Inventory Integrity, Business Optimization and Crisis Management in a small scale Textile Manufacturing and Trading Enterprise

A report for the BDM Project Exhibition

By,
Name: Avijeet Palit
Roll number: 21f1005675
Email: 21f1005675@ds.study.iitm.ac.in

IITM BS Degree in Data Science & AI,
Indian Institute of Technology, Madras, Chennai
Tamil Nadu, India, 600036

Declaration Statement

I am working on a Project titled *"Inventory Integrity, Business Optimization and Crisis Management in a small scale Textile Manufacturing and Trading Enterprise"*. I extend my appreciation to **Khushbu Textile, Bhagalpur,** for providing the necessary resources that enabled me to conduct my project.

I hereby assert that the data presented and assessed in this project report is genuine and precise to the utmost extent of my knowledge and capabilities. The data has been gathered from primary sources and carefully analyzed to assure its reliability.

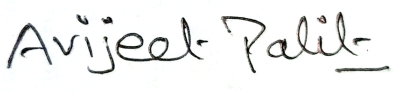
Additionally, I affirm that all procedures employed for the purpose of data collection and analysis have been duly explained in this report. The outcomes and inferences derived from the data are an accurate depiction of the findings acquired through thorough analytical procedures.

I am dedicated to adhering to the principles of academic honesty and integrity, and I am receptive to any additional examination or validation of the data contained in this project report.

I understand that the execution of this project is intended for individual completion and is not to be undertaken collectively. I thus affirm that I am not engaged in any form of collaboration with other individuals, and that all the work undertaken has been solely conducted by me. In the event that plagiarism is detected in the report at any stage of the project's completion, I am fully aware and prepared to accept disciplinary measures imposed by the relevant authority.

I understand that all recommendations made in this project report are within the context of the academic project taken up towards course fulfillment in the BS Degree Program offered by IIT Madras. The institution does not endorse any of the claims or comments.

Signature of Candidate:



Name: **Avijeet Palit (21f1005675)**

Date: **12/12/2023**

Content

Executive Summary

This comprehensive project report details the Business Data Management (BDM) project titled “Inventory Integrity, Business Optimization, and Crisis Management in a Small-Scale Textile Manufacturing and Trading Enterprise.” The focus of this study was Khushbu Textile, a family-operated Multi-generational enterprise registered as Small Industry in 2005 in Bhagalpur, Bihar, India. Originally a traditional weaving business, it has evolved into a small-scale, semi-organized entity within the MSME sector, operating both B2B and B2C segments.

The project was initiated to address several pressing issues faced by Khushbu Textile, including inventory discrepancies, stock disappearance, financial instability, and the overall inefficiency in business operations. These challenges were significantly impacting the company's profitability and operational integrity.

The objective of the BDM project at Khushbu Textile was to enhance operational efficiency and financial health by addressing key issues. The project focused on optimizing business operations and supply chain processes, correcting inventory discrepancies, and managing stock disappearances. Additionally, it aimed to improve financial clarity, accountability, and debt management, while also enhancing employee and vendor reliability. Through these efforts, the project sought to ensure long-term sustainability and crisis management, ultimately restoring inventory integrity and streamlining operations for a more robust business model.

Methodologies employed included quantitative and qualitative analysis, using tools such as Lean Six Sigma’s DMAIC framework, 5S methodology, Root Cause Analysis, Machine Learning and Forecasting, Financial ratios and various statistical tests to validate findings. Data was collected through multiple sources, including direct surveys, sales data from digital marketplaces, and financial records provided by the enterprise.

Key findings from the project revealed:

- Significant inventory discrepancies linked to theft and mismanagement.
- Financial ratios indicated deteriorating financial health, directly correlated with inventory issues.
- Employee and vendor analyses highlighted areas of unreliability and dissatisfaction that needed addressal.

The project outcomes included improved inventory accuracy, identification and mitigation of theft, enhanced financial viability, and streamlined operation processes. Recommendations were made for implementing robust inventory management systems, enhancing employee training programs, improving data management practices, and establishing regular audits to prevent future discrepancies.

The project has significantly contributed to the restoration of operational integrity at Khushbu Textile. It has also provided a blueprint for similar small-scale industries facing challenges in adapting to digital marketplaces and maintaining operational efficiency. This report serves as a testament to the potential benefits of structured data management and systematic problem-solving within the traditional business sectors in Tier-2 and Tier-3 cities in India.

Organization Background:

The Enterprise that I am working for is **"Khushbu Textile"**, which is a for-profit, private proprietorship, manufacturing and trading firm. The Enterprise was established around 2005 in the tier-3 city of Bhagalpur, Bihar, India by Mamta Devi supported by her husband; later their children took active participation in the business.

This enterprise began as a traditional weaving business in the cottage industry, and has evolved into a small-scale semi-organised organization within MSME in recent years. Over the years, It has diversified its operations to include both B2B and B2C segments in response to changing market demands and profit maximization.

The core Business of this enterprise involves taking natural and synthetic treads, weaving them into raw cloths and supplying them directly to other businesses for further processing. They also offer weaving as a service to other businesses contributing to their revenue. In recent years(last 3 years), with the accelerating popularity of the digitization and digital marketplaces in the Indian Economy, they try their hands by venturing into the B2C sector. In this segment, they outsource tailoring and other processes to produce end products as Traditional Indian Attire(TIA), which then they marketed through various digital platforms such as Messo, enterprise's own Website and social Media channels.

Despite its growth and market recognition, the business encounters several challenges which incorporate Inventory Discrepancy, Stock disappearance, lack of proper management practices, lack of structured data maintenance, operational challenges and many more. The above reasons have necessitated the initiation of this project.

Problem Statements

The Problem Statement for this project can be broadly divided into following objectives to address:

Objective 1: Analyzing Business Operation and Supply Chain

- Capability of business operations and supply chain through a flow chain diagram.

Objective 2: Assessing Inventory Discrepancy

- Discrepancies between physical inventory data and digital records/actual Units.
- Financial losses due to discrepancies.
- Operational inefficiencies, Data accuracy and integrity issues.
- Connection between theft and inventory discrepancies.

Objective 3: Tracking Stock Disappearance

- Checking on Quantity and cost of Disappeared Stocks
- Impacts on order fulfillment and revenue.
- Challenges in tracking missing inventory.
- Confusion, delays, and customer dissatisfaction.
- Effects of delays and order inaccuracies.

Objective 4: Clarifying Uncertainty in Finance and Impact

- Financial viability concerns.
- Checking on Accountability Measures
- Accurate financial assessment : Effects on productivity and profitability
- Financial Impact Uncertainty

Objective 5: Optimizing Accountability and debt management

- Relationship between debt and inventory issues.
- Debt Diversity Analysis

Objective 6: Analyzing Employee satisfaction and reliability

- Employee Reliability analysis
- Employee Satisfaction with current role
- Employee Diversification

Objective 7: Outsourcing Partner/Vender reliability.

- Outsourcing Partner Reliability Analysis
- Inventory Discrepancies and Outsourcing Partner

Objective 8: Potential Risks : Analysis and regulatory compliance.

- Potential implications and loopholes of theft or unauthorized access
- Compliance with legal and regulatory requirements.
- Impact of compliance issues on the business.

Objective 9: Assessment on resource allocation, Crisis handling and long term sustainability

- Allocation of significant resources to address inventory issues & Opportunity costs associated.
- Implications for strategic decision-making & Impact on strategic resource allocation.
- Risk to the long-term sustainability of the business
- Effects of ongoing inventory management challenges on the business's future.
- Checking on the Organisation structure of the business and suggesting suitable organization structure.

Objective 10: Market Research

- Customer Segmentation
- Market Size and Competition Overview

Objective 11 : SWOT Analysis of the Impact of Digitization and Digital marketplaces on Cottage and Small-Scale Industries in Semi & Unorganized sector Industries in Tier-2/3 Cities in India.

Background of the Problem

Around one month ago from this date (5th Oct, 2023), One of my friend named ‘Anukul Shahni’, who is also a part of the Enterprize, over which I am working on, in this project and he is also the son of the proprietary, reaches to me in frustration. Following the conversation, I got to know that his business is under a high debt burden. This statement at first glance shocked me, as from the last few years, His business grew tremendously. He suspects that there are potential thefts of units from his inventory by his employees.

After this conversation, I visited the site and also took a glance at his business data and records which are definitely not well maintained. On That day I also inquired about the operations and found that operations are not of standard and the business is prone to miss management as well. Although their sales and production are upto a average mark, the enterprise was lagging behind in profit and revenue.

Based on these, I get an intuition that the enterprise semi-organised approach, lack of data management and inefficient Business operation have led to these significant issues, including suspension on theft, financial instability and more.

Problem Solving Approach

To address the Problem statement in this project, I follow the division of the problem statement in objectives as mentioned above in ‘3. Problem statement section’. I will address all the objectives separately and then combine their results to the final conclusion.

I will try to stick to the standard methodologies to address these kinds of problems with little modifications so as to fit them in the above written situation. I will try to use Quantitative and Qualitative methods extensible wherever and whoever suited best to the required objectives. At present, I'm planning to implement a few methods from lean six sigma, especially tools like DMAIC(Define > Measure > Analyze > Improve > Control), 5S(Sort, Set in order, Shine, Standardize and Sustain) as the problem objectives are revolves around the production and operation process. To explore the Cause and Effect relationship I plan to use iterative interrogative techniques like ‘5 WHYS’ and ‘FishBone Diagram’ as the problem objectives also highlight the mismanagement within the business. To dig deep especially on the objective of ‘stock disappearance’, I’m in plan to execute the ‘Root Cause Analysis’ as It may be possible that there are other hidden reasons around this particular objective like employee dis-stisfaction and illegal practices by competitors. Apart from these, I will extensively use other Statistical tools, Ground Surveys with employees, Meeting and Discussion with the PORs of the Enterprise. Furthermore, I also intend to refer Case Studies to meet the analytical conclusions with practicality and execution with an elevated confidence.

The Intend Data Collection as in agreement with the Enterprise is all the data that they maintain physically in their ‘ledger book’ or the business dairy, the sales and order data from the digital marketplaces and their website and few other sources which are still not disclosed by the Enterprize. Enterprise also allows to list and prepare an account for all the units currently available in stock and in processing. These sets of data are enough

to address the base problems effectively as for simple justification I can get the loss by disappearance of stock by just doing simple math of Input - Output . For the optional objective, I need detailed data when the Enterprize was working only in B2B, recognised as a cottage industry and operation only in non-digital space for the comparative study to address that particular objective. For which Enterprize, partially agreed, given they will find those data.

As per tools requirement, I will use excel for basic calculations, python and its libraries and google colab to handle extensive calculations and draw graphs to get insights for my project objectives. I will use physical forms, copy and pens and other electronic/stationary gadgets to record responses from surveys and meetings.

Expected Outcome

This project aims to restore the integrity of the Enterprise's Inventory, optimize its business operations and manage the crisis effectively, ensuring a brighter future for the business. It is expected to yield the following outcomes:

- Improve Inventory Accuracy.
- Identification and mitigation of employee theft.
- Enhanced financial viability.
- Streamlined operation process.
- Strengthened Relationships with vendors and digital marketplaces.
- Compliance with legal and regulatory requirements.
- Efficient resource allocation .
- Long Term Business Survivability and Sustainability.

Meta Data & Descriptive Statistics

1. **Messo sales data**: This data is collected from the digital marketplace where the business has the maximum share of sales. The data ranges from January, 2022 to September, 2023. This data collected to get the sale figure will be going to help in analyzing the revenue subsequently Inventory discrepancies and other targeted objectives.

   Link : messo sales

   a. **Order_date , year, month, day, month-year:** These are the columns that contain data about the date of sale/transaction through Messo digital marketplace of a product in different date formats potentially required for some analysis.
   Descriptive statistics: Although descriptive statistics has no relevance in this regard but on analysis, we got **July-2022** record maximum transactions with **18526** transactions.

   b. **Quantity:** This column contains the quantity of each order/transaction placed.
   Descriptive statistics:

mean	**1.005486**
std	**0.096431**
min	**1.000000**
50%	**1.000000**
max	**17.000000**

c. **Order_status:** This column contains information about the nature of transaction and has 5 values as **delivered, shipped, rto, return, canceled, exchanged.**
d. **Messo_price:** This column contains the listed price of the product on the marketplace.
Descriptive Statistics:
count 203987.000000
mean 415.233206
std 107.076987
min 221.000000
25% 348.000000
50% 381.000000
75% 480.000000
max 10302.000000
e. There are a list of columns like
(**'manifest time', 'reseller_pin', 'end_customer_state', 'end_customer_pin', 'gst_amount', 'gst_rate', 'shipping_charges_total', 'gst', 'taxable_shipping', 'shipping_gst_18_percent', 'meesho_price_plus_shipping_charges_total', 'tcs_taxable_amount', 'end_customer_state_new'**)
which are self explanatory and not so important in this regard but we kept to avoid data loss. For the descriptive statistics is available at the working collab file for which the link is given at the bottom of the section.

2. **Raw Tailor Data:** The business has many outsourcing partners for tailoring work. By getting this data we are able to trace the input and inventory of the business for its B2C segment. The tailor data is collected from ledgers and dairy maintained by the business and then converted into a csv file by manual data entry.
The original data file:
https://drive.google.com/drive/folders/1ii53nbOgjfk3keVQjvnKiOjLn7IqWRHJ?usp=sharing
Gsheet: raw taloir data
   a. **Tailor_name:** This column contains information about the identification/name of tailor/outsourcing partner.
   b. **Date, m_day, month, year:** These columns consist of date of transactions (Input of end product/ output of raw material) in different formats to ease the analysis process.
   c. **type(out):** This column consists of information about the type of raw material that was given to the outsourcing partner.
   d. **type(in):** This column consists of information about the type of finished product received from the outsourcing partners.
   e. **quantity_out_(m):** information about quantity of raw materials in **meters** given to the outsourcing partner.
   f. **quantity_in_(Pc):** Information about the quantity of received goods in **pieces** from the outsourcing partner.
   g. **quantity_in_(m):** Information about the quantity of received goods in **meters** from the outsourcing partner.

h. **expected_quantity_in(pc):** Information about the quantity of expected received goods in **meters** from the outsourcing partner given raw materials.

Descriptive Statistics:

index	unique	top	freq	mean	std	min	50%	max
taloir_name	15	Munna Master	758	-	-	-	-	-
date	472	25 September 2022	28	-	-	-	-	-
month	12	June	736	-	-	-	-	-
year	-	-	-	2022.559022	0.49655653	2022	2023	2023
type(out)	2	than	1953	-	-	-	-	-
type(In)	6	long	2331	-	-	-	-	-
quantity_out_(m)	-	-	-	126.1913861	78.55790686	-68	106	800
quantity_in_(Pc)	-	-	-	46.40602056	34.90330245	1	39	328
in_or_out	2	in	2724	-	-	-	-	-
quantity_in_(m)	-	-	-	110.2266887	76.69840509	2	96	662.5
expected_quantity_in(pc)	-	-	-	53.13657792	34.79058623	-28.47407283	43.96731834	320

3. **Inventory Data:** The actual inventory data is collected and the expected inventory data is calculated given input and output to the business and stored in this sheet.

Link: Inventory data

a. **Month:** Represents the specific month of the inventory data.
b. **Year:** Indicates the corresponding year of the inventory records.
c. **Output:** Quantifies the amount of products or goods leaving the inventory during the specified month and year.
d. **Input:** Reflects the quantity of new items added to the inventory during the given time period.
e. **Variation:** Illustrates the change or difference between the output and input, indicating the overall flow of inventory.
f. **Expected Opening Stock:** Anticipated quantity of goods available at the beginning of the month.
g. **Expected Closing Stock:** Anticipated quantity of goods at the end of the month based on projections.
h. **Actual Open Stock:** Real amount of inventory on hand at the start of the month.
i. **Actual Closing Stock:** Real quantity of inventory at the end of the month.

Descriptive Statistics:

index	mean	std	min	25%	50%	75%	max
Output	5771.1875	3100.301732	1537	4261.75	4837.5	6876.25	12030
Input	7017.375	3631.130676	1473	4506	7025	9006	13713
Variation	1246.1875	1345.703495	-724	86	1464.5	2023	4060
Expected Opening Stock	4443	3107.823376	244	1940.75	4506.5	5700.5	12657
Expected Closing Stock	4480.375	3121.817822	244	1940.75	4506.5	5700.5	12677
Actual Open Stock	3234.1875	3561.985406	0	229.5	2121.5	5581	12657
Actual Closing Stock	2793	2633.122	0	229.5	2121.5	5565	8042

4. **Employee Survey:** This sheet contains quantitative survey data which is based on the discussions that I do during surveying the business. This sheet contains a range of columns which explain the demographics of employees and their satisfaction and reliability level within the business.

Link: Employee Survey

a. **Name:** Employee's full name.
b. **Position:** Job title or role within the company.
c. **Age:** Employee's age in years.
d. **Gender:** Employee's gender.
e. **Qualification**: Highest educational qualification attained by the employee.
f. **Relative**: Relationship status or any family-related information.
g. **Wages/Salary**: Compensation received by the employee.
h. **Satisfaction with Current Role (1-5):** Self-reported satisfaction level with the current job on a scale of 1 to 5.
i. **Adequate Information about Company's Goal (0-No, 1-Yes):** Indicates whether the employee feels adequately informed about the company's goals
j. **Skill Utilization (1-5)**: Self-assessed level of skill utilization on a scale of 1 to 5.
k. **Value of Ideation (1-5)**: Self-assessed importance of ideation or creative thinking on a scale of 1 to 5.
l. **Work Environment Comfortability (1-5):** Self-reported comfort level with the work environment on a scale of 1 to 5.
m. **Opportunity for Professional Growth (0-No, 1-Yes):** Indicates whether the employee perceives opportunities for professional growth within the company.
n. **Employee Well-Being:** General assessment of the employee's well-being within the company.
o. **Want to Continue Working (0-No, 1-Yes):** Indicates whether the employee wishes to continue working at the company.
p. **Employee Score:** Overall score or rating derived from various survey responses.
q. **Reliable:** Indicator of the reliability of the data or survey responses.

Descriptive Statistics

index	unique	top	freq	mean	std	min	50%	max
name	14	-	-	-	-	-	-	-
position	9	loom operator	4	-	-	-	-	-
age	-	-	-	38.214286	13.508849	23	32.5	68
gender	2	M	11	-	-	-	-	-
Qualification	5	10th	6	-	-	-	-	-
Relative	2	No	7	-	-	-	-	-
Wages/Salery	-	-	-	21928.57143	25490.46363	12000	15000	110000
Satisfaction with current role (1-5)	-	-	-	3.5	1.224745	1	4	5
Adequate Information about company's goal (0-No, 1-Yes)	-	-	-	0	0	0	0	0
Skill Utilization(1-5)	-	-	-	3.857143	1.292412	1	4	5
value of ideation(1-5)	-	-	-	2	1.176697	1	2	5
Work Enviromenet comfortability(1-5)	-	-	-	3.928571	0.997249	2	4	5
Oppertunity for professional growth (0-No, 1-Yes)	-	-	-	0	0	0	0	0
Employe well being	1	None	14	-	-	-	-	-
Want to continue working (0-No, 1-Yes)	-	-	-	0.714286	0.468807	0	1	1
Employee Score	-	-	-	48.163265	11.799324	25.714286	51.428571	65.714286

5. **<u>Approximated FInancial Data:</u>** This sheet consists of the balance sheet and P/L variables as column spread from June,2022 to September,2023. The above approximation is done within consultation with firm's conceded CA Gaurav Vikash & co. and the business controlling authorities(owner). Although this data is synthesized and can only roughly represent the financial statistics of the business.

link: Aproximiated Financial Data

a. **Month:** Time period within which financial transactions are recorded.
b. **Year:** The calendar year during which financial activities occur.

c. **Secured Loans:** Sum of loans backed by collateral, contributing to the company's capital structure.
d. **Loan Interest Rate:** The percentage charged on secured loans as a cost of borrowing.
e. **Sundry Creditors:** Amount owed to suppliers for goods or services purchased on credit.
f. **Other Liabilities:** Miscellaneous financial obligations not categorized elsewhere.
g. **Capital**: The initial investment and retained earnings representing the owner's stake in the business.
h. **Cash in Bank:** Amount of liquid funds held in the company's bank accounts.
i. **Inventory:** Value of goods and materials held for production or resale.
j. **Sundry Debtors:** Amount receivable from various sources, typically customers.
k. **Stock in Trade:** Value of goods held for trading or sale.
l. **Other Assets:** Miscellaneous assets not classified in specific categories.
m. **Fixed Assets:** Long-term assets such as property, plant, and equipment.
n. **Cost of Goods Sold (COGS):** Direct costs incurred in producing goods or services sold.
o. **Expected Revenue:** Anticipated income based on sales projections.
p. **Actual Revenue:** Realized income from sales during the specified period.
q. **Gross Profit:** Revenue minus the cost of goods sold, indicating basic profitability.
r. **Return on Investment (ROI):** Performance metric measuring the profitability of investments relative to their cost

Descriptive Statistics:

index	mean	std	min	25%	50%	75%	max
secured loans	2565833.188	1288945.062	0	2857694.75	3072919.5	3291083.5	3500000
loan interest rate	11.375	5.64358	0	14	14	14	14
sundry creditors	6032081.25	1700953.338	2700000	4838715	6247500	7600000	7900000
other liabilities	2008597.5	993879.5498	860132	1117642	1949342.5	2528308.75	3653184
Capital	6764050.563	2599840.705	3375632	4761685.75	5629072.5	9362726	10302536
Cash in bank	324427.5	327919.9599	22000	74880	95500	622500	900000
Inventory	1038220.063	743295.5616	426688	545876.75	965045	1225583.5	3508838
sundry debtors	2318792.25	773028.4122	654850	1697195.25	2401300.5	2943492.75	3217642
stock in trade	4550478.5	2344488.688	1784521	2534772	3952456.5	6255839.5	8236590
other assets	1518728	164393.7851	1004771	1444031.25	1585781	1605638.75	1673143
Fixed assets	7619916.188	1615615.944	4767650	7196387.5	8138749.5	8824040	9307500
Cost of goods sold	2956069.875	1336121.492	1204894	2256763.25	2523309.5	3375039.25	5931777
Expected Revenue	5420401.063	1358041.554	3182062	4710778.25	5152598.5	5965919.75	7919062
Actual Revenue	3768874.875	1537972.25	1500608	2931309	3426220	4359741	6431388
Gross Profit	812805	350614.4432	243695	579872.5	800993	1082205.5	1456418
ROI	28.973616	8.686943	6.538294	25.902476	29.347105	36.335064	42.009604

6. **<u>Quantized Business Process and Operation Index:</u>** This data consists of the quantization of surveys that is done to provide a comprehensive collection of quantized metrics and indices pertaining to various business processes and operational activities. The data points are synthesized as per other available quantified data and qualitative information gathered from owner, employees, workers.

Link: Quantised Business Process and Operation Index

a. **Relative Production Efficiency (1-10):** Numeric representation of how efficiently the production processes are running on a scale of 1 to 10.
b. **Relative Turnover (1-10)**: Quantifies the turnover efficiency on a scale of 1 to 10.
c. **Return Rate (1-5):** Indicates the rate of product returns on a scale of 1 to 5.
d. **Customer Satisfaction (1-5):** Measures customer contentment with the company's products or services on a scale of 1 to 5.
e. **Quality Assurance Process (1-5):** Rates the effectiveness of quality control processes on a scale of 1 to 5.
f. **Relative Inventory Level (1-10):** Evaluates inventory management efficiency on a scale of 1 to 10.
g. **Employee Satisfaction (1-5):** Gauges employee contentment with their work environment on a scale of 1 to 5.
h. **Supply Chain Effectiveness (1-5):** Measures the efficiency of the supply chain processes on a scale of 1 to 5.
i. **Strategy Effectiveness (1-5):** Assesses the success of business strategies on a scale of 1 to 5.
j. **Business Data Maintenance (1-10):** Rates the effectiveness of maintaining business data on a scale of 1 to 10.
k. **Financial Performance (1-10):** Quantifies overall financial performance on a scale of 1 to 10.
l. **Innovation/Technology Improvement (1-5):** Measures the level of innovation and technology advancement on a scale of 1 to 5.
m. **Discrepancies and Hurdles (1-10):** Evaluates the severity of discrepancies and obstacles faced in operations on a scale of 1 to 10.
n. **Marketing Efficiency (1-5):** Rates the effectiveness of marketing strategies on a scale of 1 to 5.
o. **Sustainability Score:** Represents the business's average score to sustainability.

Descriptive Statistics:

index	mean	std	min	25%	50%	75%	max
Relative Production Efficiency(1-10)	6.285714	2.591194	3	4	5	9	10
Relative Turnover(1-10)	3.190476	1.631534	1	2	3	4	6
Return Rate(1-5)	2.428571	0.597614	1	2	2	3	3
Customer Satisfaction(1-5)	3.380952	1.856777	1	2	3	4	7
Quality Assurance Process(1-5)	2.761905	0.94365	1	2	3	3	4
Relative Invetory Level(1-10)	3.904762	2.567192	1	1	3	6	8
Employee Satisfaction(1-5)	2.761905	0.995227	1	2	3	4	4
Supply Chain Effectiveness(1-5)	1.809524	0.980767	1	1	1	3	4
Strategy Effectiveness(1-5)	1.333333	0.57735	1	1	1	2	3
Business data Maintainance(1-10)	1.952381	0.804748	1	1	2	3	3
Innovation/ Technology Improvement(1-5)	2.380952	0.497613	2	2	2	3	3
Descripencies and Hurdles(1-10)	4.619048	2.312492	1	2	5	6	8
Marketing Efficiency(1-5)	2.428571	1.207122	1	2	2	3	5
Sustainability Score	39.238095	7.105665	29	34	38	46	52

7. Legal Account: Legal account data is sourced from Gaurav and Vikash Co., the associated chartered accountancy firm for the business.The data consists of financial information essential for compliance, including records of transactions, contracts, and taxation adherence**.**

a. **Balance Sheet**Overview of a business's financial position at a specific point, detailing assets, liabilities, and equity.
b. **P/L (Profit and Loss) Sheet**:Summary of a business's revenues, costs, and expenses during a specific period, indicating profit or loss.
c. **Accounting Notes:**Supplementary explanations accompanying financial statements, providing context and additional details on accounting practices.
d. **Telemetry Data**: Operational information collected in real-time, offering insights into the day-to-day financial transactions and activities of a business.

Working Colab: ∞ **Untitled15.ipynb**

Analysis Processes & Methods

1. **Business Operation and Supply Chain:**

Process Capability Analysis:
Process: Assessed the capability of business operations through a flow chain diagram.
Purpose: Identify weaknesses and potential crisis points in the supply chain.

2. **Inventory Discrepancies:**

Descriptive Statistical Analysis:
Process: Employed a Box-and-Whisker plot to visualize the spread of expected vs. actual closing stock.
Purpose: Quickly identify outliers and assess the magnitude of inventory discrepancies.

Mann-Whitney U Test:
Process: Non-parametric statistical test to compare expected and actual inventory stocks.
Purpose: Statistically confirm the significant difference in inventory, providing a robust basis for corrective actions.

Inventory Analysis Over Time:
Process: Used a time-series analysis to observe patterns in inventory discrepancies.
Purpose: Identify trends and correlate them with key events, such as the termination of an employee associated with significant discrepancies.

3. **Stock Disappearance:**

Run Chart Analysis:
Process: Visualized stock disappearance over time.
Purpose: Identify trends and periods of high disappearance.
Regression Analysis:
Process: Analyzed the impact of discrepancies on product return/cancellation.
Purpose: Quantify the relationship between stock disappearance and customer dissatisfaction.
T-Test:
Process: Examined the impact of disappearance on revenue.
Purpose: Statistically confirm the financial impact of stock discrepancies.

4. **Financial Viability:**

Financial Ratios and Radar Chart:
Process: Evaluated key financial ratios and presented them in a radar chart.
Purpose: Assess the overall financial health and viability of the enterprise.

5. **Financial Impact Uncertainty:**

Forecasting Using ARIMA and SKTime:
Process: Utilized ARIMA and SKTime for revenue forecasting and financial health forecasting.
Purpose: Understand potential future financial scenarios and uncertainties

6. **Accountability and Debt Accumulation:**

Correlation Analysis bubble chart:
Process: Explored the correlation between inventory issues and debt.
Purpose: Understand how inventory discrepancies relate to financial liabilities.

7. **Employee Reliability:**

Reliability and Satisfaction Analysis:
Process: Analyzed sentiment and satisfaction scores.
Purpose: Understand overall sentiment and satisfaction levels, providing insights into employee reliability.

8. **Vendor Score:**

Regression Analysis:
Process: Analyzed the relationship between outsourcing partners and inventory issues.
Purpose: Identify the impact of outsourcing partners on inventory and potential involvement in discrepancies.

9. **Risk Analysis and Business Sustainability Index:**

Monte Carlo Simulation on Revenue and Return on Investment:
Process: Employed Monte Carlo simulation to model revenue and ROI in varied scenarios.
Purpose: Assess potential financial outcomes under current conditions, enhancing risk management and long-term business sustainability.
Forecasting on Business Operation Data and Time Series Forecasting Using SKTime:
Process: Forecasted business sustainability based on operational data.
Purpose: Assess the sustainability of the business over time.

10. **Market Research:**

Customer Segmentation :
Process: Analyzed customer segments based on Messo sales data.
Purpose: Identify key markets and tailor strategies accordingly.
Market Size and Competition Overview

11. Theft Analysis:

Root Cause Analysis and Fishbone Diagram:
Process: Identified root causes using a fishbone diagram.
Purpose: Systematically uncover underlying issues contributing to theft.

12. Impact of Digitalization on Traditional Business:

SWOT Analysis:
Process: Conducted a SWOT analysis.
Purpose: Evaluate strengths, weaknesses, opportunities, and threats related to digitalization in the traditional business context.

13. Conclusionary Analysis:

5 Whys and 5S Analysis:
Process: Applied the 5 Whys method and 5S principles.
Purpose: Dig deep into the root causes of issues and implement structured improvements.

Result and Findings

1. **Business Operation and Supply Chain:**
   a. Process Capability Analysis: Flow Chain Diagram

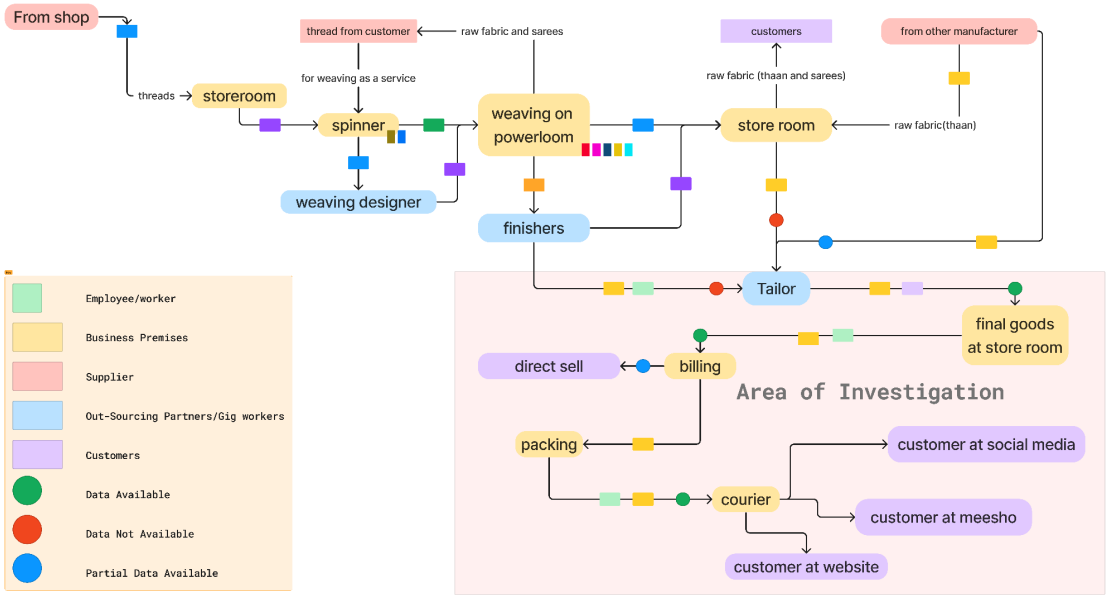


Fig 1.1 Supply chain of Khushbu textile.

Figma :https://www.figma.com/file/ouSs2s1eeEeIfa2ZCDpYtf/Supply-Chain?type=whiteboard&node-id=0%3A1&t=rZpmtV30qF4OMc3p-1

The presented supply chain has been analyzed through quantitative surveys and on-site visits to the business. The figure illustrates that the supply chain falls short of established standards, revealing potential chaotic and crisis factors within. The operational structure derived from this chain lacks sufficient checkpoints for monitoring employee activities and data maintenance. Alarming is the observation that numerous employees are overseeing closed chains in the business, suggesting a significant risk of intentional harm. It is crucial to note that the supply

chain deviates from established standards, further emphasizing the need for corrective measures.
Ref: https://www.oreilly.com/library/view/operations-management-processes/9780134741062/

2. Inventory Discrepancies:

a) Descriptive analysis:

Descriptive Statistics:

	count	mean	std	min	25%	50%	75%	max
Expected Closing Stock	16.0	4480.375	3121.817822	244.0	1940.75	4506.5	5700.5	12677.0
Actual Closing Stock	16.0	2793.000	2633.122000	0.0	229.50	2121.5	5565.0	8042.0

From the above statistics we can clearly see that there is a huge discrepancy between the expected inventory and actual inventory.

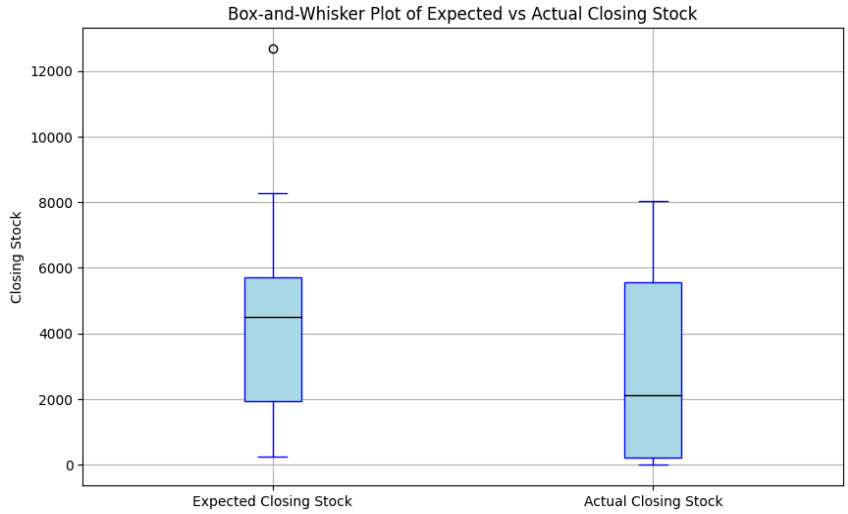


Fig 2.1: Box-and-Whisker Plot of Expected vs Actual Closing Stock

From the above plot we can see that there is an outlier sitting above with value greater than 12,000 in the expected closing stock chart. It is to be noted that the business started to maintain a rough dairy after they suspect there is something bad happening with their business, which is from june, 2022 and matching with the data, that outliers belong to the june 2022 month which hints that the theft is going on from much before than explained by the data, analyzed for this project.

b) Mann-Whitney U Test:

To hold a firm grip on the hypothesis that there is a statistically significant difference in expected and actual inventory stocks, a non parametric Mann-Whitney U Test is performed.

```
P-value for Mann-Whitney U Test: 0.0482259200506939
At significance level: 0.05
Reject the null hypothesis: There is a significant difference between Expected and Actual Closing Stock.
```

At 95% Confidence level or 3 Sigma we can say that there is a huge amount of discrepancy happening in the inventory of the business.

c) Inventory Analysis Over Time

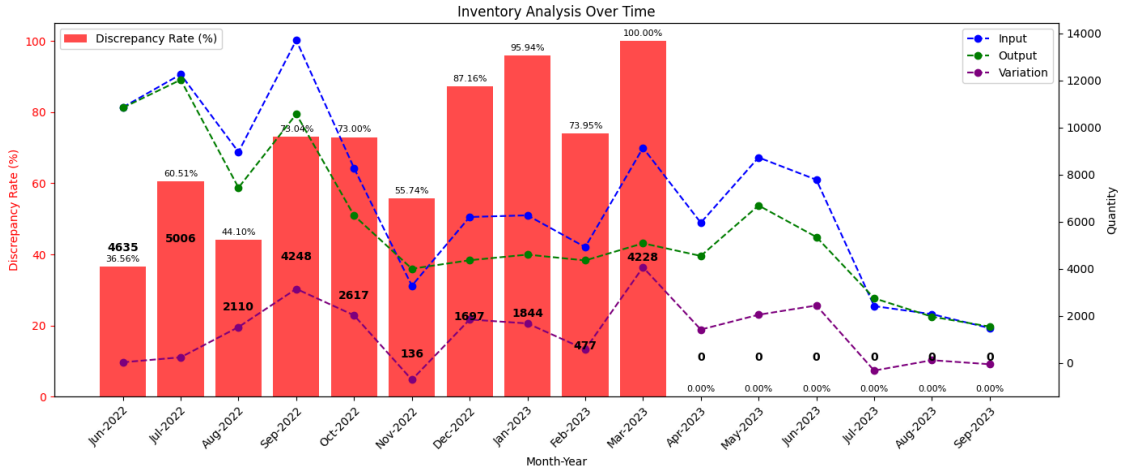


Fig 2.2: Inventory Audit over time

The provided figure unmistakably reveals a substantial occurrence of inventory theft and stock disappearance within the business from July 2022 to March 2023. Notably, there is a sudden drop in these discrepancies to zero starting from April 23. Intriguingly, this corresponds with the month when the business owner terminated the employment of a specific individual, Sumit Kumar, who held a managerial role in the B2C supply chain, as depicted by the yellow squares in Fig1.1. This observation strongly suggests that Sumit Kumar may be the primary culprit behind the aforementioned incidents.

3. Stock disappearance:

a. <u>Run chart Analysis:</u>

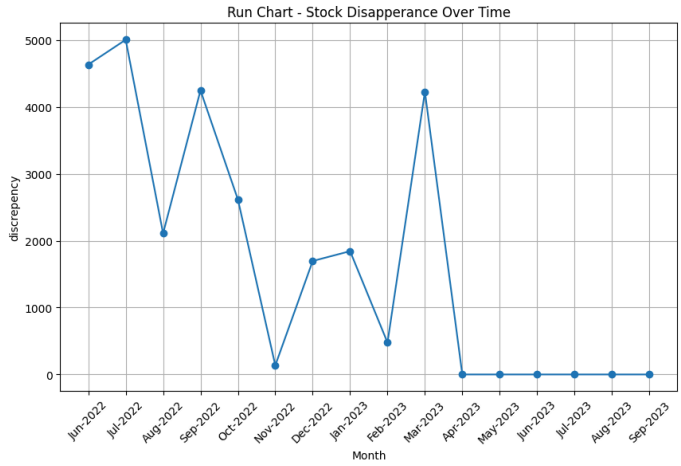


Fig 3.1 Run Chart - Stock Disappearance Over Time

From the above chart it is shown that there is disappearance of stock in huge quantities from the business from June 2022 to March 2023.

b. <u>Regression Analysis - Impact of Discrepancies on Product Return/Cancellation:</u>

```
                            OLS Regression Results
==============================================================================
Dep. Variable:                 return   R-squared:                       0.695
Model:                            OLS   Adj. R-squared:                  0.673
Method:                 Least Squares   F-statistic:                     31.92
Date:                Sun, 17 Dec 2023   Prob (F-statistic):           5.99e-05
Time:                        20:03:44   Log-Likelihood:                -120.16
No. Observations:                  16   AIC:                             244.3
Df Residuals:                      14   BIC:                             245.9
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const       1250.6306    159.865      7.823      0.000     907.753    1593.508
discrepency    0.3608      0.064      5.650      0.000       0.224       0.498
```

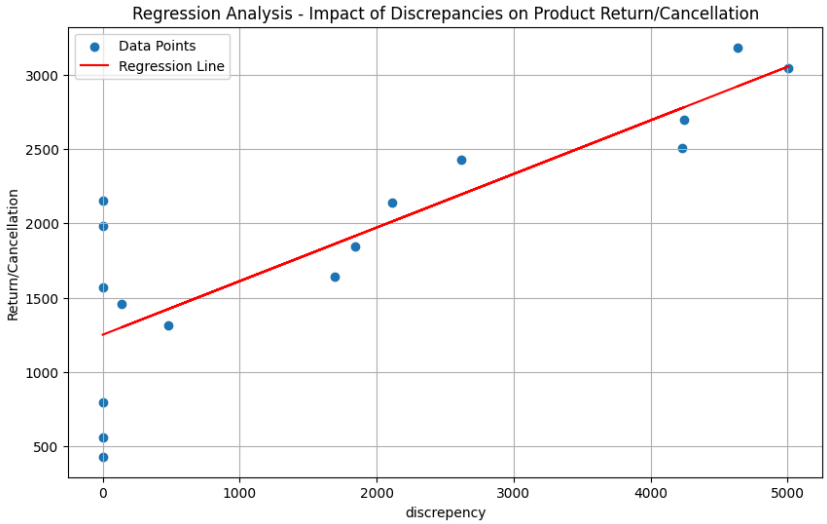


Fig 3.2 Regression Analysis - Impact of Discrepancies on Product Return/Cancellation

The graph shows a clear positive trend that with increase in stock disappearance , concealing and return of products increases, indicating low customer satisfaction. Retroactively, It may be concluded that the employee or factors that are involved in the theft can have loyalty toward business's competitors, who are practicing illegal ways and trying to destroy the reputation of the enterprise and take over the Market.

c. <u>T-test : Impact of Disappearance on Revenue:</u>

```
T-Statistic: 5.099466171305961
P-Value: 0.0001618532962874716
The coefficient for Discrepancy is statistically significant:There is an impact of Discrepancy on Revenue.
```

A t-test is performed over revenue to check the impact of this discrepancy on it and we find that at 95% or 3 sigma significant that the disappearance causes impact over revenue.

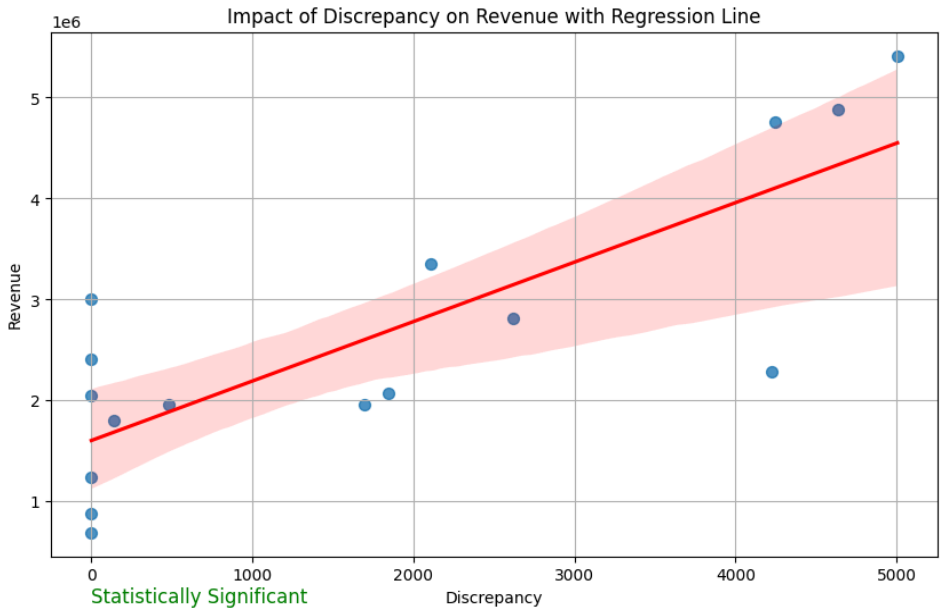
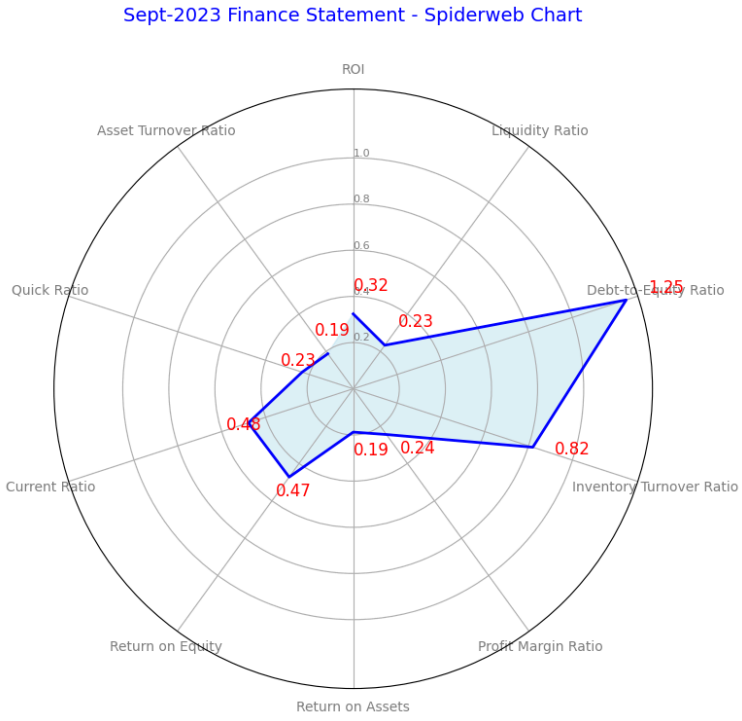


Fig 3.3 Regression line: Impact of Disappearance on Revenue

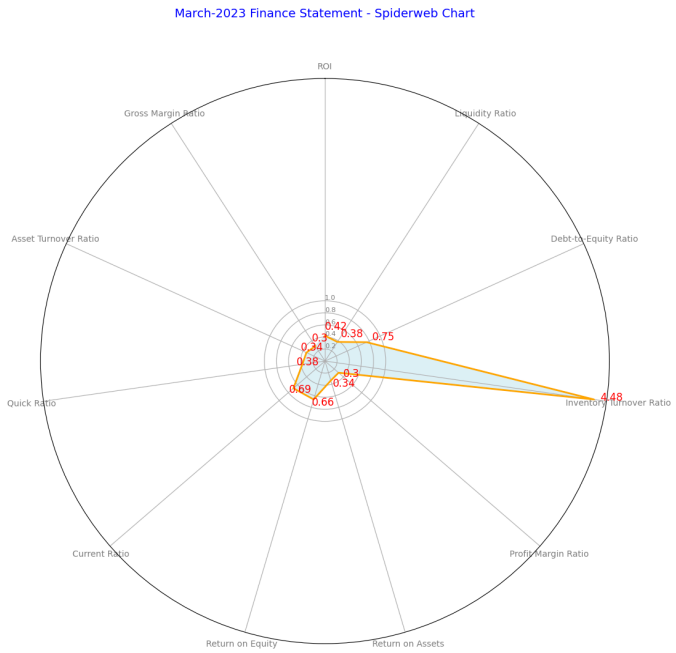
4. Financial Viability:

a. Financial Ratios and Radar chart over different months:



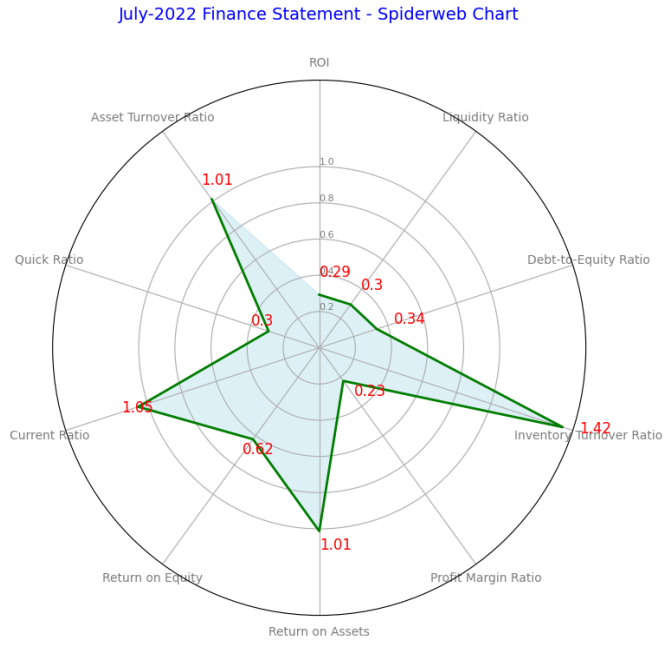
	Value
ROI	0.324256
Liquidity Ratio	0.233092
Debt-to-Equity Ratio	1.245589
Inventory Turnover Ratio	0.819327
Profit Margin Ratio	0.244859
Return on Assets	0.187651
Return on Equity	0.472678
Current Ratio	0.478176
Quick Ratio	0.233092
Asset Turnover Ratio	0.187651

Fig 4.1: Sept-2023 Finance Statement - Spiderweb Chart & Financial Ratios



	Value
ROI	0.420096
Liquidity Ratio	0.377517
Debt-to-Equity Ratio	0.753763
Inventory Turnover Ratio	4.479971
Profit Margin Ratio	0.295822
Return on Assets	0.337591
Return on Equity	0.663741
Current Ratio	0.689709
Quick Ratio	0.377517
Asset Turnover Ratio	0.337591
Gross Margin Ratio	0.295822

Fig 4.2: March-2023 Finance Statement - Spiderweb Chart & Financial Ratios



	Value
ROI	0.292749
Liquidity Ratio	0.295278
Debt-to-Equity Ratio	0.335120
Inventory Turnover Ratio	1.417840
Profit Margin Ratio	0.226455
Return on Assets	1.012607
Return on Equity	0.624512
Current Ratio	1.054954
Quick Ratio	0.295278
Asset Turnover Ratio	1.012607

Fig 4.3: July-2022 Finance Statement - Spiderweb Chart & Financial Ratios

From the above figures it is evident that the financial condition of the company deteriorated very badly, In july if you obverse debt to equity ratio, quick ratio, asset turnover ratio are at very good condition but as the theft incident increase it crushed the business badly and the financial position the enterprise currently at in sept 2023 is very worst as compared to july 2022. Through a positive perspective, we can say that enterprise has the capacity to revive.

5. Financial Impact Uncertainty:

a. Forecasting Actual and Expected Revenue Using ARIMA and SKtime:

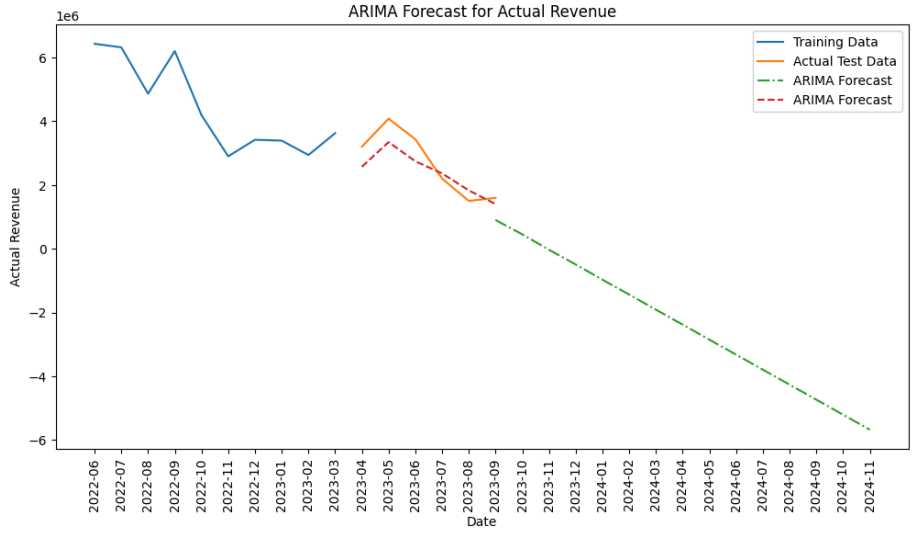


Fig 5.1: ARIMA Forecast for Actual Revenue

With the above figure we can see that the actual revenue of the enterprise is projected to go down in the near future with the current financial scenario being constant. The Mean Absolute Percentage Error (MAPE) for the above forecast is 0.165 and it shows that the revenue will hit zero over dec-2023. But as per current situation of the business, revenue is not zero, so we can safely assume that the business has entered into a different scenario.

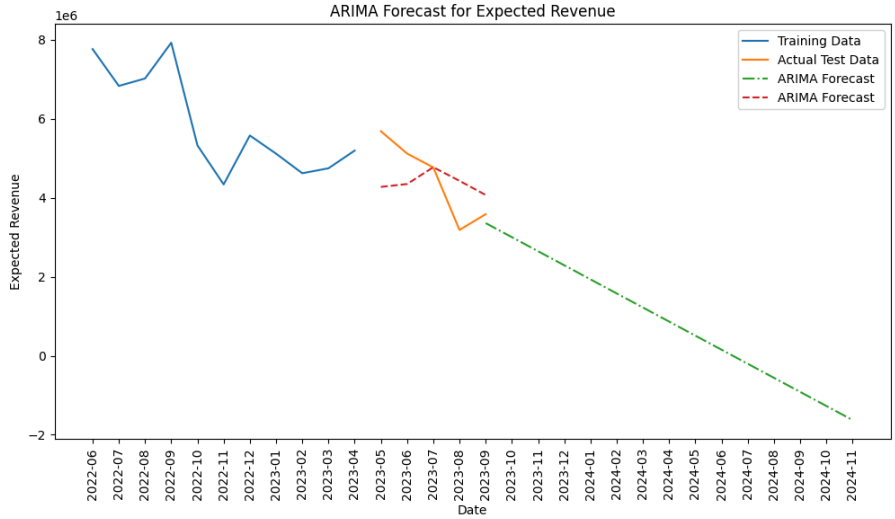
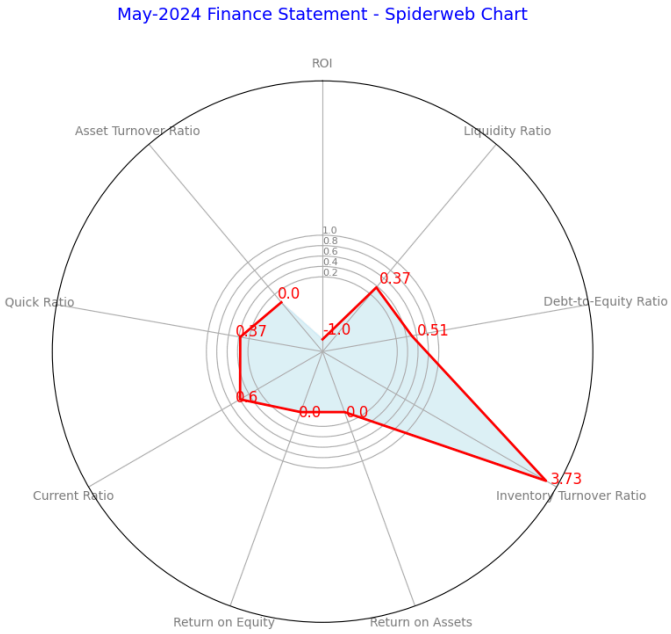


Fig 5.2: ARIMA Forecast for Actual Revenue

The forecast explains that, if the inventory theft does not happen, then the revenue of the entrize has a better stand. The Mean Absolute Percentage Error (MAPE) of the above model is 0.185

b. Forecasting on financial health:



	Value
ROI	-0.999984
Liquidity Ratio	0.372841
Debt-to-Equity Ratio	0.506968
Inventory Turnover Ratio	3.727914
Return on Assets	0.000002
Return on Equity	0.000007
Current Ratio	0.597439
Quick Ratio	0.372841
Asset Turnover Ratio	0.000002

Fig 5.3: Radar-chart and Financial Ratios expected on May-2024

In this analysis, ARIMA model is use to predict the financial performance and all the required numbers to calculate the ratios and plot the graph. For which we assume the scenario to be constant as of now. The stats shared over revealed the deteriorating condition of the enterprise. Although this analysis is not enough for different and practical scenarios which are random and happening all the time. To tackle the randomness and take account for the different scenarios possible we need to perform a scenario analysis, followed by a sensitivity analysis.

6. Accountability and Debt Accumulation:

a. Correlation Analysis:

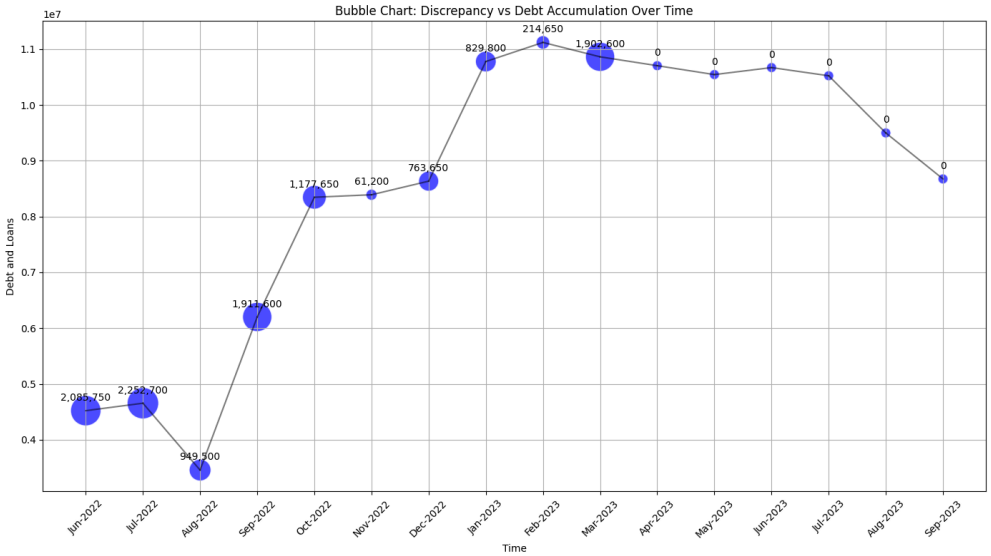
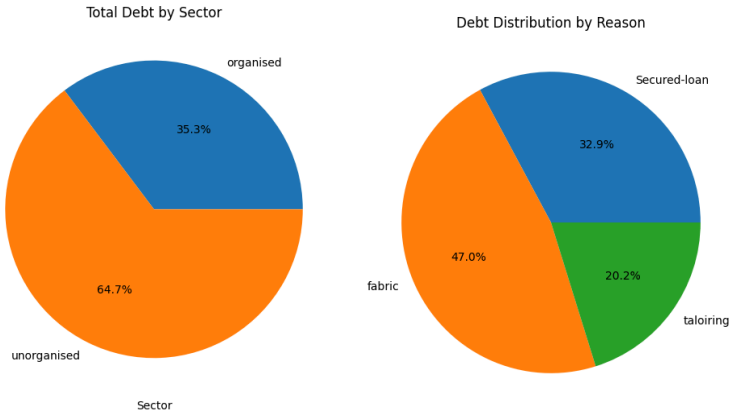


Fig 6.1: Bubble chart: Correlation between debt and inventory discrepancy.

In the graph the size of the bubble represents the amount of inventory losses in Indian rupees, the y-axis represents the amount of debt in 10 lakh (1e-7) scale and the x-axis represents the month's name. From the graph it is evident that the debt of enterprises sharply increases each month whenever there is a disappearance of stock. We can also observe that some months even encounter the disappearance of stock upto 23,00,000s and all the other disappearance numbers revolving around it.

b. Debt Diversity Analysis:



Secured-loan	2877460
fabric	4110000
taloiring	1765000

Fig 6.2: Representing debt diversification.
From the above chart we can observe that the enterprise has its debt in the unorganized sector and its maximum debt is in the fabric inputting segment, followed by secured loans and tailoring.

7. Employee satisfaction and reliability Analysis:

a. Reliability Analysis:

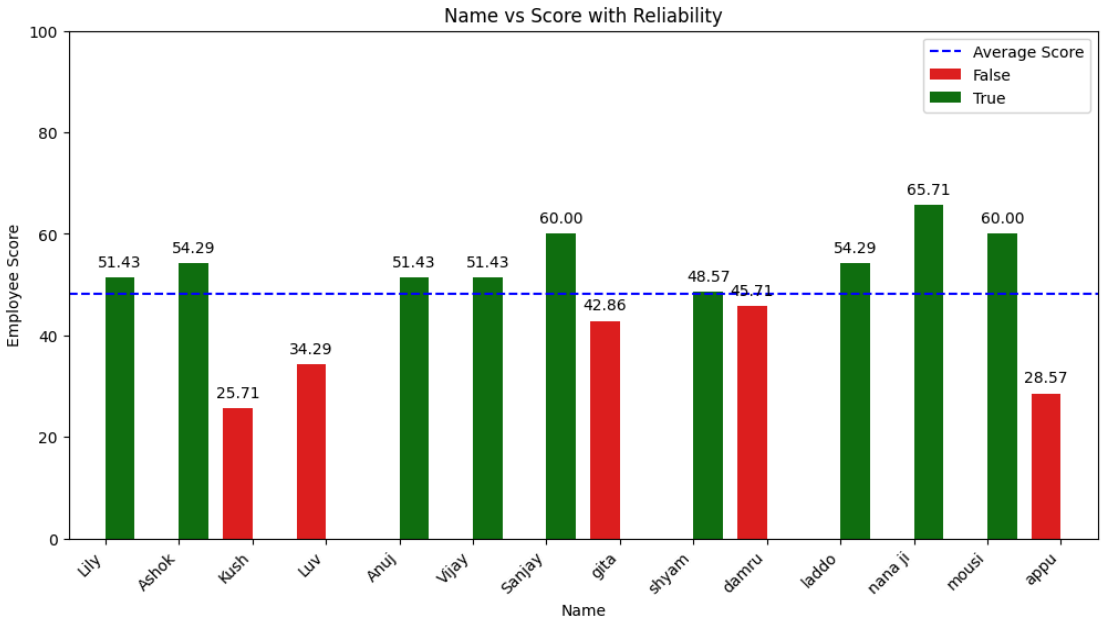


Fig 7.1: Reliability analysis
From the above graph it is clear that the average reliability score of employees within the business is not good enough and stands only at near 44 out of 100. Which clarify signifies that no

employee is trustable with closed chains within the supply chain. Furthermore, with the available employees Khus, Luv, Gita, Damru and Appu is potentially dangerous to the business.

b. Employee Satisfaction Analysis:

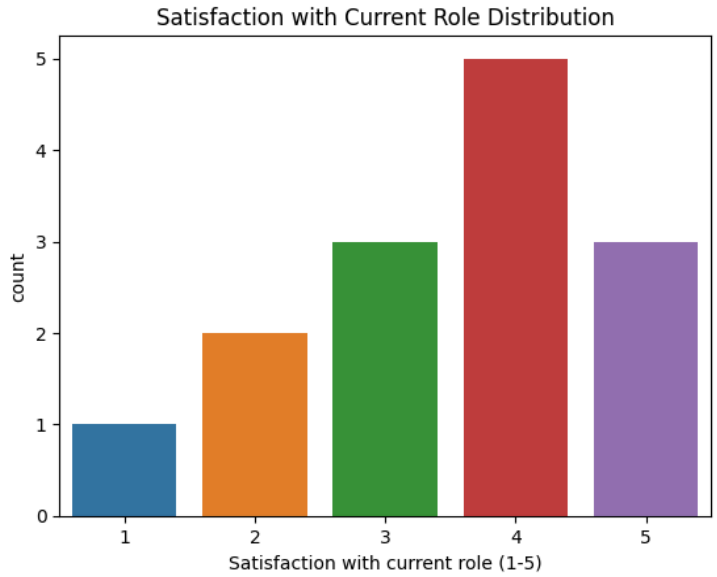


Fig 7.2 : Employee Satisfaction with current role.

The satisfaction of employees in view of normal distribution is average but it is advised to take measures to improve the overall satisfaction level of employees so as to avoid any other such incidence as of now.

c. Employee Diversification:

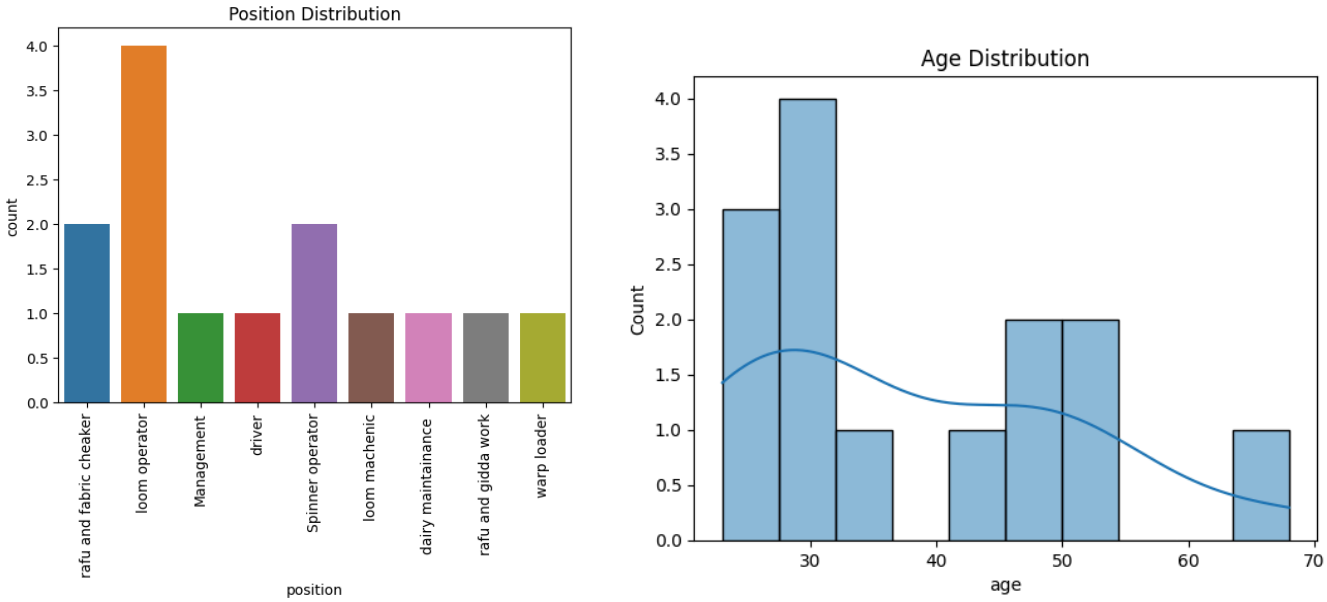


Fig 7.3: shows employee position counts and age distribution trends.

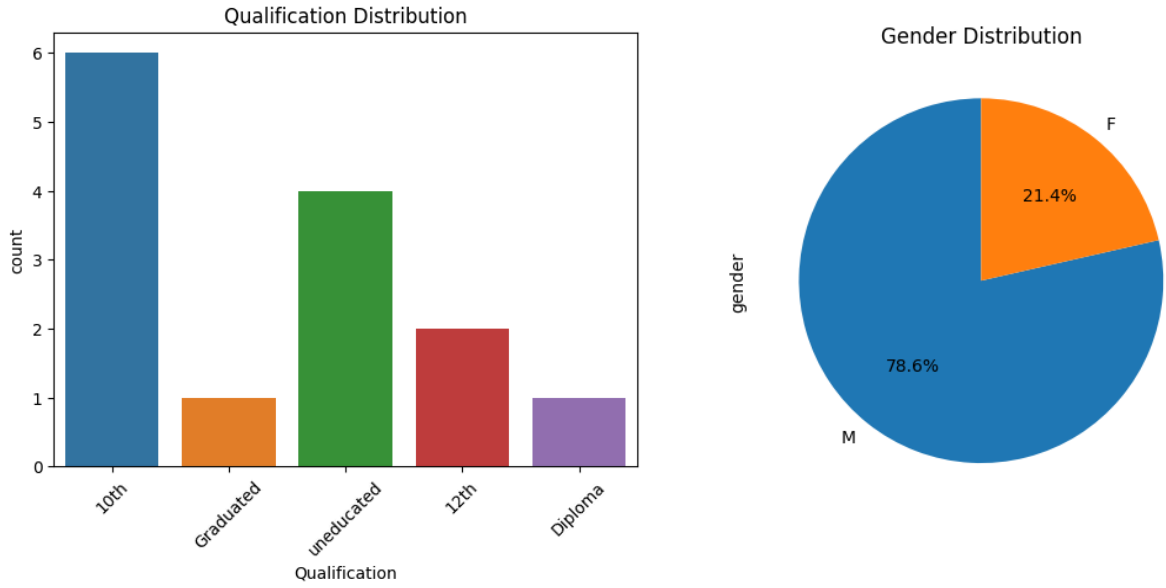


Fig 7.4 depicts employee qualifications and gender distribution percentages.

The analysis of Figures 7.3 and 7.4 shows a workforce concentrated in specific operational roles, primarily composed of younger employees, with most having at least a 10th-grade education. There is a pronounced gender disparity, with a significant male majority. These trends suggest potential challenges in diversity, experience variety, and long-term retention. Addressing these could enhance productivity and workplace culture.

8. Vendor and Outsourcing Partner Reliability:

i. Regression Analysis:

From the data it is observed that there are discrepancies in the amount of raw material given to the outsourcing partner and the amount of ready material received from them. The numbers are shocking that the amount received by them is much higher than expected. Also during entering data in excel sheets from dairy, I encountered many doubtable data points. So to understand the relation between outsourcing partners and inventory issues, the need to perform regression analysis is taken into account.

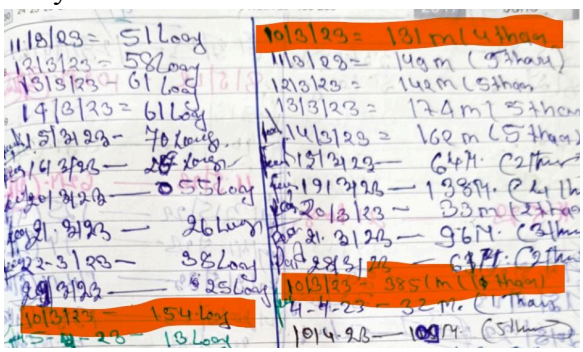


Fig 8.1: A sample of Data Manipulation in dairy

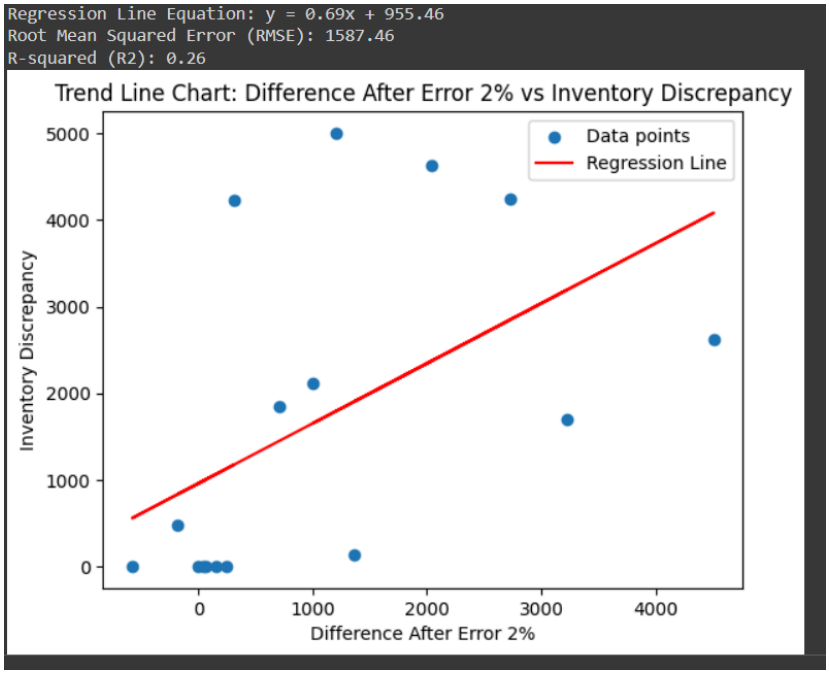


Fig 8.2: The above figure shows sharp +ve correlation between inventory discrepancy and difference of expected - actual product received by outsourcing partner. The difference variable 69% explains the inventory issue. This also shows that outsourcing partners are also involved in the theft.

ii. Outsourcing Partner Reliability Analysis:

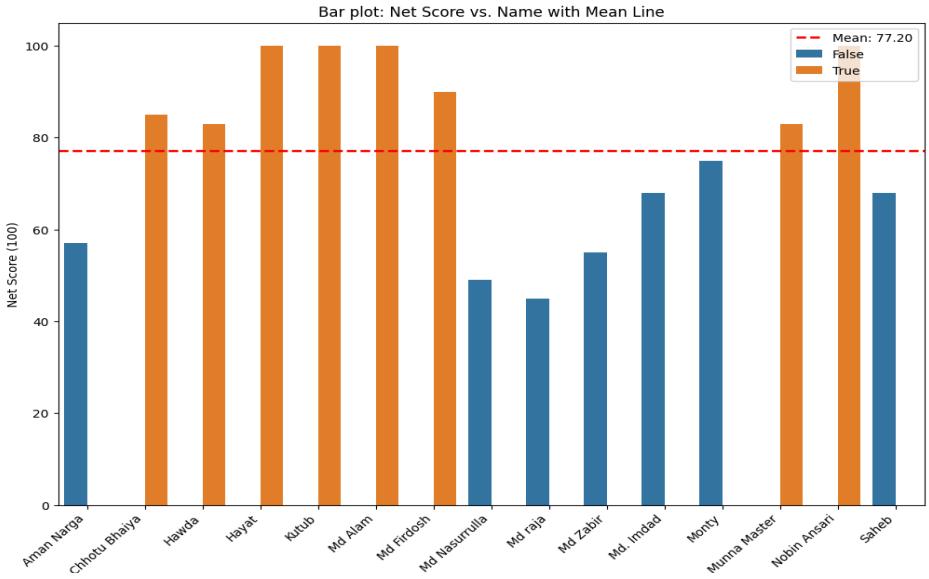


Fig 8.3: Outsourcing Partner Reliability

The above analysis is done on considering the quantitative and qualitative factors as explained by the owner of the firm . The mean of the net score for outsourcing partners stands good at 77.2% which signifies that there are some vendors who are exponentially loyal to the business whereas others like Md Raja, Md Zabir, etc are not.

Detailed: taloir_descrepencies(1).xlsx

9. Risk Analysis and Business Sustainability:

a. Risk Analysis: Monte Carlo Simulation on revenue and Return on Investment:

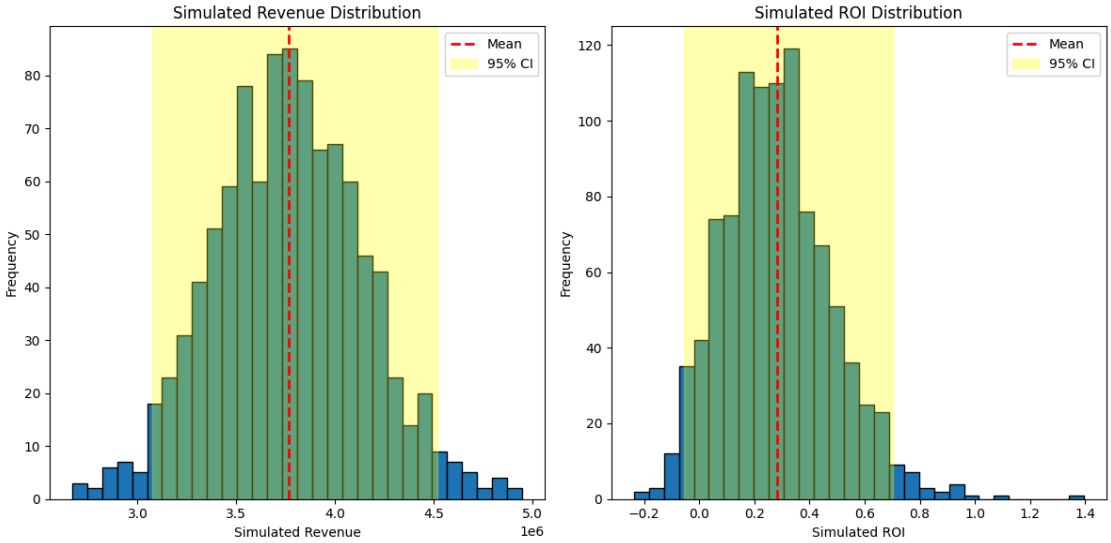


Fig 9.1: Simulated Revenue and ROI Distribution

The above figure shows that in 95% confidence level, the enterprise in any random situation will make revenue of 3 to 4.5 lakh rupees per month and ROI of -0.02 to 0.7 per month as explained by the 1.5 year data shared by the business. The revenue mean is around 3.8lakhs and roi is around 0.25 which explains that risk to the company is under a safe zone until now. Retroactively, it is also necessary that the business must maintain a revenue and and roi of indicated levels under 95% confidence level, so to avoid any risk.

b. Business Sustainability Index:

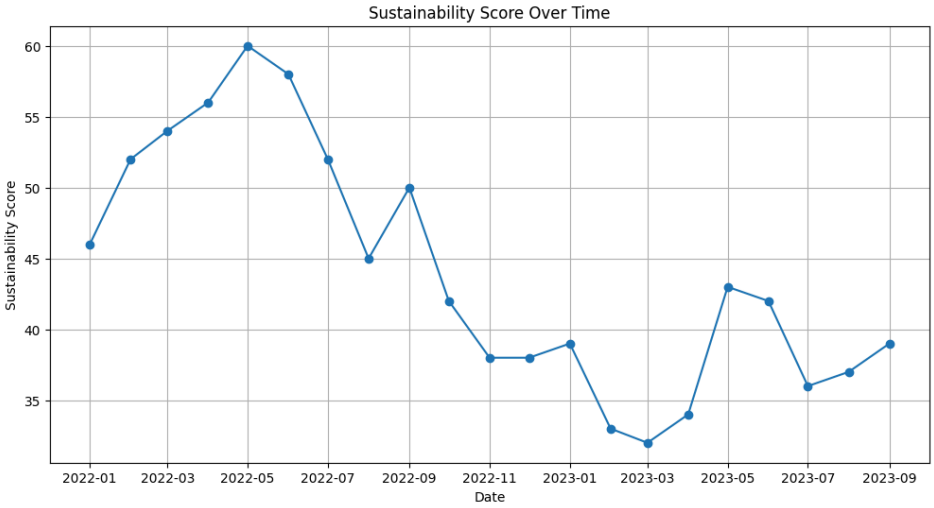


Fig 9.2: Business Sustainability Index over time

The data for this analysis is fabricated through qualitative data and ground surveys. The data has 10 columns with specified weight according to its relative and then we take the percentage over 100 to get a score. The score here specified that the business sustainability is best in the month of may-2022 and worst in the month of March-2023 which is expected as than the owner detached the thefting and fired some of its employees. It also harms the mental condition of the business

stakeholder which results in bad sustainability of business. But as of now the business is showing improvement in its condition.

10. Market Research:

a. Customer Segmentation:

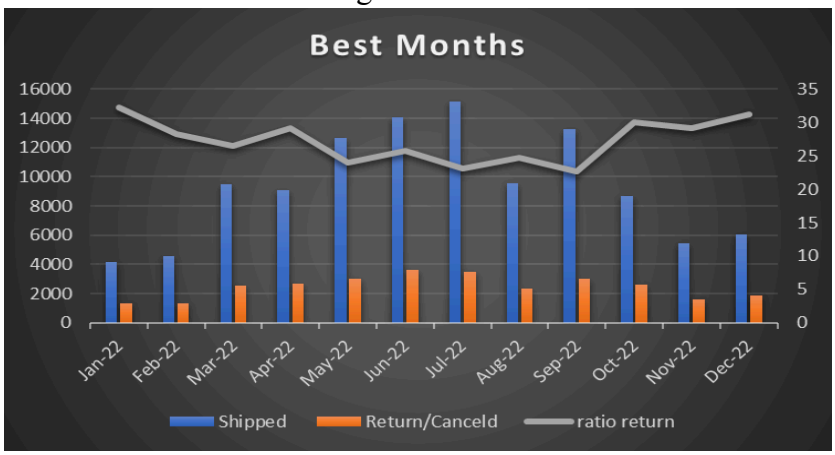


Fig 10.1: Combined Bar graph and line chart of Best month of selling

Fig 10.2: Geographical Plot for best market states

These customer segmentations are analyzed from Messo sales data which shows that tamil nadu is the best state which purchases Bhagalpuri textile products produced by the enterprise. The Best month data reveal that the January, February, November and December are low market months for textile business which also satisfy the general condition of the textile market in india.
Ref: **https://texmin.nic.in/textile-data**

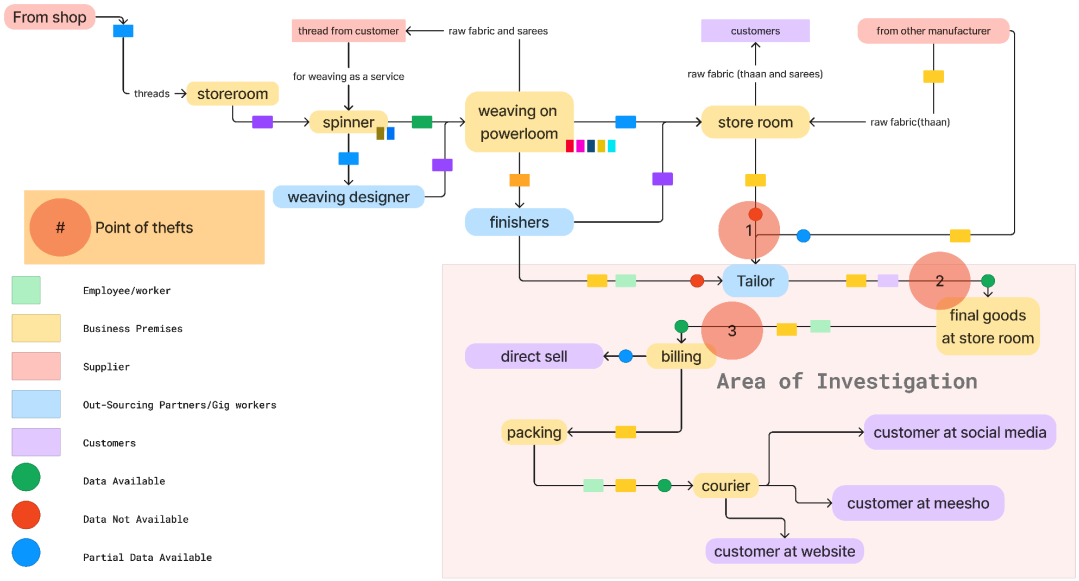
b. Market Size and Competition overview :

Bhagalpur, home to 18,268 powerlooms, annually produces 2 million meters of silk.The challenges that persist with a drop in exports to Rs. 2,000 crore in 2009. Intense competition from centers like Bangalore and Ahmedabad, along with power shortages, impacts Bhagalpur's market share and subsequently enterprize. As India targets $250 billion in textile production by 2030, Bhagalpur's silk industry must strategically navigate global competition and market shifts. This analysis underscores the need for strategic interventions in the evolving textile landscape. The Enterprise also suffers illegal ways of competition from other local manufacturers as there is no proper union or society to handle the disputes.

Ref:1. Textile Industry in India: Insights into the Garment & Apparel...
2.Bhagalpur Silk Industry of India
3. BHAGALPUR
4.Bhagalpur Silk Industry, Uniqueness of Bhagalpur Silk, Silk City, History of the Bhagalpur, Fibre2fashion

Interpretation of Results and Recommendation

1. Theft Cost Analysis:



FigR1. Shows the Position of supply chain from which theft of stocks happen.

There are 3 potential points from which the employee "Sumit kumar" stole stocks. The points are:

Point 1. It is the point when enterprises buy raw fibers and push raw materials to the tailors for further processing. Sumit kumar oversees this point and stole raw fibers. Unfortunately, The enterprise does not maintain any concrete records so in order to calculate the amount stole from this point we approximately calculate the net missing amount from the finances and subtract it from thefts from other two points and we get a number of around 12,00,000INR

Point2: At this point Sumit kumar, used to take advantage of controlling position and cleverly add his own pieces of final goods made by the tailor and the making charges are subjected to paid by the enterprise 70rs each. The tailor data shows discrepancies of

about 15,000 extra pieces received than expected as per given raw material which implies 15000X70 = 10,50,000INR

Point 3: At this point, He used to steal ready pieces from the store room directly, the total disappearance during Sumit Kumar's working time is nearly 27,000 pieces. The net amount of ready pc he stole equals to total disappear ready piece - extra pieces from tailors which equals to 29000-15000= 14,000. The cost of making one final piece is 350 rs. So the amount he stole at this stage is 14,000X350 = 49,00,000.

Approximated Amount Stolen = 12,00,000+10,50,000+49,00,000 = 71,50,000 INR

2. **Root Cause Analysis:**

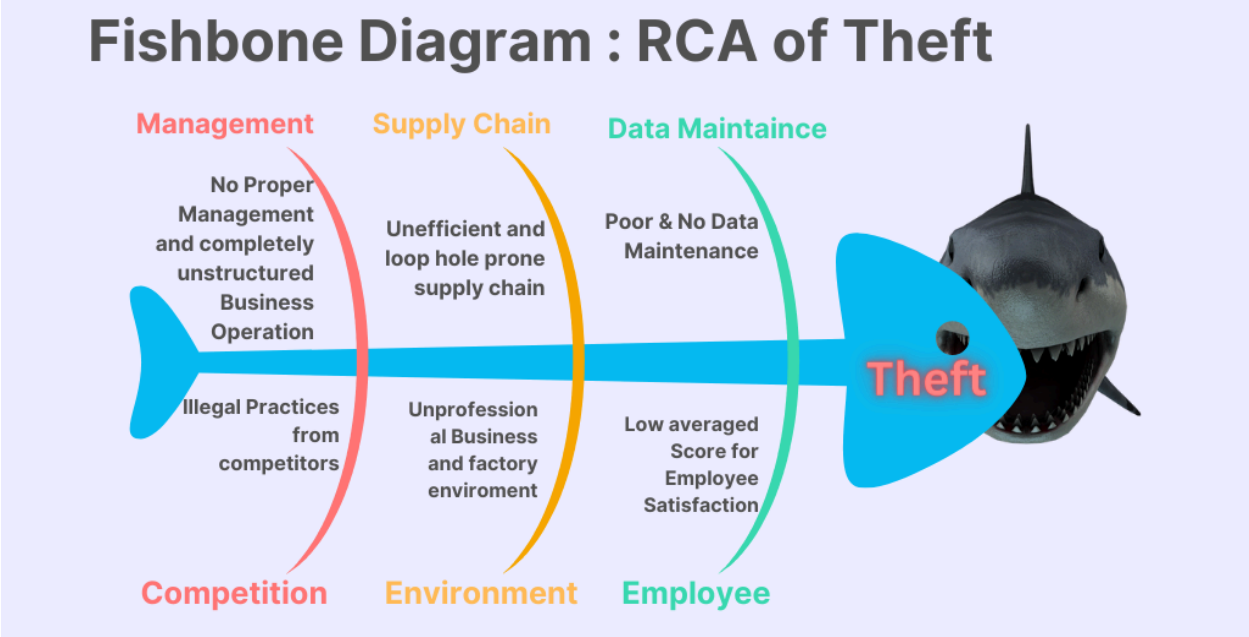


Fig R2: Fishbone Diagram

The Fishbone Diagram offers a structured analysis of potential root causes behind theft incidents within an organization. The diagram breaks down the causes into six main categories:

- Management: Highlights issues such as poor management and unstructured business operations, suggesting that organizational disarray and lack of clear protocols may facilitate theft.
- Supply Chain: Points to inefficiencies and vulnerabilities within the supply chain that could be exploited for theft, indicating a need for tighter controls and process improvements.
- Data Maintenance: Cites poor and inadequate data maintenance, which could lead to gaps in tracking inventory or financial records, thus increasing the risk of theft unnoticed.
- Competition: Includes illegal practices by competitors, suggesting that external pressures or unethical market competition could drive internal theft as a counteraction or survival strategy.
- Environment: Notes an unprofessional business and factory environment which might contribute to a workplace culture that either condones or doesn't effectively discourage theft.

- Employee: Attributes part of the cause to low employee satisfaction, which might lead to theft as a form of retribution or compensation for perceived injustices or dissatisfaction at work.

Each of these factors, individually or in combination, could create conditions conducive to theft. Addressing these issues comprehensively would require targeted interventions in management practices, supply chain security, data handling, competitive strategy, workplace environment, and employee relations to mitigate the risk of theft effectively.

3. **SWOT Analysis:**

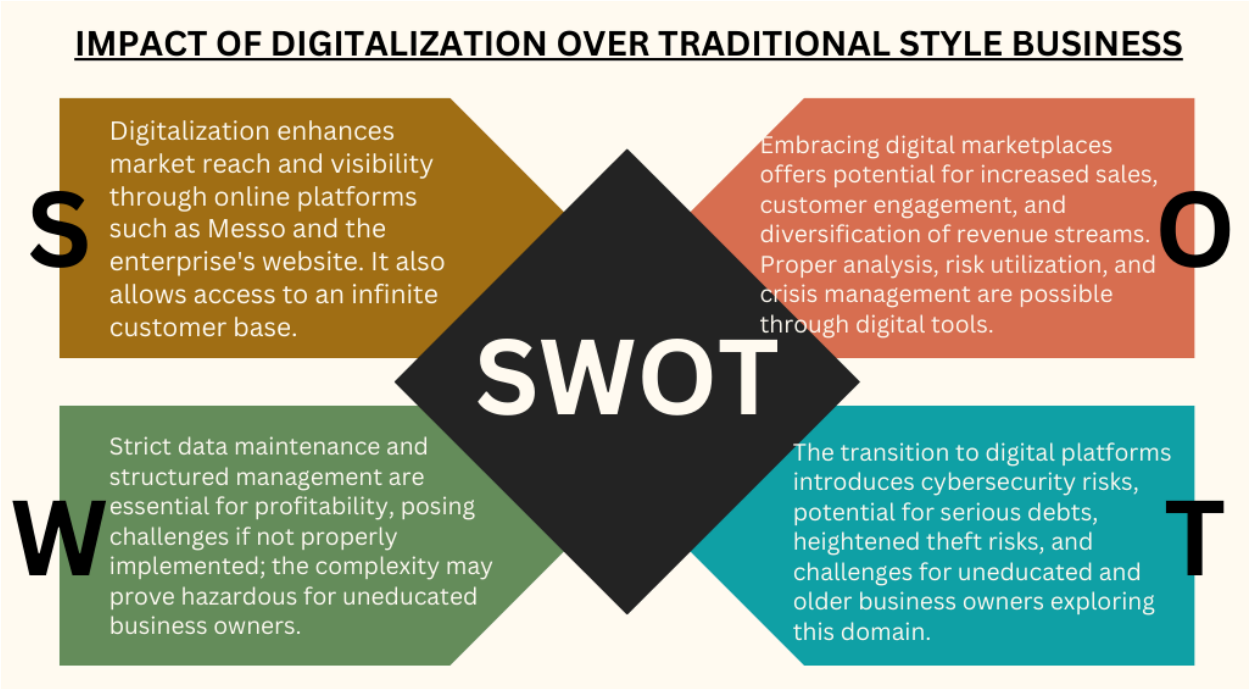


Fig R3: Shows the SWOT Analysis.

4. **5 Whys:**
    a. **Q.**Why is there a discrepancy in inventory?
    Ans: There is theft of stocks by employees.
    b. Why are employees stealing stocks?
    Ans: Lack of proper accountability and oversight in the supply chain.
    c. **Q.**Why is there a lack of accountability and oversight?
    Ans. Inefficient business operations and a semi-organized approach to supply chain management.
    d. **Q.**Why are business operations inefficient?
    Ans. The lack of structured data maintenance and standard operating procedures.
    e. **Q.**Why is there a lack of structured data maintenance and standard operating procedures?
    Ans. The business did not implement robust systems and procedures, leading to mismanagement and theft opportunities.

5. **5S:**
    a. **Sort:**
    Action: Identify and remove unnecessary items in the supply chain process.
    Purpose: Eliminate clutter and reduce the chance of theft by keeping only essential items in the supply chain.
    b. **Set in Order:**
    Action: Organize and arrange remaining items systematically.
    Purpose: Ensure that every item has a designated place, making it easier to identify discrepancies and monitor stock.
    c. **Shine:**
    Action: Regularly clean and maintain the working environment.
    Purpose: A clean and well-maintained workplace fosters a sense of order, making it easier to detect irregularities.
    d. **Standardize:**
    Action: Implement standardized processes and procedures.
    Purpose: Establish consistent methods for inventory management and business operations, reducing the likelihood of theft.
    e. **Sustain:**
    Action: Train and educate employees on the importance of maintaining the 5S principles.
    Purpose: Create a culture of continuous improvement, where employees actively participate in sustaining the organized and efficient workplace.

6. **Recommendations:**
    a. **Urgent Recommendation:**
        i. Replace employee whos score are below average.
        ii. File a legal suit against Sumit kumar
        iii. Implement proper security measure over supply chain
        iv. Adopt a system of data maintenance and hire professional accountants to serve for business.
        v. Diversify and restructure debt in organized sector
        vi. Apply for the standup India scheme under MSME and login udyami-mitra portal for business consultation and organized sector loans https://www.standupmitra.in/
        vii. Go for a change in USP by introducing new designs in your product
        viii. Go for a debt settlement with tailors who have below average score and have discrepancies in their records.
        ix. Ensure that the monthly revenue lies above the range of risk as 3.75 Lakhs with roi 0.30 every month to avoid serious risk in business.

    b. **Recommendation in long term:**
        i. Implement Robust Inventory Management Systems:

Adopting advanced inventory management systems can help track stocks accurately, minimize discrepancies, and provide real-time insights into the supply chain. This technology can enhance transparency and reduce the risk of theft.

ii. Establish Employee Training Programs

Conduct regular training sessions for employees to educate them on the importance of ethical practices, accountability, and the consequences of theft. This can contribute to fostering a culture of integrity within the organization.

iii. Enhance Data Management Practices:

Improve data recording and maintenance practices. Implementing digital tools and standardized record-keeping procedures will enhance data accuracy, making it easier to identify irregularities and discrepancies in inventory.

iv. Establish the Business as Brand:

Building a strong brand identity is crucial for the long-term success of any business. Establishing the business as a brand involves creating a distinct image and reputation that resonates with customers, employees, and partners.

v. Strengthen Vendor Due Diligence:

Conduct thorough background checks on outsourcing partners and vendors. Implement stringent measures to ensure reliability and adherence to ethical business practices. This can prevent collusion with external entities contributing to inventory issues.

vi. Optimize Supply Chain Processes:

Streamline and optimize the supply chain processes for efficiency. Identify bottlenecks, reduce unnecessary steps, and introduce automation where possible. This will not only enhance operational efficiency but also reduce the opportunities for theft.

vii. Enhance Employee Satisfaction:

Invest in measures to improve employee satisfaction, as disgruntled employees may be more prone to engaging in unethical activities. A satisfied workforce is likely to be more loyal and less inclined towards theft or sabotage.

viii. Implement Regular Audits and Checks:

Conduct regular and surprise audits of inventory, financial records, and operational processes. This proactive approach can act as a deterrent to potential theft and help in the early detection of any irregularities.

ix. Explore Security Measures:

Invest in security measures, such as surveillance cameras and access controls, to monitor critical points in the supply chain. This can act as a deterrent and provide evidence in case of any suspicious activities.

x. Continuous Improvement Culture:

Foster a culture of continuous improvement where employees are encouraged to identify and suggest improvements in processes. This approach ensures that the organization remains agile and adaptable to changing circumstances.

Outcomes(As on May'24):

1. The business has sustained itself and is currently experiencing accelerated recovery.
2. Revenue was boosted to 12 lakhs in November 2023 and further increased to 50 lakhs in December 2023.
3. The project resolved miscalculated sundry credits, totaling approximately 20 lakhs, during its tenure.
4. A legal suit was filed against Sumit Kumar in the Bhagalpur District Court.
5. The project supported strategic debt repayment through:
    a. Debt diversification in the organized sector.
    b. Debt restructuring.
6. The business is now increasingly focused on establishing its own brand.
7. The project has bolstered the morale of the business environment and all involved stakeholders.

END OF REPORT

My BDM Journey

Over the course of 1.3 years, my journey with the Business Data Management (BDM) project has been both challenging and enlightening. Initially, I approached over 100 businesses in and around Bihar and Jharkhand, facing a daunting 80% rejection rate. The businesses that did agree to collaborate presented common issues, primarily centered around revenue maximization. Despite my efforts, penetrating deeper into their core problems was a significant challenge, possibly due to my inability to fully alleviate their fears about data security or perhaps due to my own shortcomings in effectively communicating the potential benefits.

The businesses I engaged with ranged from mining and textile manufacturing to the hospitality sector. Many of these business owners, operating mostly on intuition without formal education, were apprehensive about sharing data. Even with a bonafide letter in hand, they feared potential repercussions to their operations. This resistance offered me a firsthand look into the guarded nature of small and cottage industry operators in Tier-2 and Tier-3 cities.

However, a breakthrough came when a business owner, previously approached, returned with a critical issue regarding suspected theft in his family-run business. This opened up an opportunity to not only address his immediate concerns but also to delve into a comprehensive analysis that I had been eager to conduct. The project expanded to include an investigation into the thefts, the financial impact on the business, and broader data analysis to support not just this business but potentially others in similar sectors.

During this extensive project, I aimed to tackle a broader research question: the impact of digitalization on small-scale and cottage industries in less urbanized areas of India. This involved analyzing risks, identifying potential resolutions, and understanding the positive impacts of embracing digital marketplaces.

Key Takeaways from the Business Data Management Project:

- **Persistent Engagement:** Initial rejections are common, but continuous engagement can eventually lead to breakthrough opportunities.
- **Trust Building:** Establishing trust is crucial, especially in settings where business owners are wary of data sharing.
- **Understanding Local Dynamics:** Recognizing the unique challenges and operational methodologies in Tier-2 and Tier-3 cities is vital for effective data management.
- **Flexibility in Data Handling:** Adapting to unconventional data sources and formats is necessary in environments where digital data management is not prevalent.
- **Broader Impact Analysis:** The project highlighted the significant potential benefits of digitalization for small businesses, including improved inventory management and theft detection.
- **Educational Gap:** There is a tremendous need for business education among small business owners, which can unlock their potential and lead to more structured business operations.
- **Potential for Growth:** The project underscored the unexplored potential within India's village and smaller city economies, suggesting that with the right support, these sectors could significantly contribute to the national economy.

Exploring the intricacies of the BDM Project journey in the Indian village and tier-2/3 city industries also revealed several key insights and challenges. Over 1.5 years of engagement provided me with a deep understanding of the obstacles and opportunities these sectors face. Some of them are:

1. **Unexplored Potential:** Tier-2 and Tier-3 industries in India remain largely unexplored, presenting untapped opportunities for growth and innovation.
2. **Technological Gap:** There is a significant disconnect between small industries in less urbanized areas and modern technological practices, hindering their operational efficiency.
3. **Policy Awareness:** Many small business owners in these regions are not well-informed about government policies that could benefit their operations.
4. **Risk Perception:** A prevalent hesitance towards adopting modern business practices often stems from a fear of potential risks and the unknown.
5. **Cultural Barriers:** Traditional practices and local customs heavily influence business operations, sometimes at the expense of efficiency and scalability.
6. **Financial Constraints:** Limited access to funding and financial services makes it challenging for these businesses to invest in technology or expand.
7. **Educational Needs:** There is a critical need for targeted business education and training to help local entrepreneurs leverage modern tools and practices effectively.
8. **Infrastructure Deficiencies:** Inadequate infrastructure, from poor internet connectivity to limited access to logistics and supply chain services, restricts business growth in these areas.
9. **Market Access:** Small industries in Tier-2 and Tier-3 cities often struggle with accessing broader markets, limiting their sales and growth opportunities.
10. **Informal Business Practices:** A large number of businesses operate informally, without proper record-keeping or legal frameworks, making them vulnerable to inefficiencies and legal issues.
11. **Resistance to Change:** There is often a strong resistance to change among local businesses, driven by a combination of fear, tradition, and a lack of success stories demonstrating the benefits of modernization.
12. **Resource Scarcity:** Limited availability of skilled labor and technical resources hampers the ability of businesses to innovate and improve their processes.
13. **Dependency on Local Networks:** Businesses heavily rely on local networks and relationships, which can limit their ability to innovate or adopt best practices seen in more developed markets.

Project Resources

1. **Interview and Testimonials with business Owner:** 🗀 **Interview Video**

2. **BDM Project Folder:** 🗀 **BDM Capstone**

Connect with me : Avijeet Palit,
Phone : +91-8789647995
Email: 21f1005675@ds.study.iitm.ac.in , Avijeet.palit07@gmail.com
Linkedin: https://www.linkedin.com/in/cosmoavijeet07/

Captured Moments During Project at Khushbu Textile