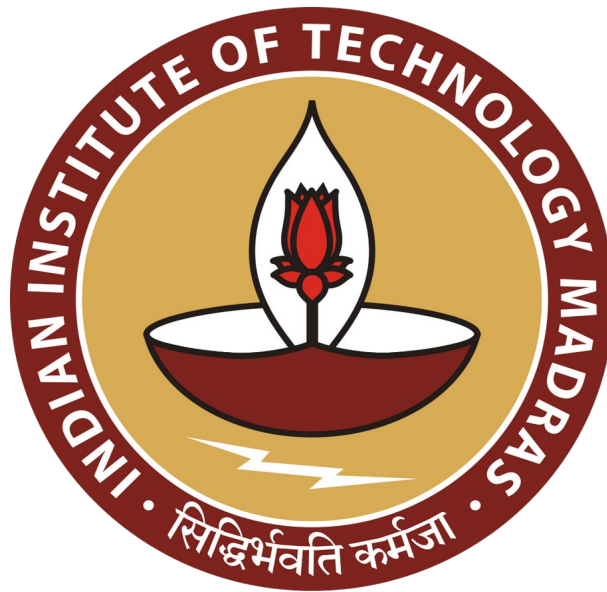# Optimising the Purchasing System of a Small Shop

A Proposal Report for the BDM Capstone Project

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1

Table of Contents

Declaration Statement

I am working on a Project Titled "Optimising the Purchasing System of a Small Shop". I extend my appreciation to Sun Agencies, 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 through 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 information 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 agree that all the recommendations are business-specific and limited to this project exclusively, and cannot be utilized for any other purpose with an IIT Madras tag. I understand that IIT Madras does not endorse this.

Signature of Candidate:

Name: Anirudh Gautham

Date: 7/1/2024

1. Executive Summary and Title

This project focuses on Sun Agencies, a shop in the R.A Puram area of Chennai, run by Mr. Murugesh, an entrepreneur. He sells stationary, snacks and also offers xerox and printout services.

The major issues that the business faces are the high investment required to purchase and maintain the xerox and printing equipment, inventory management, low margins on products, and working capital shortages.

I will be using the purchases data of the business from December 2023 to February 2024. The data collected includes the product being purchased, its price, discount (if any), quantity purchased, and the category to which the product belongs.

Since the data is collected over a period of time, I will be able to plot trend lines and histograms, comparing the sale of various products at various points in time. I can plot piecharts to visualise the distribution of purchases among products and product categories. I will also use the data to forecast how much the business will need to invest in various products in the future using the historical data. Finally, the data can be used to verify whether the quantities at which various products are purchased match their demand from customers.

2. Organizational Background

Sun Agencies is a small shop located in a densely populated neighborhood in the RA Puram area of Chennai. The establishment is run by Mr. Murugesh, an entrepreneur. He primarily sells stationary, snacks and offers xerox and printout services. He also provides courier services, in a tieup with Franch Express. The courier business, however, is beyond the scope of this project.

Initially, establishment began as a courier business only before including Xerox, stationary and snacks in its ever-expanding product line. He is contemplating opening a Pani Puri stall as well, upon recommendation from neighborhood residents.

The steady expansion of the business showcases Mr. Murugesh's business accumen as well as his apetite for risk. He also insists on behaving with integrity and honesty, despite severe competiton in the area and the battles with poverty and ill health he has had to endure in life.

3. Problem Statements

After extended interactions with Mr. Murugesh, I uncovered the following major problems that his business faced:

3.1. Maximising Available Working Capital

When products are purchased, the money spent in them is not recouped until they are sold. If the lead time between the purchase and sale of a product is high, working capital is locked up in that product until it is sold, restricting Mr. Murugesh's leeway to conduct new business.

3.2. Optimizing Allocation of Money Among Products and Equipment

As mentioned before, the shop offers a variety of products and money needs to be carefully allocated among them. Since the demand for some products and some variants will be higher than others, allocation becomes a crucial task.

3.3. Identifying Ideal Levels of Inventory for Various Products

For any business, some products will be more in-demand than others. The same product could have higher demand during some parts of the year. Using historical purchases data, I can uncover the likely quantities that need to be purchased for various products in the future, ensuring that products are bought only when they are needed and in the right quantities.

4. Background of the Problem

The majority of what is sold in Mr. Murugesh's shop are low-margin products, like stationary. It is not possible to earn a sustainable living on selling these products unless one is selling them at a large enough scale, which is not the case as his shop is even smaller than the average Kirana store. This is one of the core problems that underlie Mr. Murugesh's business.

Further, the shop offers a wide variety of products, from snacks to printouts. This creates a dilemma on how investment must be apportioned between these products. Adding new items to a business' product mix also comes with risk as it is impossible to know beforehand if they will generate good sales. This is on top of the already high electricity fees and rent that Mr. Murugesh pays monthly. The equipment used for xerox and prinouts also entail high maintenance and repair costs, which must be factored into the budgeting process.

The difficult cirumstances Mr. Murugesh faces in life also compound the above issues. He has had to nurse a severe knee injury for years. Natural disasters in Chennai over the years have only made matters worse.

5. Problem Solving Approach

5.1. Details About Methods Used For Analysis

I will be collecting data regarding the business' purchases. This will allow me to plot line graphs, pie charts and histograms to visualise the product-wise purchases. I can grasp which products are being purchased the most at various points in time and how the money available for purchases is being allocated among the various products. Using the results of the above analyses, I can reconcile these numbers with the actual sales and demand from customers to verify if purchases match customer demand.

Using the historical data collected, I will be able to forecast the quantities that need to be purchased for various products and how the money available for purchases must be allocated among various products, using Regression and other forms of forecasting. Doing so will instill an inventory management system that will ensure that orders can be placed in advance and in the right quanities.

5.2. Details About the Collected Data

I will be using the purchases data of Sun Agencies between November 2023 and February 2024. This process comprises of collecting the bills given to Mr. Murugesh by his suppliers, transferring the entries in each bill to an Excel sheet and then analysing them. The Excel sheet will contain the name of each product purchasesd its price, quantity, discount (if applicable). I will also be obtaining data on the electricity fees, rent for the shop and other overhead expenses to gain an understanding of the various lines of expenditure.

Unfortunately, the business does not maintain a record of their sales. Therefore, only the purchases data will be used for this project.

5.3. Details About the Tools Used for Analysis

As mentioned before, the data will be entered and consolidated in Excel. For data visualisation, I will be using line graphs, bar graphs, histograms and pie charts from Excel.

I will use pivot tables to filter the data based on the rows and columns and look at a subset of the data. Built-in functions like VLOOKUP can also be used to analyse a part of the data.

To perform more complicated analysis, I can use the Pandas library in Python, which has a large array of functions to work with Excel/CSV files.

I will use the Pandas library as the base to perform forecasting as well. I am planning to use the Scikit Learn library to apply Regression algorithms on the data to forecast purchasing needs in the future.

6. Expected Timelines

6.1. Work Breakdown Structure

6.2 Gantt Chart
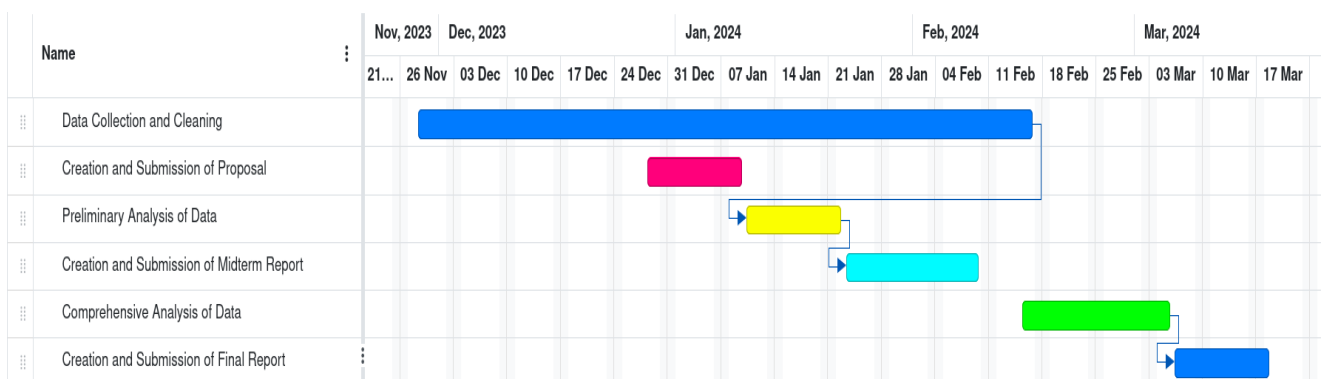
7. Expected Outcomes

7.1. Increasing Available Working Capital

Upon analysing the purchases data, I will be able to ascertain the quantities at which products are purchased. Reconciling this with the sales of various products will allow me to understand if this matches their demand. This will ensure that products are bought at the right time and in the right quantities, reducing the lead time between their purchase and sale.

7.2 Purchases Funds Allocated Optimally

The data will give me a picture of how funds available for purchases are allocated among different products. This can be analysed opposite demand to assert that products which are demanded the most by customers are purchased the most and gain an understanding of how purchases funds should be allocated among the products.

7.3 Improved Inventory Management System

By analysing the purchases, I will be able to understand the purchasing patterns of the business. Using this data, along with improvements I can suggest by analysing the data, the business will be able to get an idea of its inventory needs in the near future, allowing more efficient operations.