Modernizing and Optimizing the payment collection techniques of a Wholesale Dry Fruits Business

Mid-term Submission for the BDM capstone Project

Submitted by

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Declaration Statement

I am working on a Project titled "**Modernizing and Optimizing the payment collection techniques of a Wholesale Dry Fruits Business**". I extend my appreciation to **Pooja Store**, 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: Ojasv Singhal

Date: 28/9/23

1 Executive Summary and Title

This project centers on a Wholesale Dry Fruits Business located in New Delhi, India, specializing in B2B sales of Fox Nuts and Dry Coconuts. The organization faces several operational challenges, including an inefficient payment claiming system, outdated data management practices, and losses of stocked produce due to pests and theft.

To tackle these issues, we will employ a comprehensive analysis using various analytical approaches. Our methodology involves:

Data Collection: Gathering relevant historical data spanning several years from the organization's records, offering insights into business trends and patterns.

Data Analysis Tools: Utilizing Python (Matplotlib, NumPy, pandas) and MS Excel for data analysis.

Payment Claiming System Optimization: Focusing on improving the payment claiming system by identifying inefficiencies and implementing an optimized process to reduce unclaimed payments and associated losses.

Modernization of Data Management: Introducing modern data management solutions, including digital spreadsheets, to replace outdated and perishable bookkeeping methods, ensuring more accurate financial records.

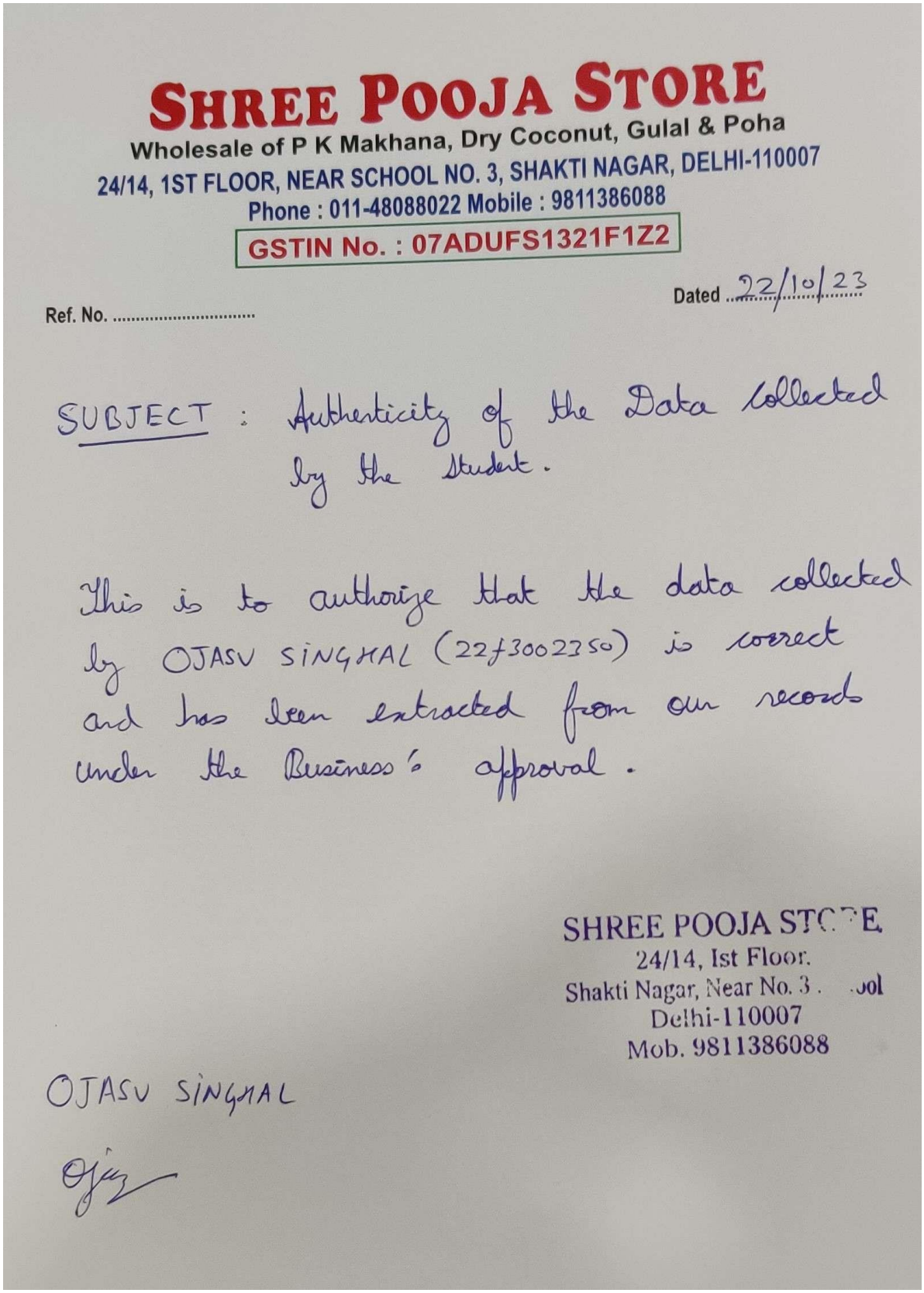
Inventory Management: Conducting a thorough analysis of factors contributing to losses of stocked produce, such as pests and theft, and recommending strategies to minimize losses and enhance storage efficiency.

Expected Outcome: The objective is to rebuild the organization's market reputation by optimizing payment collection techniques, adopting modern business practices, and reducing profit leakage. We anticipate increased efficiency, decreased financial losses, and a competitive edge in the industry.

In summary, this project will employ comprehensive data analysis and strategic improvements to address the organization's key challenges. Our approach aims to resolve these issues and position the business for sustainable growth and long-term success.

2 Proof of originality of the Data

Letter from the organization:



SHREE POOJA STORE
Wholesale of P K Makhana, Dry Coconut, Gulal & Poha
24/14, 1ST FLOOR, NEAR SCHOOL NO. 3, SHAKTI NAGAR, DELHI-110007
Phone : 011-48088022 Mobile : 9811386088
GSTIN No. : 07ADUFS1321F1Z2

Ref. No. .....

Dated 22/10/23

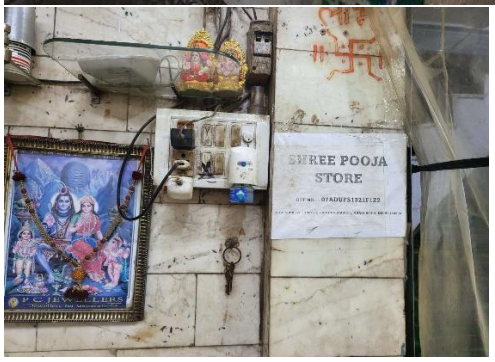
SUBJECT : Authenticity of the Data collected by the student.

This is to authorize that the data collected by OJASV SINGHAL (22f3002350) is correct and has been extracted from our records under the Business's approval.

SHREE POOJA STORE
24/14, Ist Floor.
Shakti Nagar, Near No. 3 .
Delhi-110007
Mob. 9811386088

OJASV SINGHAL

The organization’s base of operations:



3 Metadata

Payment Data:

Data Source: The data was collected from the books kept by the manager of the business.

Data Fields: Sno., Payer's Name, Items Bought, Date, Status

Data Format: Tabular data

Data Ownership: Kept by the manager and reviewed by the active partner of the business.

Data Retention Policy: Long term

Inventory Data:

Data Source: **Not kept**. Created by the student after a visit to the organization's storage units.

Data Ownership: Created by the student and handed over to the owner.

Security Incidents:

Data Source: FIRs registered by the organization to the nearest police station.

Data Format: First Information Reports

Data Ownership: Kept by the lawyer of the organization.

Data Retention Policy: Long term

Employee and Customer Data:

Data Source: **Not kept**. Created by the student after insights from interviews with the various employees of the business.

Data Fields: Employee Name, Position, Year of joining, Legal wrongdoings if any.

Data Format: Tabular data

Data Ownership: Created by the student and handed over to the owner.

Data Retention Policy: Until the release of a particular employee.

Performance Metrics, Pest Control Records, and Feedback and Suggestions:

Scraped the internet to find reviews for the business.

Pest Control Records were created by the student after looking at several bills created by the pest control company present with the manager

4 Descriptive Statistics

Payment Data:

Data Source	Data Fields	Summary statistics
Books by Manager	Sno., Payer's Name, Items Bought, Date, Status	**Total Records**: 253
		Average Transaction: ₹50,121
		Percentage of Incomplete Payments: 31.2%

Inventory Data:

Data Source	Data Fields	Summary statistics
Student's Visit	N/A	**Total inventory of fox nuts in kilos**: 2000kg
		Total cost of Fox nuts in inventory: ₹1.2 cr.
		Total inventory of other items in kilos: 500kg
		Total cost of other items in inventory: ₹20 lakhs.
		Weight of items in kilos deemed unfit for sale due to various reasons: 200kg

Security Incidents:

Data Source	Data Fields	Summary statistics
FIRs	FIRs	**Total number of security incidents**: 30

Employee Data:

Data Source	Data Fields	Summary statistics
Student's Interviews	Employee Name, Position, Year of joining, Legal wrongdoings if any	**Total employees**: 10
		Average Years of service: 5 years

Customer Data:

Data Source	Data Fields	Summary statistics
Internet and market perception	N/A	**Total Feedbacks considered**: 50
		Percentage of positive feedbacks: 96%

Pest Control Records

Data Source	Data Fields	Summary statistics
Student's pest control records	N/A	**Number of pest control records found**: 5
		Mean duration between two pest controls: 1 year
		Total expenditure: ₹50,000

5 Analysis Method

Introduction

This analysis report presents an in-depth examination of various data sources, including Payment Data, Inventory Data, Security Incidents, Employee and Customer Data, and Performance Metrics, Pest Control Records, and Feedback and Suggestions. Our method for analyzing this data follows a structured and comprehensive approach designed to provide valuable insights for informed decision-making. The analysis has been conducted through Python using libraries like Matplotlib, NumPy and Pandas.

Methodology

Data Cleaning: We started by cleaning the data to ensure its accuracy and reliability. Missing or inconsistent values were addressed, and any erroneous entries were corrected.

Descriptive Statistics: For each data source, we calculated essential descriptive statistics to gain an initial understanding of the data:

In the Payment Data, we computed the total number of records, the average items bought per transaction, and the date range. We also created a frequency distribution of payment statuses to understand the distribution of different statuses.

In the Inventory Data, we calculated the total number of items in the inventory.

For Security Incidents, we analyzed the total number of incidents and examined time distributions to identify patterns or trends.

In the Employee and Customer Data, we summarized the number of employees, analyzed their distribution by position, and calculated the average years of service. We also identified employees with legal wrongdoings, if any.

For Performance Metrics, Pest Control Records, and Feedback and Suggestions, we calculated the total number of reviews, pest control records, and feedback/suggestions. We summarized sentiments expressed in internet reviews and identified common themes or issues in feedback and suggestions.

Visualizations: In addition to descriptive statistics, we used visualizations to present data in a more comprehensible manner:

Bar charts and pie charts were used to represent the distribution of payment statuses and sentiments in reviews.

Time series graphs were employed to visualize payment trends over time and to analyze performance metrics.

Hypothesis Testing (if applicable): If specific hypotheses were relevant, we conducted statistical tests to verify or reject them. This allowed for data-driven decision-making based on sound statistical evidence.

Justification for Methodology

Our chosen methodology provides several advantages over other methods:

Comprehensive Approach: By starting with data cleaning and performing a wide range of descriptive analyses, we ensure that all aspects of the data are considered. This approach is comprehensive and leaves no stone unturned.

Data Validation: We made extensive efforts to validate the accuracy and reliability of the data. This step is crucial to ensure the analysis is based on high-quality information.

Visualization: Incorporating visualizations enhances data understanding. Visual representations can reveal trends and patterns that might not be immediately evident from raw data.

Hypothesis Testing: When applicable, hypothesis testing adds a layer of rigor to the analysis. It allows us to make data-driven decisions and draw conclusions with confidence.

Contextual Analysis: Our approach takes into account the context of each data source, allowing for a more nuanced and insightful interpretation of the data.

Privacy and Compliance: Throughout the analysis, we maintained a strong focus on data privacy and compliance with relevant regulations to ensure the protection of sensitive information.

In summary, our methodology not only provides a comprehensive and detailed analysis but also offers a robust and well-rounded approach that ensures the data's integrity and reliability. This method is better suited for extracting actionable insights that can drive informed decision-making and strategy.

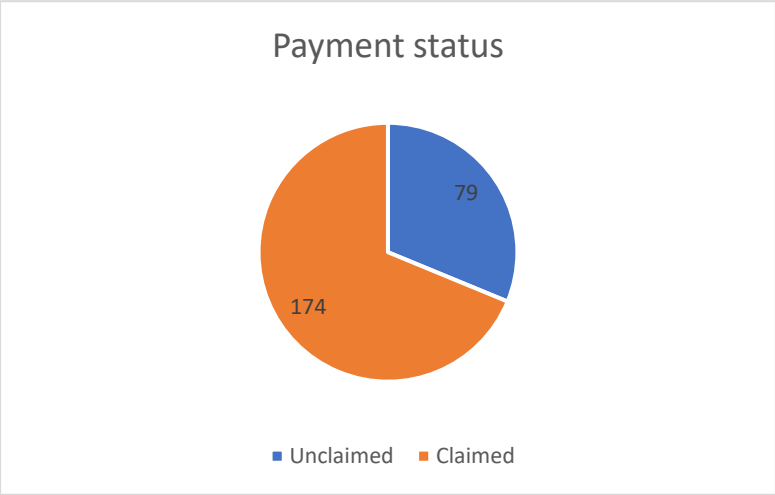
This analysis shines a light upon the shortcomings and the strengths of the business. It enables the decision makers to take necessary action for the betterment of their business's profitability.

Example Code used for analysis

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

# Load data into Pandas DataFrames
payment_data = pd.read_csv('payment_data.csv')
inventory_data = pd.read_csv('inventory_data.csv')
security_incidents = pd.read_csv('security_incidents.csv')
employee_customer_data = pd.read_csv('employee_customer_data.csv')
performance_metrics = pd.read_csv('performance_metrics.csv')

# Data Cleaning
# Handle missing or inconsistent data as needed
```

```
# Payment Data Analysis
total_records = len(payment_data)
average_items_per_transaction = payment_data['Items Bought'].mean()
date_range = (payment_data['Date'].min(), payment_data['Date'].max())
status_distribution = payment_data['Status'].value_counts()

# Inventory Data Analysis
total_items = len(inventory_data)

# Security Incidents Analysis
total_incidents = len(security_incidents)

# Employee and Customer Data Analysis
total_employees = len(employee_customer_data)
average_years_of_service = employee_customer_data['Year of
joining'].apply(lambda x: np.datetime64('today') - x).mean()
employees_with_legal_wrongdoings =
employee_customer_data[employee_customer_data['Legal wrongdoings if
any'].notnull()]

# Performance Metrics, Pest Control Records, and Feedback and Suggestions
Analysis
total_reviews = len(performance_metrics)
sentiments = performance_metrics['Sentiment'].value_counts()
common_themes = performance_metrics['Themes'].value_counts()

# Visualization
plt.figure(figsize=(10, 5))
plt.bar(status_distribution.index, status_distribution.values)
plt.title('Payment Status Distribution')
plt.xlabel('Status')
plt.ylabel('Count')
plt.show()

# Repeat visualization steps for other data sources as needed

# Hypothesis Testing (if applicable)
# Perform statistical tests using NumPy or SciPy

# Privacy and Compliance
# Ensure data protection and compliance with relevant regulations

# Summarize findings and present the analysis report
```

6 Results and Findings



A significant proportion of the payments are withheld which renders the business to lose a lot of money. This must be mitigated by strict policies when it comes to providing products to businesses having a bad reputation in the market and are prone to withholding payments.

The losses endured by the business due to an ill-equipped inventory management system are considerable. It's estimated that the business loses around ₹5 lakhs per year due to this.

These are just a few conclusions drawn from the extensive research that must be carried for tangible benefits to the business.