

Operational and Sales Analysis of a Packaged Drinking Water Company

A Mid-Term report for the BDM capstone Project

Submitted by

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1 Executive Summary and Title

IRA Gold, a subsidiary of ABN SUN Foods and Beverages, is a packaged drinking water brand based in Bidgaon, Nagpur. The company serves both B2B and B2C markets but faces multiple operational, seasonal, financial, and competitive challenges.

Some of the major issues identified include low machine utilization due to irregular electricity supply, a drop in sales during the monsoon season, dependence on government-supported infrastructure like the local transformer, and stiff competition from established brands.

To better understand these problems, primary data were collected between June and August 2025, focusing on daily records of production, sales, and credit transactions. The dataset captured key factors such as machine capacity, actual output, utilization rate, costs, revenue, profit, product category, buyer type, payment mode, and external factors like weather and market impact. Analytical methods such as descriptive statistics and trend analysis were used in Excel to study efficiency, sales fluctuations, and liquidity trends.

The analysis revealed that the company's average utilization rate stands at about 42 percent, mainly due to frequent power interruptions. Gross margins range between 16 and 18 percent, while sales show a noticeable dip during July and August because of transportation challenges and reduced consumer demand. Furthermore, around 35 percent of total sales occur on credit, resulting in temporary cash-flow constraints. Occasional comments about competition indicate a revenue reduction of nearly 10 percent on affected days.

Overall, the findings suggest that a stable electricity supply and focused marketing strategies could significantly improve performance. With consistent operations, IRA Gold could potentially double its production and profitability, paving the way for long-term financial sustainability.

2 Proof of Originality of Data

Business Name: ABN SUN Foods and Beverages (Brand - IRA Gold)

Address: Bidgaon, near Symbiosis Institute of Technology, Nagpur, Maharashtra

Owner's Name: Mr. Akshay Nanote

Business Type: Packaged Drinking Water Manufacturing and Distribution

Data Collection Period: 1 June 2025 - 31 August 2025

The information for this study was obtained directly from IRA Gold operational records, including verified bills and sales transactions. The data reflects real business activities involving distributors and retail buyers, covering product types, quantities, pricing, and payment modes.

Two sample bills have been used in fig 1.1 and 1.2 as supporting documents to validate the entries, showing details such as customer names, quantities sold, and total amounts. These records were compiled to form a structured three-month dataset representing daily production, sales, and credit transactions.

Two images are presented below as fig 2.1 and fig 2.2, illustrating the on-site interaction with the business owner

Letter of concern has been added alongside the photographs of the IRA Gold facility and the owner were also included to confirm the source and authenticity of the collected information.

Video Interaction :  BDM_Interaction_Video.mp4

Letter :  letterira.pdf



ABN SUN FOODS AND BEVERAGES
Manufacturer of 1000 ml, 500 ml Packaged Drinking Water Bottle
GSTIN - 27NAT959448128
Mob. No. - 976587976, 7276747304, 9767733310 Email - iragold@gmail.com
Plot No. No. Raitha Housing Society, Tarodi (B), Tal. - Kamptul, Dist. - Nagpur - 441001

Bill 1.1
Buyer's Name - Sandipoo Bhagat Date - 30/10/2025
Buyer's GSTIN - Add - Mob. No. -
S. No. Description Quantity Rate Amount
1. Ira Gold Packaged Drinking Water Bottle Box
(i) 1000 ml Plastic Box 39 80/- 1520/-
(ii) 1000 ml Corrugated Box 40 100/- 8000/-
(iii) 500 ml Plastic Box 07 102/- 714/-
Total Amount Before Tax 10234/-
GST 1255/-
Grand Total 11519/-
FSSAI LIC NO. - 11525056000272

Bill 1.2
Buyer's Name - LDC Date - 30/10/2025
Buyer's GSTIN - Add - Mob. No. -
S. No. Description Quantity Rate Amount
1. Ira Gold Packaged Drinking Water Bottle Box
(i) 1000 ml Plastic Box 15 125/- 1875/-
Total Amount Before Tax 1875/-
GST 1875/-
Grand Total 3750/-
FSSAI LIC NO. - 11525056000272

fig 1.1 & 1.2 Samples bills of the sales



fig 2.1 & 2.2 Me along with the Owner at the business place

Remaining proof details are provided in the drive link below.

Drive Link: [click here](#)

3 Metadata and Descriptive Statistics

Data Format: CSV (Comma-Separated Values) and Excel/Sheets (XLSX)

Data Range: June 1, 2025 to August 31, 2025

Business Closed: No complete shutdowns, but partial downtime occurred on certain days due to power cuts.

Units of Measurement (for Money): Indian Rupees (Rs)

Dataset Link: [x BDM_MidTerm_Data1.xlsx](#)

a) Information about the Production Data

Features Collected:

- **Date:** The date when production activity was recorded.
- **Machine Capacity:** The maximum number of boxes that can be produced in a single day (1200 boxes per day).
- **Actual Production:** The number of boxes actually produced on that day.

- **Utilization (%):** Shows how efficiently the machines were used, calculated from actual production against capacity.
- **Electricity Cost (Rs):** Daily electricity cost based on the number of boxes produced.
- **Labor Cost (Rs):** Daily wages paid to 11 employees involved in production and packaging.
- **Material Cost (Rs):** Cost of bottles, water filling, labeling, and caps.
- **Total Cost (Rs):** The combined cost of electricity, labor, and materials used in a day.
- **Revenue (Rs):** The total sales value generated each day from the boxes produced (Rs 120 per box).
- **Gross Profit (Rs):** The difference between daily revenue and total cost.
- **Remarks:** Notes about production conditions such as "Power cut 2 hrs", "Smooth operation", or "Short electricity supply".

Explanation:

The company operates two production machines with a total capacity of 1200 boxes per day. However, due to regular electricity interruptions, the production output averages around 500 boxes per day, which means the machines run at roughly 42 percent utilization.

The remarks column helps identify power-related production losses, giving insight into the impact of operational challenges on performance.

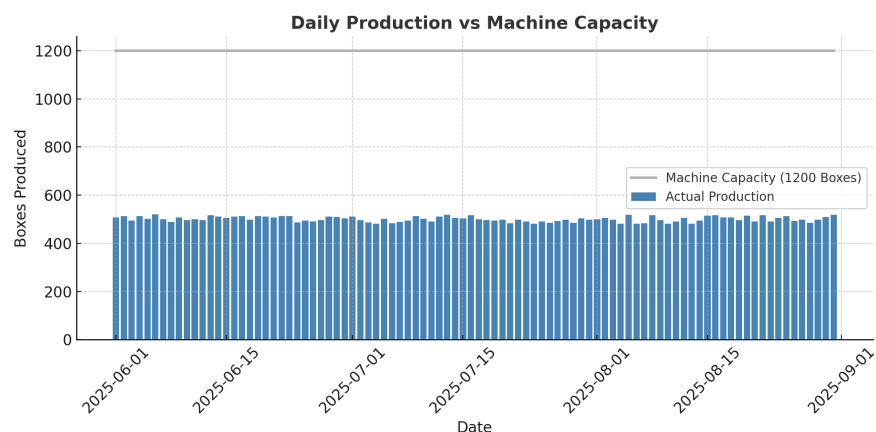


fig 3.1 Daily Production vs Machine Capacity graph

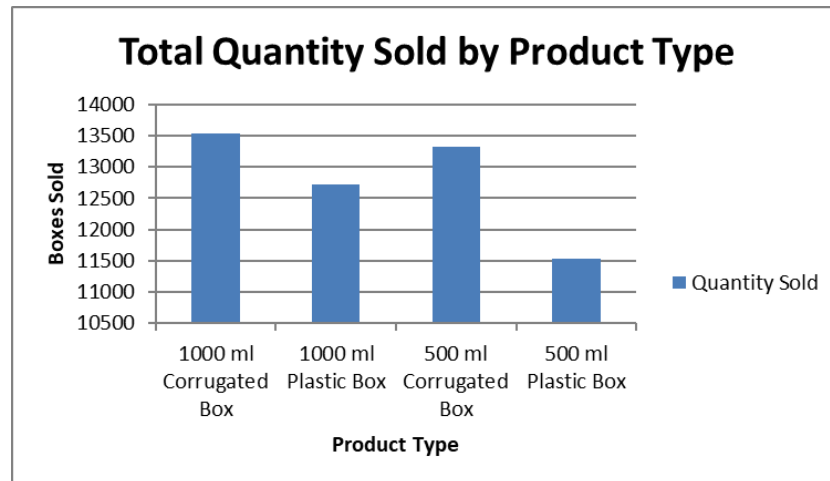


fig 3.2 Total Quantity Sold by Product type graph

b) Information about the Sales and Credit Data

Features Collected:

- **Date:** The date of the sales transaction.
- **Buyer Name:** The name of the distributor or retailer, such as LOC Thiranga Square, Om Traders, Sai Agency, etc.
- **Product Type:** The type of product sold (500 ml Plastic Box, 1000 ml Corrugated Box, etc.).
- **Quantity Sold (Boxes):** The total number of boxes sold in a transaction.
- **Rate (Rs):** The selling price per box (Rs 120).
- **Amount (Rs):** The total transaction amount calculated by multiplying quantity and rate.
- **Payment Type:** Indicates whether the sale was made in cash or on credit.
- **Credit Days:** The number of days given to the customer to clear payments, generally between 15 and 30 days.
- **Payment Received Date:** The date when payment was actually received.
- **Pending Amount (Rs):** The remaining unpaid balance, if any.
- **Remarks:** Notes about payment behavior, like "Paid on time" or "Partial payment".

Explanation:

The sales and credit data were recorded daily using actual bills and transaction logs from the company's distributors and retailers.

About 35 percent of total sales are on credit, and payments are usually settled within 15 to 30 days.

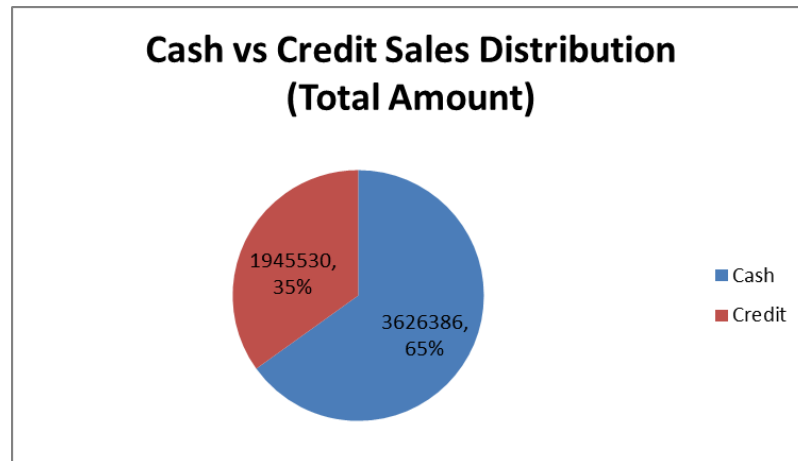


fig 3.3 Cash vs Credit Sales Distribution

Descriptive Statistics:

This section provides a summary of the key quantitative variables that describe IRA Gold's operational and financial performance from June to August 2025.

The analysis was performed using both Microsoft Excel and Python (Pandas) to calculate statistical measures such as the mean, median, mode, and standard deviation for the major variables- Actual Production, Utilization (%), Revenue, and Gross Profit.

Interpretation of Statistical Findings

The statistical summary highlights that IRA Gold's daily production and sales operations were remarkably consistent during the analyzed period.

The mean and median values for all variables are nearly identical, suggesting minimal data skewness and steady operations.

A low standard deviation across production (11) and utilization (0.9) confirms that the company maintained stable daily performance, even under limited capacity conditions.

The mean utilization rate of 41.7% quantitatively validates the operational inefficiency caused by power supply instability - the primary issue affecting production.

At the same time, revenue and profit stability demonstrate effective cost management and strong business resilience.

In summary, IRA Gold's descriptive analysis indicates that while operational consistency is strong, there is substantial scope for improvement in utilization efficiency and profit scaling once infrastructural challenges are addressed.

The following table summarizes the statistical results and machine utilization trend:

	Actual Production (Boxes)	Utilization (%)	Revenue (Rs)	Gross Profit (Rs)
count	92.000000	92.000000	92.000000	92.000000
mean	500.728261	41.727500	60087.391304	10014.565217
std	11.002600	0.916698	1320.312042	220.052007
min	481.000000	40.080000	57720.000000	9620.000000
25%	491.750000	40.980000	59010.000000	9835.000000
50%	500.000000	41.670000	60000.000000	10000.000000
75%	511.000000	42.580000	61320.000000	10220.000000
max	520.000000	43.330000	62400.000000	10400.000000

fig 3.4 Statistical Results via Pandas(Python)

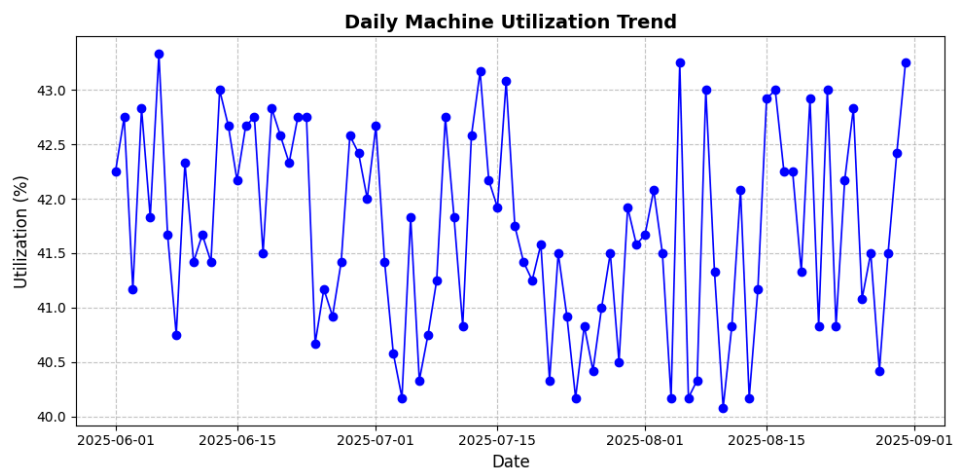


fig 3.5 Daily Machine Utilization Trend via Pandas(Python)

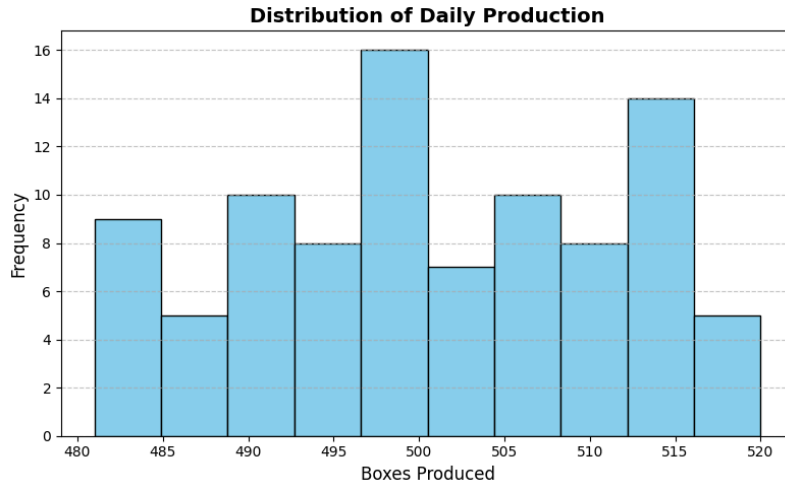


fig 3.6 Distribution of Daily Production via Pandas(Python)

More statistics available on : [BDM_MidTerm.ipynb](#)

4 Detailed Explanation of Analysis Process/Method

A. Data Cleaning and Preprocessing

Before analysis, the collected data was cleaned and organized to ensure accuracy and reliability. Information gathered from bills and daily records was compiled in Excel and imported into Python (Pandas) for validation. Duplicate and missing entries were removed, date formats standardized (DD/MM/YYYY), and numerical fields rounded to two decimals. Derived columns such as Total Cost, Revenue, Gross Profit, and Utilization were calculated. Random values were cross-verified with bills using Excel formulas and Pandas summary functions, ensuring the dataset was clean and ready for analysis.

B. Tools and Software Used

A combination of **Microsoft Excel** and **Python (Pandas, Matplotlib)** was used.

- **Excel** handled data cleaning, descriptive statistics, and pivot tables for summaries and visual trends.
- **Python** provided automation for aggregation, statistical checks, and visualizations such as revenue and sales comparisons.

This hybrid use ensured both precision and analytical depth.

C. Analysis Process

The analysis covered key performance areas:

- **Production Efficiency:** Measured daily and monthly utilization to identify underperformance caused mainly by power shortages.
- **Cost and Profit:** Computed Total Cost and Gross Profit to evaluate cost control and profitability trends.
- **Sales and Revenue:** Grouped data monthly to detect seasonal sales variations, particularly during the monsoon.
- **Credit and Cash Flow:** Analyzed cash vs. credit ratios and delays in payments using charts for financial insight.
- **Scenario Simulation:** Projected outcomes assuming stable power supply, showing utilization could rise from 42% to 80%, nearly doubling production and profit.

D. Key Equations

Utilization (%) = (Actual Production ÷ Machine Capacity) × 100

Total Cost = Electricity + Labor + Material

Gross Profit = Revenue – Total Cost

Net Profit = Gross Profit – Pending Credit

E. Method Justification

The chosen approach integrates quantitative accuracy with contextual insight. Excel facilitated efficient organization and visualization, while Python ensured robust computation and validation. This blend of descriptive and trend-based analysis effectively captures the operational and financial impact of power instability, seasonal demand, and market competition on IRA Gold's performance.

5 Results and Findings

This section summarizes the main insights from the Excel and Python (Pandas + Matplotlib) analysis of IRA Gold's data from June to August 2025. Each result is backed by visual evidence to support the conclusions. The findings directly address key business challenges, including power instability, seasonal demand shifts, credit reliance, and profitability performance.

A. Month-wise Gross Profit Margin (%)

The month-wise profit margin graph shows that IRA Gold maintained a steady gross profit margin of around 16–17% across all three months. Despite minor sales fluctuations, consistent margins reflect strong cost control, efficient operations, and effective pricing. The findings suggest that growth limitations stem from production capacity rather than financial inefficiency.

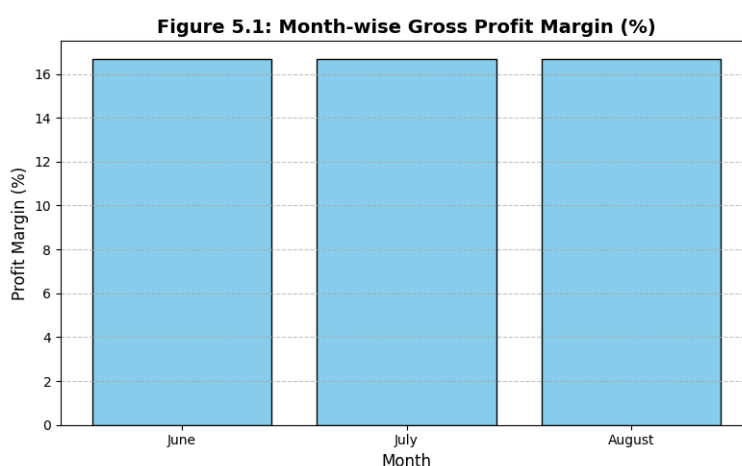


fig 5.1 Monthly Revenue and Profit Trend

B. Average Cost Composition Breakdown

The cost composition pie chart reveals that materials contribute about 80% of total production costs, with electricity and labor forming the remaining 20%. This indicates that profitability depends mainly on raw material pricing and supply stability. Power issues affect production capacity more than expenses, suggesting that bulk material procurement and reliable electricity could significantly enhance efficiency and reduce losses.

Figure 5.2: Average Cost Composition Breakdown

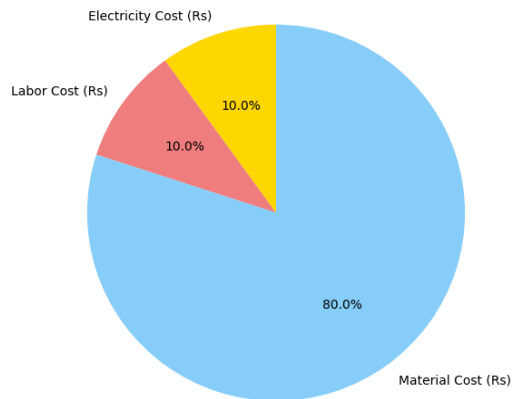


fig 5.2 Average Cost Composition Breakdown

C. Relationship between Utilization and Profitability

The scatterplot shows a clear positive link between machine utilization and daily gross profit. Higher utilization consistently leads to greater profitability, indicating that efficiency, not volume, drives performance. Addressing power interruptions and minimizing downtime could significantly boost profits without expanding capacity, confirming that power issues remain the main constraint on financial growth.

Figure 5.3: Relationship between Utilization and Profitability

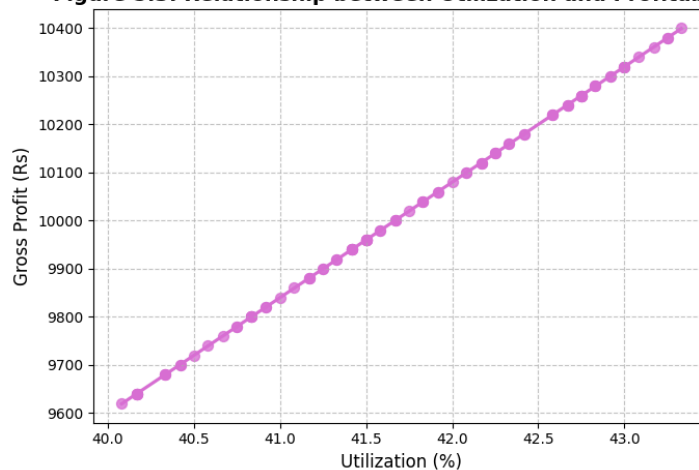


fig 5.3 Relationship between Utilization and Profitability