



Indian Institute of Technology Madras

BDM CAPSTONE PROJECT

Optimizing storage constraints and efficient
employment of capital among different categories of
products in a versatile shop

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Executive Summary

This report is constructed to collect and analyze data from the business to identify the bottlenecks and provide insightful observations to solve a few of the issues. The organization on which this project is based deals primarily in selling raw materials that ice cream manufacturing mills need to make ice cream. They also sell various products which are needed by the bakeries for making confectionary items and they also sell wood polish/lac polish (or in general hardware) products.

For this project, only the ice cream segment of the business is considered. In this project, two major problems are being analyzed, which is regarding the storage problem of maintaining a large catalogue of products such that proper stocks are maintained without overspending on some products and the other one is, finding an efficient strategy for capital expenditure among the high-value low-moving and low-value high-moving products keeping in mind their storage needs. The objective of this project is to provide significant strategies the business can implement to rectify these problems.

Organization Background

The name of the organization is **Nandi Variety**. It is a proprietary business run by Mr. Fullara Prosad Nandi. It is situated in the semi-urban town of Bolpur in the state of West Bengal, India. The firm deals with B2B as well as B2C. Currently, two employees are working in the firm along with Mr. Nandi.



Pic 1: front view of the shop Nandi variety. Pic 2: Counter view, from left Mr. Nandi, employees: Rasu Chakraborty, and Nitai Das

The firm started its business 20 years ago, with a small list of bakery products. It quickly realized that, since the bakery industry has a seasonal component to it (more sales during winters), it is difficult to survive without augmenting other categories. With the passing years, the firm has entered into the ice cream industry which is again a seasonal business (mainly summers) and is B2B, and into wood polish/lac (or in general hardware) products selling, which is B2C. These strategies have made sure that the business remains operational

for the whole year around. According to Mr. Nandi, the revenue generated by the business is around 50 lacs per annum.

Objectives

1. Optimize the storage constraint to maximize profits by organizing different categories of products, e.g. -products that are fast-moving but low price, slow-moving but high price, and products consuming significant storage space.
2. To find an efficient strategy to predict the demand of product categories such that those items could be stocked in large quantities during the off-season by balancing the capital expenditure across categories.
3. To come up with ideas to tackle the frequent stock-out issues and to counter the fluctuating prices.

Background

The second in-person meeting with Mr. Nandi gave some ideas about the problems of the business. During the on-season (March-June) the products sold by the business gets frequently supply disruptions due to external reasons. Also, the price of the products fluctuates frequently, this result in customer dissatisfaction, loss of profit, and loss of business to competitors. To rectify these issues, the firm has developed a strategy to stock bulk amount quantities of the products, which it thinks are most fluctuating in nature/get the most out of supply. There again it fails to maintain a balance between capital expenditure on different ranges of products (e.g., high value, large space-occupying, fast-moving, etc).

This results in the firm investing too much capital in a certain category of products which then sits idle for a long time, incurring both capital and storage blockage. Sometimes, some product gets a price cut or the demand for them becomes low due to some external reasons. In these scenarios, the storage area becomes unable to adjust to the changing demand for new products.

On asking about the reason, for not storing less of the slow movers and focusing only on the fast-moving products, it is understood that the product categories cannot be absolutely classified like that.

Some products which are fast movers this season might become slow movers during the next and vice versa.

Data Collection Process

Problem-solving Methods

To achieve the aforementioned objectives the following methods can be implemented,

1. The First step is, to analyze the percentage of storage available to the ice cream segment of the business. As already mentioned, the business deals in three very distinct categories namely ice cream, bakery, and polish materials. The ice cream and bakery products are food products while the polish products are poisonous and highly inflammable. To avoid any accident or contamination, they must be kept separate from each other.
2. Next step is, to identify the most demanded products, the products getting the maximum price fluctuations, and whose supply gets disrupted during the season time. These are the products of utmost importance. Let's call them 'products of concern'. The storage space needs to be distributed among them.
3. Once the storage area limitations and products of concern are defined, the next step is to identify the fast/slow moving, high/low storage requiring, and expensive/low-cost products that can be sorted according to storage needs and priority.
4. To balance the business expenditure such that not too much money is spent in bulk procuring the idle products, the average weightage of each product of concern depending upon variables such as demand, supply, and price fluctuation, storage space requirement needs to be seen. Bulk orders during the off-season need to be placed based on this parameter obtained in the previous season.
5. To rectify the out-of-stock problem, the average inventory day of the most demanded products needs to be obtained.

Data Collection

For achieving the objectives, the data collection process includes collecting the following:

Daily sales data, purchase data, data regarding the storage space, some qualitative data about the storage space environment, and information about the criteria for storing different products in those spaces. All the data collected is from January-June, 2022.

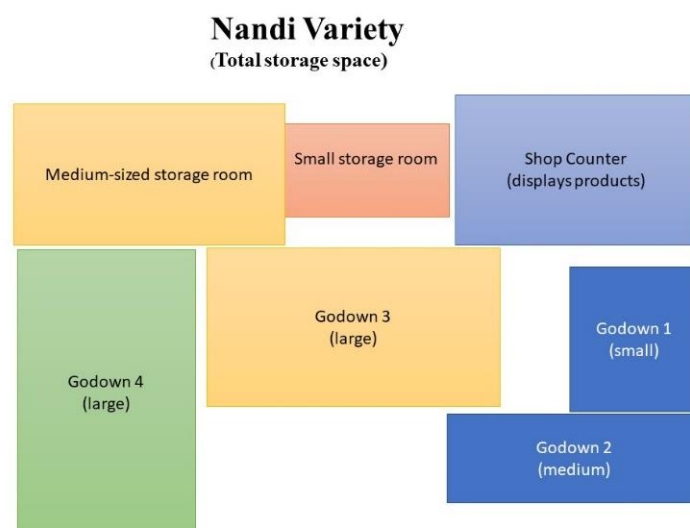


Fig 1: Pictorial representation of storage space of the organization

Data Analysis tools

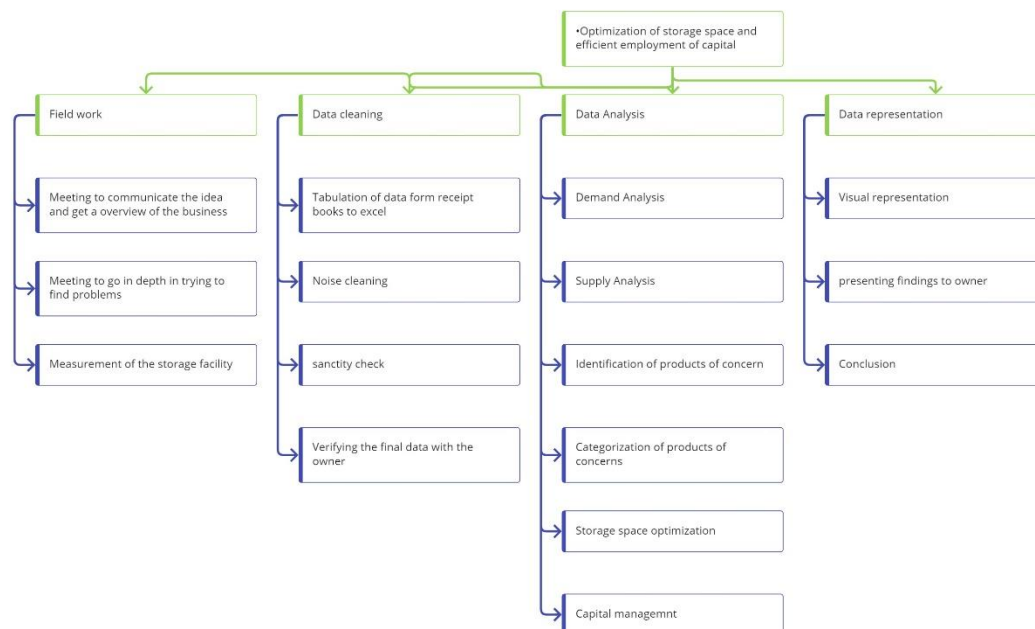
1. Pie chart: A pie chart can give the % of total storage available for the ice cream segment of the business.
2. Pareto analysis: A Pareto analysis will help identify the 'products of concern'.
3. Demand curve: For each product of concern a line chart will show the demand and can help forecast future demands.
4. Supply curve: For the same products a supply line chart will show the supply side of the products of concern.

Depending upon the correlation between demand and supply bulk stocking before the season time can be done to help negate the price fluctuations and supply disruptions of the season time.

5. Scatter plot: A scatter plot is most suitable to identify the slow/fast selling and low-cost/expensive products.
6. Column Chart: A column chart showing the relation between product cost and space required can be used to manage storage requirements.

Expected Timeline

Estimated work breakdown structure (WBS) for the project :



The total project can be broken down into three primary parts :

- a. Approaching different businesses and trying to convince them of the objectives (Oct-Nov, 2 months)
- b. Getting data from the business, data tabulation, and cleaning (Dec-Jan, 2 months)

- c. Data Analysis, intimating the business about the findings and final report (Feb-April, 3 months)

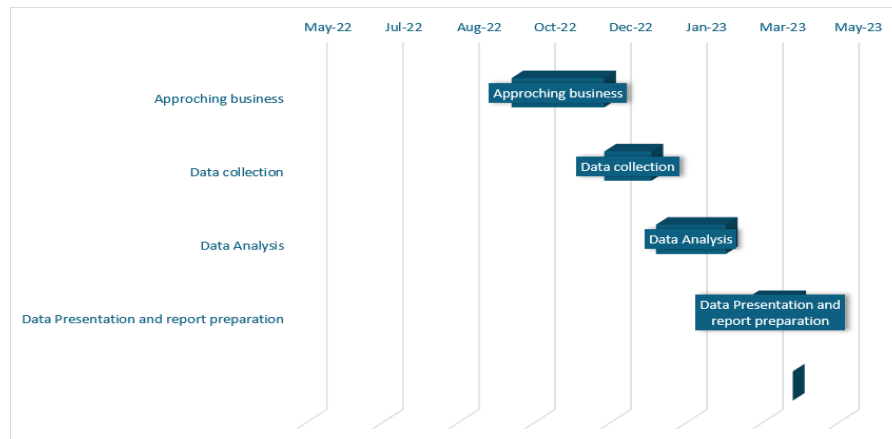


Fig 2: Gantt representing the estimated timeline

Expected Outcomes

It is expected that after analyzing the data, there will be significant actionable insights regarding the concerns of the business. It is also expected that these insights will positively impact the business towards its growth.