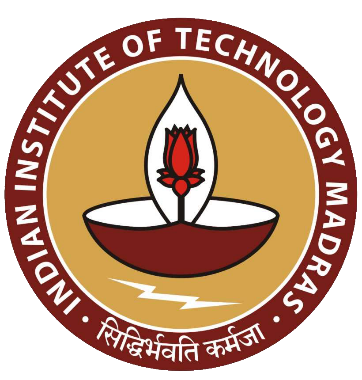
BDM CAPSTONE PROJECT PROPOSAL



# Market Basket analysis and inventory optimization through data mining for a low-growth organic food store

By:-

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**Executive Summary :**

This capstone project aims at helping a small struggling retail firm called organic window, which sells a wide range of organic food products. It is located in the tier 2 city of Dehradun, Uttrakhand.  
The store was opened by the owners as a way of realizing the dream of making organic food more accessible to an average Indian citizen through affordable and competitive pricing.

From a business point of view, the 10-month-old firm has been struggling to break even and has appointed various new strategies to boost sales like diversifying its product lineup, small events like talks on the benefits of organic food over conventional food, and have recently started with the distribution of their products to various retailers across Dehradun.

This project aims to undertake market research on organic food and its consumers, perform extensive data analysis of the firm’s sales and revenues, consumer preferences, costings, demands, profit margins, availability, growth, and a wide range of SKUs and business units offered by the organic window, to come up with an optimized inventory lineup and inventory quantity to find solutions of the underlying identity crisis of a relatively new and dynamic firm.  
It should also help the firm in making data-driven decisions on finding the right demographic, pricing, and channels of sales for a better return on investment in the future.

The project will be completed in phases, with the first phase focusing on discussions with the owners over various business problems faced by the firm and the formation of problem statements through those problems followed by appropriate data collection.  
The second phase will deal with the analysis of the data and conveying results and findings to the owners.  
The third phase will deal with the implementation of various strategies finalized through the analysis and observation of results as a cause of those implemented strategies.

**Organization Background :**

Organic Window is a small business that was established in march 2022 that sells organic, paahadi, and natural food Products. These products range from everyday groceries like organic rice, pulses, and flour to state-specific food products like Buransh (Rhododendron juice), chutneys, pahadi pulses, and pahadi spices.  
The store is located in the city Dehradun, capital of Uttrakhand. The store is a joint venture opened by two women, Mrs. Suchi and Mrs. Nandita, who are also key stakeholders in the firm.

During a conversation with one of the owners, Mrs. Suchi, she revealed that in her search for better dietary options, she found out that about 590 lakh metric tonnes of fertilizer products and 62000 metric tonnes of chemical pesticides were used in India in 2020-21 FY. In India, these products still use over 80 toxic agrochemicals that are banned worldwide. These agrochemicals are detrimental to human beings in the long term and lead to rapid soil degradation.

Witnessing this degradation in Food quality and an increase in chronic diseases across India, inspired Mrs. Suchi to provide quality, organic, toxic-chemical-free food to Indians at an affordable price, her mission.   
Originally, she wanted to convert farmers in her home state from conventional farming to natural farming but that required satisfactory income generation for farmers to make that switch  
To achieve this she first had to create a link between farmers and consumers, for which she along with Mrs. Nandita opened an organic window store in their home state of Uttrakhand.

Currently, Organic Window sources most of its organic products from established organic brands like Samridhi and Organic Tatva. Some products, generally pahadi and natural products, are sourced directly from local farmers of Uttrakhand. All of these products are then packaged and sold as organic window products.

**Background of the Problem :**

The first step to understanding the business problem is to understand the economics of organic farming. Unlike Conventional farming, Organic farming does not involve the use of synthetic chemicals, such as pesticides and fertilizers. Organic farmers often use techniques such as crop rotation, composting, and natural pest control to maintain soil health and productivity.   
In terms of production costs, organic farming generally has higher costs due to the use of labor-intensive methods and the lack of access to synthetic chemicals and genetically modified organisms (GMOs), which can lead to much lower yields in comparison.  
These fundamental differences in farming procedures can lead to differences in higher production costs for organic food, higher market prices, and in turn lower consumer demand.  
The B2B sourcing of the majority of products has also resulted in additional costs for each product.

Now generally in first world countries organic food items come with premium pricing but in a country like India where a consumer will bargain for even 5 Rs dhania, consumers are generally not willing to pay almost double the price of similar cheaper normal products along with the fact that most Indian citizens may not even be aware as to why organic products are healthier options.

Thus, in a tier 2 city like Dehradun, this directly leads to a very low-growth business model with fewer sales. To counter this the owners have drastically reduced the selling price by giving huge discounts which range from 30-40% on almost all products.

This in turn leads to much lower profit margins ( about 25% on average for organic window) which then requires huge sales to generate enough revenue to break even, which is about 1.6 lakh Rs per month for this store.

To boost sales the owners have also tried different selling strategies. For example, they have recently started giving their products to other established retail shops other than their store.

The owners are also worried about the huge underlying inventory of about 2 lakhs Rs and are not too keen on keeping the business running for much longer. They have approached this business in a much more conservative manner where they have spent very low to no money on marketing and are trying their luck through various sales channels like distribution.

**Problem Statement**

It has been 10 months since the inception of the store and yet, the owners have conveyed, that not even once have they reached break even.  
The store started with low growth and has now plateaued. This is worrisome for the owners as they still have a huge underlying inventory and are skeptical about going forward with the business.  
Further discussion with owners revealed that originally all SKUs were organic products but over the course of the last 6-7 months they have also added lots of pahadi and natural products to diversify inventory. This has also led to a lot of overstocking of certain SKUs as the owners said a lot of inventory has just been laying around.

Hence, I have come up with the below-mentioned problem statements:

1. Finding solutions for the current identity crisis Organic Window is going through by optimizing the inventory lineup through careful data-driven analysis of past SKU sales, demands, profit margins, availability, and growth
2. Identifying opportunities for increasing sales and profit at Organic Window by analyzing data on customer preferences, product offerings, associations, and competitors in the organic food market.  
   subsequently optimizing product pricing and inventory stocking by analyzing data on sales, cost, and demand to improve profitability and increase sales.
3. Analyzing data on weather patterns, local events, and holidays to identify potential impacts on sales and develop strategies to maximize sales during these times.
4. Analysis of different channels of sales for determining the priority channels and identifying the channels with the highest ROI for appropriate resource Allocations.

**Problem-Solving Approach :**

1. **Methodology to be used:**

To find solutions for the above-mentioned problem statements, I will be using various statistical and non-statistical approaches to find macro and micro trends.

For the first problem statement, I plan to start by using descriptive statistics summarizing the data to understand the general characteristics of the store's customers, sales, and inventory.  
I plan on using time series analysis of various SKUs to understand SKU-specific trends in sales, demand, and profit margins over time. Understanding these trends for different products can prove to be helpful in making informed decisions about which products to keep in the inventory lineup and which to remove.  
to perform this analysis data on sales, demand, and profit margins for different SKUs over a period of time could be collected on a daily, weekly, or monthly basis, depending on the granularity of the analysis needed which may reveal different insights on different levels.

Further, these insights will be cross-checked using a sales-revenue scatter plot to confirm the dropping of only low sales and revenue Skus. This analysis will help make decisions like which product to drop, which products need a decline in inventory, and which products need an increase in quantity as per the demand

Time series analysis may also prove to be useful in finding seasonalities in sales or finding any trends with different weather conditions and holidays. For example, if it found that sales of some products increased in Diwali last year, I can propose some sort of gift packings for upcoming festive holidays like Holi.

I can then use Predictive modeling like regression analysis to make data-driven projections on demands for different SKUs which will help in stocking up appropriate quantities for each SKU. This will be helpful in cost reduction for the struggling store as it will decrease overstocking

I also plan on performing market basket analysis to identify associations or patterns between items in a transaction dataset, such as what items are commonly purchased together. This may provide us with potential opportunities to boost sales.

Finally, I’m planning to use various data visualization techniques like Pareto charts, box plots line plots, and scatter plots to find additional insights, distributions, correlations, etc.

For example, I can plot sales into different price brackets and analyze what range of pricing current organic window consumer demographics are more willing to pay.

If the owners will be willing, I will also propose some sort of AB testing for certain similar yet distinguished products as the lineup is still very diverse and new. This can also be used for pricing strategies for new and existing products. This will require some additional time and effort and hence additional approval from the owners.

1. **Intended data collection:**

I’m planning to collect data from the time of its inception which would be from mid of march 2022 to January 2023 and some market data on the organic food industry.  
I plan on collecting data on the sales of each SKU along with dates of sale, the cost of each SKU, and the selling price of each SKU.  
I also plan on extracting bill data for my market basket analysis. This will be done through recon (software used by organic window to store transactional data on purchases from the store, as conveyed by the owners).  
I also intend to collect inventory data on each SKU and how it was moved over the course of 10 months along with sales data from different channels like stores, retail shops, individual events, etc

1. **Analysis tools to be used:**

I’m planning on using excel for simple data collection, structuring, and analysis. I will also be using excel for some descriptive analysis and data visualization.

For predictive analysis and time series analysis, I plan on using python.  
both of the above-mentioned tools may be used for data cleaning, sorting, and adequate transformations as deemed fit

**Expected Timeline :**

The start date of this project has been 16th January. The expected timeline is displayed in below given Gantt chart.

It is expected that the final submission will be done by 20th February

**Expected Outcome:**

It is expected that the implementation of strategies that I will come up with through data analysis should result in an optimal allocation of the current underlying inventory, exploiting associations and customer preferences, and better pricing should boost revenue.  
along with this optimized lineup, inventory management and determination of priority channels should also boost sales and reduce the overall cost per month for the firm

Ultimately all these strategies should give additional run rate and hopefully sufficient profits to the organic window that can then be invested back into the firm through strategies like marketing.