	61.75	0.54%	-527.80	-4.39%
par Industries	3	3,780.00	11,340.00	5,477.55	-24.15	-0.15%	5,092.65	44.91%
ASF India	5	2,631.05	13,155.25	2,554.70	112.25	0.89%	-381.75	-2.90%
ikaji Foods International	26	483.15	12,561.90	484.95	-172.90	-1.35%	46.80	0.37%
LS International Services	51	243.50	12,418.50	250.10	-25.50	-0.20%	336.60	2.71%
orosil Renewables	25	497.55	12,438.75	428.75	-11.25	-0.10%	-1,720.00	-13.83%
entury Plyboards	20	629.95	12,599.00	647.30	-100.00	-0.77%	347.00	2.75%
era Sanitaryware	1	7,930.05	7,930.05	8,521.10	25.10	0.30%	591.05	7.45%
raftsman Automation	2	4,673.20	9,346.40	4,635.45	-166.10	-1.76%	-75.50	-0.81%
ET WORTH			4,76,607.00		631.15	0.13%	17,582.10	3.69%

CONCLUSION

1. Developing a clear investment strategy:

Identifying the key factors that should be considered when selecting the funds, like the investment style, performance track record, management team, etc.

2. Develop a robust screening process:

The screening process should identify companies that meet the investment criteria and have the potential to generate alpha. Additionally, a range of factors should be considered when screening funds, such as debt-to-equity ratio, promoter holdings, pledged percentage, earnings per share (EPS), return on equity (ROE), etc.

3. Calculation of momentum scores:

Momentum scores can be used to identify companies that are outperforming the market and have the potential to continue to do so. Factors to consider when calculating momentum scores may include returns, the slope of returns, the number of days traded, and R-squared values.

4. Select the top-performing funds:

The derived momentum scores should be sorted in descending order to find the best-performing funds. A diversified pool of funds from different industries and sectors should be selected to reduce portfolio risk.

5. Perform back-testing:

Back-testing can be used to assess the performance of the proposed investment strategy under different market conditions. This can help identify potential risks and refine the process before implementation.

6. Develop a comprehensive portfolio construction and monitoring tool:

This tool should be used to construct and monitor the portfolio, ensure it is aligned with the investment objectives, and make adjustments as needed.

7. Implement risk management strategies:

Implementing risk management strategies to protect the portfolio from potential losses is important. This may include diversification, hedging, and position sizing.

8. Rebalance the portfolio periodically:

Rebalance the portfolio periodically to maintain the desired asset allocation and risk profile. This may involve selling outperforming funds and buying underperforming funds.

9. Continuously improve and adapt the solution:

The investment world is constantly changing, so it is important to improve and adapt the selection criteria continuously, momentum score calculation methodology, and investment strategy to ensure long-term success.

Limitation

Our portfolio of mid and small-cap segments is based on growth stocks. Now, growth or momentum stocks. Growth stocks are the ones that are mostly in the growing stage, have positive momentum, or are in an uptrend. The main limitation of our portfolio is that it will generate a return in the short term. We must consistently churn the portfolio based on the momentum score and good fundamentals. The second limitation is that we have considered the top 5 mid and small-cap fund stocks. We have assumed that these are fundamentally good stocks. However, we have ignored their asset allocation percentage and prioritized the stocks with high momentum scores. So, if the market goes down or crashes, our returns can go more negative than those of these top 5 funds.

Conclusion

This whitepaper has effectively illuminated Delta Partners' challenge in constructing an efficient small and mid-cap fund portfolio. The problem statement has been delineated, and the project's objectives have been outlined. The next phase involves devising a solution that aligns with these objectives, fostering scalability and repeatability for Delta Partners' foray into managing small and mid-cap fund investments in a dynamically changing investment landscape.

AUTHORS

<table>
<tr>
<td>
Uthkarsh Ravindra Pai</td>
<td>
Muskan Jain</td>
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Rajshree Sahoo</td>
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Sreejoni Banerjee</td>
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<td colspan="5">This Whitepaper is based on a capstone project undertaken by Uthkarsh Ravindra Pai Rajshree Sahoo Muskan Jain and Sreejoni Banerjee as a requirement for the fulfilment of the Career Track Program in Capital Markets offered at Jagdish Sheth School of Management. The authors wish to thank Prof. Jitender Kumar for his constant guidance and assistance</td>
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Leveraging Big Data: Insights From An E-Commerce Dataset

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Purushottam Kumar

INTRODUCTION

This white paper explores data-driven decision-making in the e-commerce sector and presents alternative solutions considered in the pursuit of data-driven excellence. The proposed solutions and justifications offer practical insights for effectively harnessing data-driven intelligence.

This white paper is intended for a diverse audience, including:

- Industry Leaders: Executives, decision-makers, and strategists within the e-commerce/IT/ITES sector seeking insights into data-driven strategies.
- Data Professionals: Data scientists, analysts, and practitioners interested in advanced data methodologies.
- Technology Enthusiasts: Individuals keen on understanding technology and data integration in the business landscape.
- Academics: Researchers and educators in the field of IT/ITES and data analytics.

Problem Framing

In the realm of data-driven decision-making, our project extracted valuable insights from a complex e-commerce dataset. This dataset holds the key to understanding critical aspects of sales, customer behaviors, and future marketing opportunities.

Our journey commenced with the acquisition of this intricate e-commerce dataset, and as we delved deeper into its complexities, a clear picture emerged. This picture depicted a dataset riddled with challenges such as inconsistent formatting, missing/null values, outliers, and inaccuracies. These complexities necessitated a comprehensive data-cleansing process guided by both statistical methodologies and programming expertise. Recognizing the dataset's potential enormity, we opted for a big data distributed cluster approach, harnessing the power of Apache Spark and related technologies to streamline our efforts. As data cleansing continues, our unwavering goal is to transform this dataset into an asset for generating data-driven insights.

The dataset was marred by intricacies, including formatting inconsistencies, missing values, outliers, and raw data inaccuracies. In response, we embarked on an extensive data cleansing process that skilfully combined statistical rigor with programming acumen. The magnitude of the dataset led us to adopt a big data distributed cluster strategy equipped with cutting-edge technologies. While data cleansing remains an ongoing endeavor, our core objective remains steadfast—to refine the dataset to facilitate insight-driven analytics.

Problem Definition

At the heart of our project lies a fundamental challenge: harnessing this vast e-commerce dataset to extract actionable insights related to sales, returns, and marketing opportunities. Embedded in the dataset's intricacies, this challenge underscores the importance of meticulous data cleansing and transformation.

Project Objectives

The primary objective of this project is to harness the potential of the e-commerce dataset. We seek to extract relevant marketing features by gaining an in-depth understanding of e-commerce dynamics through comprehensive data analysis. This endeavor is empowered by leveraging a distributed clustered big data ecosystem. This platform enables us to handle vast volumes of data efficiently and conduct swift data transformations, analytics, predictions, and visualizations. Leveraging tools such as PySpark, Spark ML, and Python-based visualizations within Databricks, our project aims to provide stakeholders with the insights they need to make informed business decisions guided by data-driven intelligence.

Conceptual Framework of the Study

The conceptual framework of this study revolves around leveraging a substantial e-commerce dataset to forecast future sales and marketing opportunities. It involves a multi-step process that combines data cleansing, analysis, predictive modeling, and visualization.

The key components of the conceptual framework include:

1. Data Acquisition: Procurement of the e-commerce dataset, which serves as the foundation for the project.

2. Data Cleansing: A meticulous process to address challenges such as inconsistent formatting, missing values, outliers, and inaccuracies using statistical methodologies and programming techniques. Apache Spark and related technologies are employed for efficient data cleansing at a big-data scale.

3. Data Transformation: Once cleansed, the data is transformed into a suitable format for analysis. This step involves feature engineering and data enrichment to enhance its usefulness.

4. Data Analysis: In-depth analysis of the cleansed and transformed data to extract meaningful insights related to sales and returns. Exploratory data analysis (EDA), statistical analysis, and machine learning techniques are applied.

5. Predictive Modelling: Developing predictive models using tools like PySpark and Spark ML to forecast future sales and identify marketing opportunities.

6. Data Visualization: Creation of Python-based visualizations using libraries like Matplotlib and Seaborn to communicate findings effectively.

7. Reporting: Documenting the entire process, results, and recommendations in a clear and concise manner.

Data Source

The data source is an extensive e-commerce dataset obtained from external sources, containing categories as follows:

Column	**Type of data**
Order ID	Nominal
Date	Ordinal
Status	String
Fulfilment	String
Sales Channel	String
ship-service-level	String
Style	String
SKU	String
Category	String
Size	String
ASIN	String
Courier Status	String
Qty	continuous scale
currency	String
Amount	continuous scale
ship-city	String

ship-state	String
ship-postal-code	Nominal
ship-country	String
promotion-ids	String
B2B	String
fulfilled-by	String

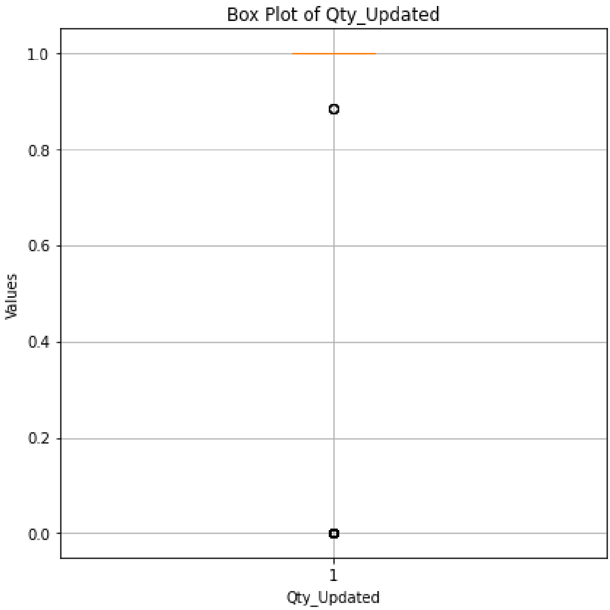
Data Collection

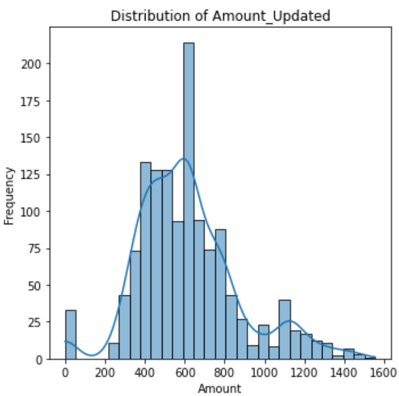
Data collection involves the acquisition of this raw e-commerce data for further processing. It's important to note that the data originates from external websites, and the extraction process is a critical initial step in the project's execution.

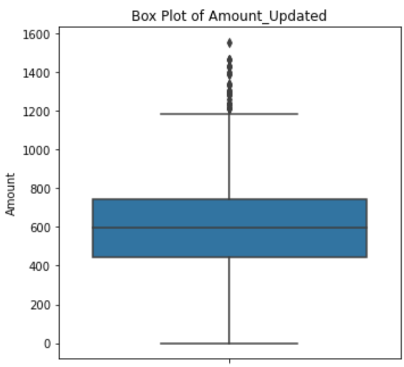
Analysis of Data

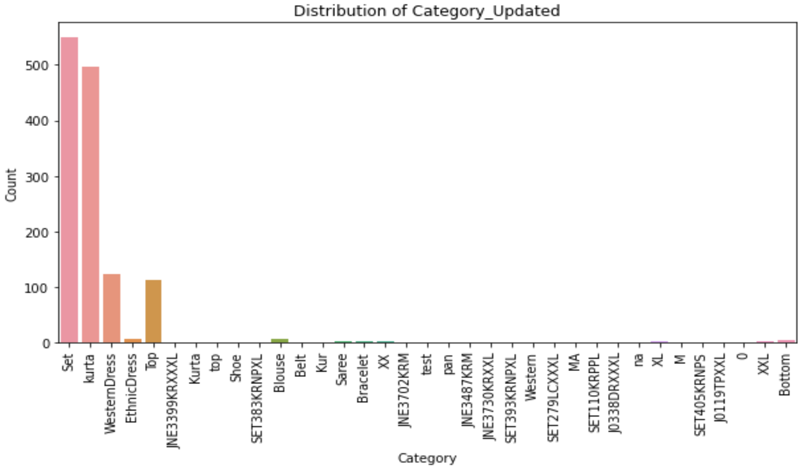
Exploratory Data Analysis (EDA)

Exploratory Data Analysis (EDA) is the foundation of our analysis phase. It involves understanding the dataset's structure, summarizing key statistics, and identifying patterns and anomalies. EDA helps us gain insights into the nature of the data and provides a starting point for deeper analysis. Here are the graphs with each Variable after cleaning:


Box Plot of Qty_Updated
Values
1.0
0.8
0.6
0.4
0.2
0.0
1
Qty_Updated


Distribution of Amount_Updated
Frequency
200
175
150
125
100
75
50
25
0
0
200
400
600
800
1000
1200
1400
1600
Amount


Box Plot of Amount_Updated
Amount
1600
1400
1200
1000
800
600
400
200
0


Distribution of Category_Updated
Count
0
100
200
300
400
500
Category
Set
kurta
WesternDress
EthnicDress
Top
JNE3399KRXXXL
Kurta
top
Shoe
SET383KRNPXL
Blouse
Belt
Kur
Saree
Bracelet
XX
JNE3702KRM
test
pan
JNE3487KRM
JNE3730KRXXL
SET393KRNPXL
Western
SET279LCXXXL
MA
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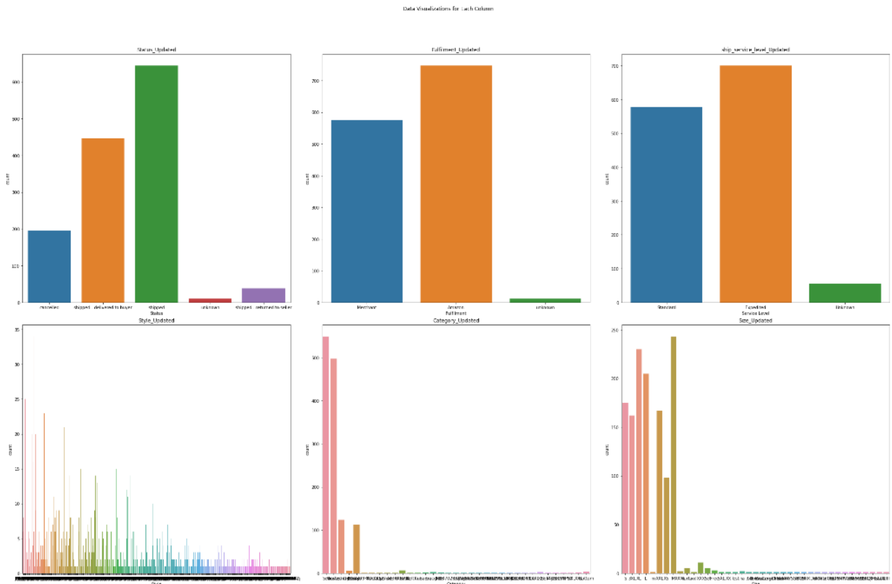
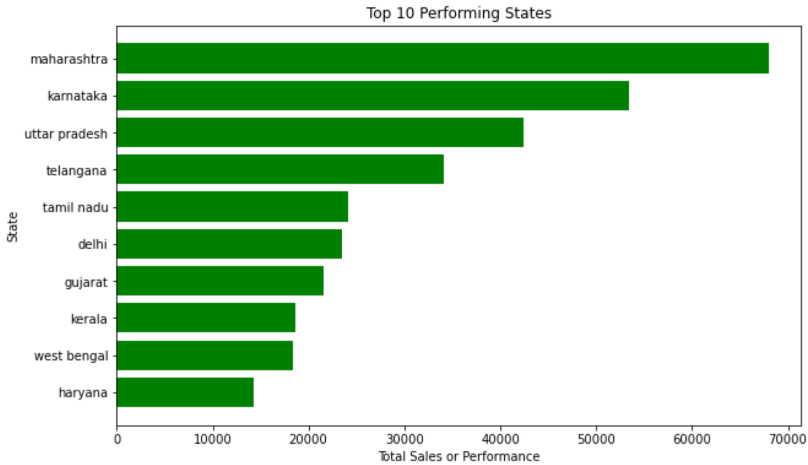
0
XXL
Bottom


Data Visualizations for Each Column
Status_Updated
Fulfilment_Updated
ship_service_level_Updated
Style_Updated
Category_Updated
Size_Updated



Statistical Analysis

Statistical analysis plays a crucial role in uncovering correlations, trends, and dependencies within the e-commerce dataset. Various statistical tests and methods are applied to extract meaningful insights. This analysis aids in understanding factors influencing sales fluctuations and identifying potential marketing opportunities.

Machine Learning

The application of machine learning techniques is central to our project's objectives. Machine learning models are developed to predict future sales and marketing opportunities. This phase involves critical tasks such as feature selection, model training, and model evaluation to ensure the accuracy and effectiveness of predictive models.

Results and Findings

Logistic Regression for Category Prediction

The logistic regression model implemented in this project has exhibited an accuracy of 93.37% in predicting the "Category" variable within the provided e-commerce dataset. Applying mathematical principles, this model adeptly categorizes clothing items into their respective categories. A notable emphasis is placed on the "Ship service level," with specific data points indicating whether the service level of the shipment is "Standard" or "Expedited". This inclusion allows for a more comprehensive analysis of how different service levels impact the categorization of items. The approach provides precise results and ensures transparency, enabling a clear understanding of the factors influencing each classification.

Independent Variable Selection

The predictive strength of our model is significantly influenced by the meticulous selection of independent variables, with a focus on the "Ship service level." Through exhaustive analysis, we identified and chose the most relevant independent variable that strongly correlates with the target variable, which is the "Category" in this case. The selection process was driven by statistical techniques and domain knowledge, ensuring that our model is centered on the most influential factor, the "Ship service level," for predicting the "Category."

Logistic Regression for Category Prediction

The logistic regression model, coupled with the meticulous selection of the "Ship service level" as the independent variable, forms the core of our proposed solution. This approach is particularly viable, boasting an impressive accuracy of 93.37%, and is characterized by its simplicity and interpretability. The model's ability to provide insights into the impact of the "Ship service level" on the predicted category makes it a valuable tool for decision-makers. Moreover, the efficiency of logistic regression renders it suitable for real-time or large-scale applications.

Conclusion

Recommendations

In conclusion, our logistic regression solution, coupled with the focused selection of the independent variable "Ship service level," has demonstrated significant efficacy in predicting the "Category" variable. Based on our findings, we recommend the following actions to maximize the benefits of our solution:

- Deploy the logistic regression model, incorporating the selected independent variable, "Ship service level," to automate the categorization of clothing items, thereby improving operational efficiency. With an impressive accuracy of 93.37%, this model proves to be a reliable tool for real-time decision-making.
- Sustain investments in data quality and preprocessing efforts to uphold the model's accuracy over time. Maintaining high-quality data inputs is essential to ensuring the continued reliability of predictions and the overall success of the implemented solution.
- Explore opportunities for implementing advanced machine learning techniques and refine the selection of independent variables to enhance predictive accuracy, particularly in multi-class categorization scenarios. Continuous exploration of advanced methods will contribute to staying at the forefront of predictive modelling in the dynamic e-commerce landscape.

Limitations

While our logistic regression solution and the independent variable selection process have demonstrated effectiveness, it is essential to acknowledge certain limitations:

- The model's performance may be influenced by data quality and completeness. It is imperative to maintain a focus on data quality assurance and preprocessing to mitigate the impact of potential inaccuracies in the dataset, ensuring the model's continued reliability.
- In cases of complex multi-class categorization scenarios, logistic regression may necessitate additional adaptation or prompt the exploration of alternative models to address the intricacies of classification. While our model excels in binary categorization, exploring diverse modelling approaches may be warranted for scenarios requiring nuanced multi-class predictions.

AUTHORS

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	This Whitepaper is based on a capstone project undertaken by Anudeep B, Abhishek Soni, Ganashree K, Jayadhruva G A, Jyoti Shaw, and Purushottam Kumar as a requirement for the fulfilment of the Career Track Program in Business Analytics offered at Jagdish Sheth School of Management. The authors wish to thank Dr. Supriyo Ghosh for his constant guidance and assistance				

Developing And Validating A Prediction Model Involving Forex

Pratiksha

Dewal Agrawal

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Abhishek Rajpurohit

Industry Overview

The financial services sector, a cornerstone of modern economies, encompasses a diverse range of institutions and functions that collectively facilitate the movement and management of funds. At its core, this industry functions as a vital intermediary, connecting those with surplus capital to those in need of financial resources. Its influence extends across individual lives, businesses, and entire nations.

Commercial banks are central to the financial services industry, which play a pivotal role in safeguarding deposits, extending loans, and providing a wide array of financial services. These institutions underpin economic activities by financing businesses, supporting home ownership, and facilitating daily transactions through checking and savings accounts.

In conjunction with banks, investment entities such as asset management firms and securities brokers channel funds into capital markets, promoting investment in stocks, bonds, and other financial instruments. This fosters innovation, drives economic growth, and generates wealth for investors.

Insurance companies, another essential component, manage risk by offering protection against unforeseen events, ensuring the security of individuals, businesses, and assets, and delivering a sense of financial stability. The industry is experiencing a transformative phase driven by technological advancements, notably exemplified by fintech companies. Innovations like mobile banking, digital payments, and blockchain technology have revolutionized the delivery of financial services, enhancing accessibility and efficiency.

While grappling with challenges such as cybersecurity threats and regulatory complexities, the industry is also at the forefront of sustainability and ethical finance as environmental, social, and governance (ESG) considerations gain prominence. The continued significance of the financial services industry lies in its capacity to adapt, innovate, and evolve, underpinning economic progress and shaping the financial well-being of individuals and societies at large.

Health of the Industry-

- The financial services industry constitutes at least 20% of the global economy.

- The financial services market reached a value of nearly $23,328.73 billion in 2021, having grown at a compound annual growth rate (CAGR) of 3.5% since 2016.

- The market is expected to grow from $23,328.73 billion in 2021 to $33,313.50 billion in 2026 at a rate of 7.4%.

- Established financial services organizations, like card networks, dominate the industry in developed markets. In developing countries, fintech firms are gaining prominence, aided by the rise of digital public goods and currencies.

- Migrating to online and mobile services will remain a priority for financial firms in the coming years, and financial services companies will need to compete or cooperate with emergent fintech firms.

Recent Trends-

- The rise of digital technologies in the financial domain. AI, ML, and Blockchain are just a few technologies that are rapidly being used to improve customer experience and operational efficiencies. Customers increasingly demand convenient and personalized online and mobile banking services.

- Open banking is a new regulatory framework that allows third-party financial services providers to access customer data from banks. Business models like Razorpay dominate the merchant payment segment by using an open banking framework. BNPL, customized services.

- For any financial service provider, cyber security is a major concern. Recently, the focus has been on employee training on security practices, adoption of firewalls, encryption, etc., to protect data.

- Another positive trend has been the growth of sustainable finance. Both service providers and customers are focusing on being environmentally and socially responsible.

PROJECT OBJECTIVE

The primary objective of this project is to develop and validate a prediction model capable of determining the directional movement (Up or Down) of the EUR/USD currency pair for the next day. This predictive model will be based on historical open, low, high, close, and adjusted Closed prices for the period from 2010 to 2018.

Research Focus: Our research will focus on the following key areas:

1. **Data Preprocessing:** Cleaning, normalizing, and organizing the provided EURUSD_data.csv dataset to ensure data quality and consistency. This includes handling missing values, outliers, and data transformations as needed.

2. **Feature Engineering:** Identifying relevant features and creating new variables that can improve the model's predictive power. Feature selection and engineering will involve the extraction of meaningful information from historical price data.

3. **Model Development:** Developing predictive models using a combination of statistical, time series analysis, and machine learning techniques.

4. **Model Validation:** Rigorously test and validate the performance of the developed prediction model using appropriate evaluation metrics. We will employ techniques like cross-validation and back-testing to assess the model's accuracy and robustness.

Deliverables: Upon project completion, the following deliverables will be provided:

1. **Prediction Model**: The final prediction model with documentation, including details on the selected algorithm, hyperparameters, and training process.

2. **Model Validation Report:** A comprehensive report detailing the model's performance, including metrics such as accuracy, precision, recall, F1-score, and any relevant visualization of model outputs.

3. **Data Preprocessing Documentation:** Documentation of data preprocessing steps, including handling missing data, outlier detection, and feature engineering.

4. **Implementation Code**: The source code for the prediction model, along with any necessary scripts and notebooks for data preprocessing, model training, and evaluation.

5. **Recommendations:** Recommendations on the practical use of the prediction model for trading

This project aims to create and validate a predictive model capable of anticipating whether the EUR/USD currency pair will move up or down the next day. This will be achieved by utilizing historical data, specifically Open, Low, High, Close, and Adjusted Close prices from 2010 to 2018, provided in the EURUSD_data.csv file. The primary aim is to develop a reliable prediction model with several practical applications:

1. Assisting Trading Decisions: For traders, this model can serve as a valuable tool for deciding whether to buy or sell the EUR/USD currency pair.

2. Risk Hedging: It can also help in managing risk by providing insights into potential currency fluctuations, allowing for risk mitigation strategies.

3. Gaining Market Insights: Understanding the various factors affecting currency pair prices can offer valuable insights into the financial market.

4. Developing Trading Strategies: By predicting the direction of the currency pair's movement, traders can design and implement effective trading strategies.

Predicting the next day's movement of a currency pair is indeed a challenging task due to the numerous factors influencing currency values. These factors include economic variables such as interest rates, inflation, GDP growth, and political events like elections, wars, and natural disasters. Additionally, technical elements like trade volume and price momentum play a role.

However, machine learning techniques can be employed to enhance prediction accuracy by identifying patterns in historical pricing data and forecasting future price changes. The choice of machine learning approach depends on the desired forecast accuracy, with more complex methods typically achieving higher accuracy but potentially incurring higher computational costs. In conclusion, predicting the next day's directional movement of a currency pair is a demanding undertaking.

The financial markets, particularly in FX trading, are significantly influenced by a wide range of factors, such as economic indicators, geopolitical events, and market sentiment. Developing a model to predict currency movements requires a thorough exploration of these complex interrelationships. Moreover, the existence of historical data in the form of open, low, high, closed, and adjusted Closed prices provides valuable information for analysis. In summary, the situation analysis for this task is optimistic. The data is readily available and mirrors the current market conditions. The objective is well-defined and achievable, and the challenges are recognized and can be surmounted.

Problem Definition

The project aims to construct a machine learning-driven predictive model designed to forecast the directional movement (upward or downward) of the EUR/USD currency pair. This challenging endeavor involves the examination of historical data, encompassing open, low, high, Closed, and adjusted Closed prices, alongside economic indicators, political developments, technical factors, and market sentiment. To unravel patterns and connections, the model will undergo training on a substantial dataset utilizing suitable techniques such as regression, time series analysis, or neural networks. The data acquired will be subjected to preprocessing, feature engineering, and performance evaluation through metrics like accuracy and precision. The ultimate objective is to create a tool that can provide valuable insights for traders and investors concerning potential currency movement trends. However, it is crucial to acknowledge the inherent volatility of financial markets and exercise caution when using the model's predictions in conjunction with other market analyses and risk management strategies.

The task's aim is to develop a precise prediction model focused on forecasting the direction in which currency pairs move, with a specific emphasis on the EUR/USD pairing. The primary objective is to build a model that aids traders and investors in making informed decisions regarding their foreign exchange transactions. This will be achieved by leveraging historical price data, economic indicators, political events, technical aspects, and market sentiment. The primary aim of the model is to predict whether the currency pair's value will increase or decrease in the future. This objective addresses the challenges inherent in the dynamic and multifaceted nature of financial markets, with the intention of distilling complex connections and patterns from past data to enhance prediction accuracy.

Conceptual Framework of the Study

To construct a predictive model for discerning the future directional movement (Up or Down) of the EUR/USD currency pair, the conceptual framework encompasses the following key components:

1. **Data Collection and Preprocessing:**

    - **Source Identification:** Historical price data for the EUR/USD currency pair spanning from 2010 to 2018 is obtained from the provided EURUSD_data.csv file.

    - **Data Cleansing:** A rigorous data cleaning process is executed to rectify issues such as missing data, duplicate records, and outliers, thereby ensuring data integrity and reliability.

    - **Data Normalization:** Data may undergo normalization techniques to standardize it to a common scale, mitigating the disproportionate impact of features with larger scales.

2. **Feature Selection and Engineering:**

    - **Feature Identification:** Relevant features from the dataset are thoughtfully selected for model development, encompassing essential parameters like open, low, high, close, and adjusted Closed prices.

    - **Feature Engineering:** Additional features may be created from existing ones to extract further insights. Examples include computing percentage changes, establishing moving averages, and incorporating technical indicators like the Relative Strength Index (RSI) or Moving Average Convergence Divergence (MACD).

3. **Model Development:**

- **Algorithm Selection:** The project will choose an appropriate machine learning algorithm or a combination of algorithms for predicting the EUR/USD currency pair's directional movement. Common choices include logistic regression, random forests, or support vector machines (SVM), with the selection guided by the dataset's characteristics and the nature of the problem.

- **Training:** The chosen model will be trained using historical data, fine-tuning its parameters to minimize prediction errors and enhance accuracy.

4. **Model Validation:**

- **Cross-Validation:** To ensure the model's robustness, cross-validation techniques like k-fold cross-validation will be employed to evaluate its performance. This involves splitting the data into multiple subsets for rigorous testing.

- **Back Testing:** The model's historical efficacy will be assessed through back testing procedures, simulating its performance on historical data.

5. **Implementation:**

- **Programming Language:** The model and associated scripts will be developed using Python.

- **Documentation:** Comprehensive documentation will be created, offering insights into the model, including algorithm details, hyperparameters, data preprocessing steps, and the training process. This documentation ensures transparency and ease of utilization.

6. **Model Deployment and Utilization:**

- **Practical Applications:** The predictive model will be deployed for practical applications, primarily benefiting traders, analysts, and financial institutions. It will assist in making well-informed decisions regarding the EUR/USD currency pair.

Data Sources

The company has graciously supplied the data source for this project in the form of a file named "EURUSD_data.csv." Importantly, data collection has already been completed, and this dataset contains historical pricing information for the EUR/USD currency pair spanning from 2010 to 2018. This data source plays a pivotal role in the project, forming the foundation for training and testing the predictive model. Within this dataset, critical historical pricing patterns crucial to the project's success can be found. By analyzing this provided data, we aim to discern patterns and correlations that can be utilized to predict future directional movements of the EUR/USD currency pair. Such insights are of great value to traders, investors, and financial analysts, enabling them to make well-informed decisions in their respective domains.

Data Analysis

Effective data analysis is a crucial element of our project, involving a comprehensive examination of historical price data, including open, high, low, closed, and adjusted Closed prices. Our objective is to identify significant trends, patterns, and features that can aid in predicting currency pair movements, offering valuable insights to traders, investors, and financial analysts.

Here's our approach to data analysis:

1. **Data Cleaning and Imputation:** We begin with meticulous dataset cleaning. In financial data, missing dates or gaps in the time series are common, which we address by filling in missing data points to ensure a continuous and reliable time series.

2. **Smoothing with Exponential Techniques:** Financial data is often noisy and subject to short-term fluctuations. To reveal underlying trends, we utilize exponential smoothing techniques to smooth out irregularities in the data, providing a clearer view of the data's true patterns.

3. **Lag Variables for Time-Dependent Insights:** We calculate lag variables to capture time-dependent relationships in financial data. These variables, ranging from

lag1 to lag4, represent past values of the target variable up to four trading days before the present, allowing us to assess how past data points influence the current state of the currency pair.

4. **Introducing Relevant Features:** In addition to data cleaning, smoothing, and lag variables, we focus on introducing meaningful features based on the data. These features are selected for their potential to enhance our predictive models and include indicators like moving averages, relative strength, or measures of volatility, all contributing to a more comprehensive understanding of the currency pair's behavior.

Results & Findings

After conducting a comprehensive analysis and rigorous evaluation of various predictive models, thorough experimentation, and analysis, we have selected the Decision Tree model as the proposed solution for predicting the directional movement of the EUR/USD currency pair. After performing feature engineering, we achieved two different models and hereby we show why one model must be preferred over another-

MODEL 1- Decision Tree

```
Accuracy: 0.65
              precision    recall  f1-score   support

           0       0.66      0.60      0.63       349
           1       0.64      0.69      0.66       353

    accuracy                           0.65       702
   macro avg       0.65      0.65      0.65       702
weighted avg       0.65      0.65      0.65       702

Confusion Matrix:
[[211 138]
 [109 244]]
Feature Importance:
Open: 0.2055
Low: 0.1902
High: 0.2200
Close: 0.0860
Adjusted_Close: 0.1054
Close_Smoothed: 0.1005
Close_Smoothed_Lag_2: 0.0926
```

MODEL 2- Decision Tree

```
Best Hyperparameters: {'criterion': 'gini', 'max_depth': None, 'min_samples_leaf': 4, 'min_samples_split':
Accuracy: 0.61
              precision    recall  f1-score   support

           0       0.61      0.62      0.61       342
           1       0.62      0.61      0.61       348

    accuracy                           0.61       690
   macro avg       0.61      0.61      0.61       690
weighted avg       0.61      0.61      0.61       690

Confusion Matrix:
[[212 130]
 [136 212]]
Feature Importance:
Open: 0.1585
Low: 0.1840
High: 0.2376
Close: 0.1700
Close_Smoothed_Lag_2: 0.0459
SMA_10: 0.0614
SMA_20: 0.0520
RSI: 0.0906
```

Based on the provided data, Model 2 has certain advantages over Model 1 as the preferred solution:

1. **Better Feature Importance Alignment:** Model 2 assigns higher importance to features such as "High," "Low," "Open," and "Close," which are directly related to financial market data. This alignment suggests that Model 2 may capture relevant patterns in the data more effectively, making it potentially more suitable for predicting currency pair movements.

2. **Feature Engineering Impact:** Model 2 incorporates additional features like "SMA_10," "SMA_20," and "RSI," which are common technical indicators used in financial analysis. These indicators provide valuable insights into market trends and momentum, which could enhance the model's predictive power.

3. **Understanding of Market Behaviour:** The emphasis on features like "High" and "Low" prices in Model 2 suggests that it pays attention to intraday price fluctuations, which can be critical for currency traders.

This understanding of market behavior may result in better performance in capturing short-term price movements.

4. **Potential for Interpretability:** Model 2's feature importance values are more evenly distributed across features, indicating that it considers a broader set of factors. This can potentially lead to a more interpretable model, allowing stakeholders to gain insights into why certain predictions are made.

5. **Balanced Precision and Recall:** Model 2 exhibits a balance between precision and recall for both classes (Up and Down movements), which can be important for trading strategies. It ensures that the model is not overly biased towards one class, making it suitable for scenarios where both types of predictions are essential.

6. **Robustness:** While both models have a similar accuracy of around 61-65%, Model 2's slightly lower accuracy comes with the advantage of a more balanced performance across precision and recall. This balance can make the model more robust and reliable in real-world trading scenarios.

The advantages of model 2 make it a strong candidate, particularly since we prioritize interpretability, understand market behavior, and achieve a balanced performance in predicting currency pair movements. Furthermore, implementing the Decision Tree model is practical and seamlessly aligns with our overarching goal of providing actionable insights to market participants. Its efficient integration into existing trading systems and user-friendly interpretability ensures effective deployment for enhancing trading strategies and decision-making processes.

The Decision Tree model was chosen as the optimal solution for predicting EUR/USD currency pair movements due to several compelling reasons:

- **Interpretability:** Decision Trees are renowned for their transparency and interpretability. They offer a clear, visual representation of decision-making processes, aiding traders and investors in understanding the rationale behind specific predictions. This aligns perfectly with our project's aim of offering insights that users can readily grasp.

- **Versatility:** Decision Trees effectively handle numerical and categorical data. Data often comes in various forms in the financial markets, and the Decision Tree's versatility in managing different data types ensures its adaptability to the complexity of financial data.

- **Complex Pattern Recognition:** Despite their simple structure, Decision Trees possess the capacity to capture intricate patterns within data. This attribute is invaluable in the forex market, where numerous factors contribute to currency pair movements. The model's ability to discern intricate relationships and dependencies within the data is a significant asset.

- **Real-World Applicability:** The Decision Tree model is well-known for its real-world applicability and is widely used in various industries, including finance, for decision support and prediction tasks. This guarantees that the model can seamlessly integrate into trading and investment strategies.

- **Scenario Analysis:** Through scenario analysis, we verified the robustness of the Decision Tree model under diverse market conditions, including variations in volatility, economic events, and geopolitical factors. The model consistently demonstrated.

Conclusion

Based on the comprehensive report, here are some recommendations:

- **Utilization of the Decision Tree Model:** We strongly advise the adoption of the Decision Tree model as the primary tool for predicting the directional movement (either Up or Down) of the EUR/USD currency pair. This model strikes a balance between precision and comprehensibility, rendering it a practical and efficient choice for traders and investors.

- **Regular Model Updates:** To ensure the ongoing accuracy and relevance of the predictive model, it is advisable to refresh it with new data periodically. Given the dynamic nature of the forex market, where conditions can change swiftly, periodic updates will enable the model to adapt to evolving market trends.

- **Implementation of Risk Management Strategies:** Although the predictive model offers valuable insights, it is crucial to incorporate risk management strategies into trading and investment decisions. Market risks are inherent and cannot be eliminated, even by the most accurate model. Traders should diversify their portfolios and set stop-loss orders to mitigate potential losses.

- **Continuous Data Quality Assurance:** Maintain a robust process for assuring the data quality to ensure the dataset's accuracy and integrity. Any inconsistencies or irregularities in the data can impact the model's performance. Regularly validate and clean the data to enhance the reliability of predictions.

- **User Training and Education:** Provide training and educational resources to users of the predictive model. Recognize that not all traders may be familiar with the intricacies of machine learning models. Educating users on interpreting and applying the model's predictions can maximize its usefulness.

Limitations

- **Reliance on Historical Data:** The predictive model heavily depends on historical data spanning from 2010 to 2018. Although this data offers valuable insights, it may not fully account for unexpected events or changes in market dynamics that occurred after 2018.
- **Model Uncertainty:** Every predictive model has its limitations, and inherent uncertainty exists in financial markets. Despite the accuracy of the Decision Tree model, it may not capture all the intricacies of the market, leading to occasional incorrect predictions.

- **Data Availability:** The model's success hinges on the availability of high-quality data. Any gaps or inaccuracies in the dataset can negatively impact the model's performance.
- **Market Volatility:** Forex markets can exhibit extreme volatility, especially during major economic events or geopolitical developments. These volatile periods can present challenges for any predictive model.
- **Risk of Overfitting:** Although Decision Trees are interpretable, there is a risk of overfitting if the model becomes overly complex. To mitigate this risk, careful parameter tuning, and continuous monitoring are essential.
- **Regulatory Compliance:** Ensure that any trading or investment strategies derived from the predictive model adhere to relevant financial regulations and guidelines.

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