

# BDM CAPSTONE PROJECT: MID-TERM REPORT



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## **UNDERSTANDING FLUCTUATIONS IN THE PRICE OF STATIONERY GOODS - EXECUTIVE SUMMARY:**

This report aims to look at the fluctuations in the sale price of stationery goods. The main reasons for the variations in prices include – fluctuations in cost price, unrecorded discounts, and different brands of products. The fluctuations are cyclical, with similar lows and highs recorded across 3 months.

The dataset used for this analysis was unfortunately limited to 1 month of B2B transactions, and 3 weeks in 3 separate months for B2C transactions. Still, it provides some useful insights into the seasonality of prices. A larger dataset will be used for further longitudinal analysis.

All of the primary data was in the form of paper records, which were manually put into Excel. Appropriate measures were taken to clean the data such as item consolidation and outlier identification.

Finally, an interesting insight is that from a similar number of transactions, the stationary generates about 37% less revenue from its B2C transactions than it does from its B2B transactions. However, the number of B2C transactions is also considerably greater, leading to greater overall revenue generation.

## **PROOF OF ORIGINALITY OF DATA:**

### **Images**

[https://drive.google.com/drive/folders/1TWGUoqK1h\\_jlSIVhMXJfRB3wORfRCws7?usp=sharing](https://drive.google.com/drive/folders/1TWGUoqK1h_jlSIVhMXJfRB3wORfRCws7?usp=sharing)

### **Video Recording of Interaction with Business Owner**

<https://drive.google.com/drive/folders/1BQ854jOuOcccZF5lOUFZegWgRjuWVJ2Y?usp=sharing>

### **Primary Data**

<https://drive.google.com/drive/folders/1RilOG0UaFhxnHwpzVaTw3C6WLkMQ4Avt?usp=sharing>

### **Minutes of Meeting**

Throughout the months of Jan-April, I have had 7 one-on-one interactions with the owner of B.C.Bros. Following is a brief description of what was discussed in each meeting.

- **Meeting 1 [20/1/23]:** Met with the business owner and provided him with an overview of the project. Got information about the history of the shop, the type of customers it deals with, the number of employees, type of data it records.
- **Meeting 2 [24/1/23]:** Discussed the problems that the business was facing – reduction of sales post-covid, the need to cut down costs, and dominance of online shopping. The owner wanted to know if there was a way to increase sales and/or reduce expenses.
- **Meeting 3 [3/2/23]:** Data collection begins. The owner was reluctant to give data regarding the cost of items and shop inventory. Hence, I decided to collect data on sales instead.
- **Meeting 4 [3/2/23], Meeting 5 [10/3/23]:** More data collection in the form of GST tax invoices and cash memos.
- **Meeting 6 [29/3/23]:** Discussed where the business gets its inventory from. The business sources its goods from Guwahati, Kolkata, Delhi, Bombay, and Chennai. About 80% of these suppliers interact directly with the business, while the remainder deal with the business through intermediaries within the state.
- **Meeting 7 [6/4/23]:** Talked with the owner about potential missing data. Recorded a video and obtained a letter from the business for proof of the originality of the data.

## **METADATA AND DESCRIPTIVE ANALYSIS:**

### **Metadata**

- *For B2B transactions:*
  - INVOICE NO. – Unique ID for each receipt.
  - DATE – The date that the items were sold.
  - DELIVERY NOTE DATE – The date on which the goods were dispatched from the shop. The invoices for such transactions were prepared at a later date.
  - CUSTOMER – Name of the customer/business to whom the goods were sold.
  - ITEM – Name of the sold item.
  - HSN/SAC – Codes used for the classification of goods and services under GST.
  - RATE (INCL. TAX) – Price of 1 unit of an item (including tax).
  - RATE – Price of 1 unit of an item (excluding tax).
  - QUANTITY – Quantity of an item that was sold to a customer in one transaction.
  - AMOUNT – Revenue generated from the sale of an item. This is excluding tax.  
Calculated as  $QUANTITY \times UNIT PRICE$ .
  - SGST RATE – The rate at which SGST is charged on the item.
  - SGST – Amount of SGST charged on the item.
  - CGST RATE – The rate at which CGST is charged on the item.
  - CGST – Amount of CGST charged on the item.
  - AMOUNT (INCL. TAX + ROUND OFF) – Revenue generated from the sale of an item. This is including tax.  
Calculated as  $QUANTITY \times RATE (INCL. TAX)$
- *For B2C transactions:*
  - ID – Unique ID for each transaction/receipt.
  - DATE – The date that the items were sold.
  - PRODUCT – Name of the sold item.
  - AMOUNT – Revenue generated from the sale of an item. Calculated as  $QUANTITY \times UNIT PRICE$ .
  - QUANTITY – Quantity of an item that was sold to a customer in one transaction.
  - UNIT PRICE – Price of 1 unit of an item (including tax).

## Descriptive Statistics:

Statistical data for the top 10(based on item count, contribution to revenue, etc.) items has been listed. The whole list can be seen in the Excel workbook linked at the bottom.

### B2B Transactions:

Date Range: Oct-2022

Number of unique items: 160

Number of transactions: 90

Number of customers: 61

Total Revenue Generated: ₹ 303,487.81

(a) Minimum, Average, Median, and Maximum of the UNIT PRICE of each item. (Sorted on Item Count)

Row Labels	Min. Unit Rate	Average Unit Rate	Median Unit Rate	Max. Unit Rate	Count of ITEM
A4 PAPER	₹ 240.00	₹ 279.83	₹ 270.00	₹ 350.00	30
BALL PEN - PACKET	₹ 60.00	₹ 80.29	₹ 78.00	₹ 120.00	14
PEN	₹ 3.20	₹ 198.01	₹ 116.00	₹ 616.00	10
BALL PEN	₹ 4.00	₹ 9.68	₹ 8.50	₹ 20.00	9
STAPLER PIN	₹ 7.50	₹ 17.93	₹ 9.50	₹ 42.80	8
REGISTERS	₹ 41.25	₹ 104.46	₹ 86.25	₹ 247.50	7
NOTE BOOK	₹ 27.00	₹ 102.39	₹ 90.00	₹ 221.00	7
FS XEROX PAPER	₹ 320.00	₹ 338.00	₹ 340.00	₹ 350.00	5
88A TONER	₹ 650.00	₹ 786.00	₹ 800.00	₹ 950.00	5
STAPLER MACHINE	₹ 58.50	₹ 78.00	₹ 65.00	₹ 120.00	5

Figure 1: B2B Unit Price

(b) Minimum, Average, Maximum and Standard Deviation of the QUANTITY of each item sold in a single transaction. (Sorted on Total Quantity Sold)

Row Labels	Minimum	Average	Maximum	Standard Deviation	Total Quantity Sold
BALL PEN	1	136.3333333	400	128.4350246	1227
ENVELOPE 9X4	1000	1000	1000	0	1000
CONFERENCE PAD	150	230	300	61.64414003	690
PEN	1	60.8	300	93.83261693	608
BUTTON FILE	12	136.75	235	79.94802999	547
NOTEPAD	90	108.8	150	21.11302915	544
9X4 BROWN ENVELOPES	50	166.6666667	250	84.98365856	500
A4 PAPER	1	11.5	40	10.4427008	345
ENVELOPE 7X5	250	250	250	0	250
ENVELOPE	250	250	250	0	250

Figure 2: B2B Quantity Sold

(c) Minimum, Average, Median, Maximum, and Standard Deviation of the AMOUNT of revenue contributed by each item in a single transaction. (Sorted on Total Contribution to Revenue in the entire month).

Row Labels	Minimum	Average	Median	Maximum	StdDevp of AMOUNT	Total Contribution to Revenue
A4 PAPER	₹ 285.71	₹ 2,771.93	₹ 2,254.45	₹ 9,642.80	₹ 2,421.46	27.40%
BUTTON FILE	₹ 228.84	₹ 6,322.45	₹ 3,369.00	₹ 18,322.95	₹ 7,047.38	8.33%
WHITE BOARD 6*4	₹ 8,389.83	₹ 8,389.83	₹ 8,389.83	₹ 8,389.83	₹ -	5.53%
FS XEROX PAPER	₹ 883.92	₹ 2,064.27	₹ 1,250.00	₹ 5,714.20	₹ 1,841.78	3.40%
88A TONER	₹ 677.97	₹ 1,767.80	₹ 805.08	₹ 3,305.10	₹ 1,255.84	2.91%
BALL PEN	₹ 8.47	₹ 878.67	₹ 542.40	₹ 2,644.00	₹ 811.84	2.61%
CONFERENCE PAD	₹ 1,831.20	₹ 2,092.90	₹ 2,160.00	₹ 2,287.50	₹ 192.23	2.07%
REGISTERS	₹ 114.30	₹ 892.61	₹ 562.56	₹ 2,209.80	₹ 758.51	2.06%
NOTEPAD	₹ 636.00	₹ 1,185.84	₹ 1,220.40	₹ 1,762.80	₹ 379.24	1.95%
NOTICE BOARD 6X4	₹ 5,593.22	₹ 5,593.22	₹ 5,593.22	₹ 5,593.22	₹ -	1.84%

Figure 3: B2B Amount Generated

#### B2C Transactions:

Date Range: (25/7/22 – 3/8/22), (11/8/22 – 18/8/22), and (14/10/22 – 21/10/22).

Number of unique products: 162(July), 149(August), 173(October).

Number of transactions: 87(July), 90(August), 89(October).

Total Revenue Generated: ₹ 160,541.00(July), ₹ 188,051.00(August), ₹ 192,035.00(October).

(a) Minimum, Average, Median, and Maximum of the UNIT PRICE of each item. (Sorted on Item Count)

#### July

Row Labels	Min of Unit Price	Average of Unit Price3	Median	Max of Unit Price2	Count of Product
A4 PAPER	230	257.5	260	295	14
PHOTO PAPER	90	180.7692308	130	320	13
STAPLER PIN	9	271.3636364	200	561	11
BUTTON FILE	10	29.45454545	28	105	11
PENCIL - PACKET	25	50.83333333	50	70	9
PEN	3.8	34.56875	33.75	78	8
PEN - PACKET	78	122	78	320	6
BALL PEN	4.5	35.25	13.5	125	6
REGISTER	40	85.11111111	58.16667	160	6
COVER FILE	45	62.33333333	57	100	6

Figure 4: B2C July - Unit Price

## August

Row Labels	Minimum	Average	Median	Maximum	Count of Product
A4 PAPER	₹ 245.00	₹ 281.84	₹ 275.00	₹ 365.00	19
BALL PEN	₹ 6.50	₹ 10.34	₹ 10.00	₹ 16.00	9
BUTTON FILE	₹ 10.00	₹ 24.44	₹ 29.00	₹ 40.00	9
ENVELOPES	₹ 1.20	₹ 60.28	₹ 15.00	₹ 220.00	9
PEN	₹ 5.00	₹ 57.50	₹ 62.50	₹ 100.00	6
REGISTER	₹ 48.00	₹ 98.92	₹ 100.25	₹ 150.00	6
STAPLER PIN	₹ 80.00	₹ 298.00	₹ 180.00	₹ 585.00	5
NOTEBOOK	₹ 18.00	₹ 45.49	₹ 45.00	₹ 63.75	5
CALCULATOR	₹ 354.00	₹ 461.00	₹ 500.00	₹ 580.00	5
STICK FILE	₹ 11.50	₹ 23.88	₹ 17.50	₹ 49.00	4

Figure 5: B2C August - Unit Price

## October

Row Labels	Minimum	Average	Median	Maximum	Count of Product
A4 PAPER	250	276.25	277.5	300	12
PEN	3.7	171.025	78	400	8
SELCOASE	115	115	115	115	6
REGISTER	48	122.7916667	97.5	250	6
ERASER	3.75	5.828703704	5	11.22222222	6
STICK FILE	9.75	52.79166667	49.5	85	6
PENCIL - PACKET	37.5	50.5	50	60	5
GEL PEN	18	58.8	78	80	5
R/ PROTECTOR	30	30	30	30	5
BUTTON FILE	10	24.3	22.5	40	5

Figure 6: B2C October - Unit Price

- (b) Minimum, Average, Median, Maximum, and Standard Deviation of the AMOUNT of revenue contributed by each item in a single transaction. The total quantity of the item sold is also shown. (Sorted on Total Contribution to Revenue in the entire month).

## July

Row Labels	Minimum	Average	Median	Maximum	Standard Deviation	Total Quantity Sold	% Contribution to Revenue
BUTTON FILE	₹ 33.00	₹ 1,888.82	₹ 440.00	₹ 14,700.00	₹ 4,081.62	₹ 469.00	13%
A4 PAPER - CASE	₹ 2,300.00	₹ 3,000.00	₹ 2,450.00	₹ 4,800.00	₹ 1,041.63	₹ 5.00	7%
A4 PAPER	₹ 260.00	₹ 770.36	₹ 260.00	₹ 2,400.00	₹ 846.66	₹ 44.00	7%
PEN	₹ 30.00	₹ 910.75	₹ 160.50	₹ 6,000.00	₹ 1,929.86	₹ 277.00	5%
PHOTO PAPER	₹ 90.00	₹ 350.77	₹ 270.00	₹ 900.00	₹ 230.93	₹ 32.00	3%
88A TONER	₹ 900.00	₹ 2,050.00	₹ 2,050.00	₹ 3,200.00	₹ 1,150.00	₹ 5.00	3%
F/S PAPER	₹ 320.00	₹ 800.00	₹ 610.00	₹ 1,450.00	₹ 483.61	₹ 14.00	2%
F/S PAPER - CASE	₹ 3,950.00	₹ 3,950.00	₹ 3,950.00	₹ 3,950.00	₹ -	₹ 1.00	2%
STAPLER	₹ 237.00	₹ 658.33	₹ 406.50	₹ 1,775.00	₹ 531.63	₹ 29.00	2%
COLOURED BOARD	₹ 520.00	₹ 1,273.33	₹ 900.00	₹ 2,400.00	₹ 811.64	₹ 70.00	2%

Figure 7: B2C July - Amount Generated

## August

Row Labels	Minimum	Average	Median	Maximum	Standard Deviation	Total Quantity Sold	% Contribution of Revenue
A4 PAPER	₹ 245.00	₹ 1,187.63	₹ 580.00	₹ 6,240.00	₹ 1,365.44	82	12.00%
F/S PAPER	₹ 320.00	₹ 5,023.33	₹ 750.00	₹ 14,000.00	₹ 6,349.89	43	8.01%
CONNECTOR PEN	₹ 9,900.00	₹ 9,900.00	₹ 9,900.00	₹ 9,900.00	₹ -	33	5.26%
DISTA PAPER : RULED	₹ 9,800.00	₹ 9,800.00	₹ 9,800.00	₹ 9,800.00	₹ -	35	5.21%
BOND STAND	₹ 7,400.00	₹ 7,400.00	₹ 7,400.00	₹ 7,400.00	₹ -	4	3.94%
NOTICE BOARD	₹ 750.00	₹ 2,775.00	₹ 2,775.00	₹ 4,800.00	₹ 2,025.00	2	2.95%
EXAM PAPER	₹ 5,300.00	₹ 5,300.00	₹ 5,300.00	₹ 5,300.00	₹ -	20	2.82%
GEOMETRY BOX	₹ 270.00	₹ 1,228.75	₹ 372.50	₹ 3,900.00	₹ 1,542.99	43	2.61%
DISTA PAPER : PLAIN	₹ 4,125.00	₹ 4,125.00	₹ 4,125.00	₹ 4,125.00	₹ -	15	2.19%
BUTTON FILE	₹ 80.00	₹ 414.67	₹ 348.00	₹ 1,000.00	₹ 264.14	184	1.98%

Figure 8: B2C August - Amount Generated

## October

Row Labels	Minimum	Average	Median	Maximum	Standard Deviation	Total Quantity Sold	% Contribution to Revenue
A4 PAPER	₹ 280.00	₹ 1,660.83	₹ 1,260.00	₹ 5,400.00	₹ 1,360.50	₹ 72.00	10.38%
BUTTON FILE	₹ 225.00	₹ 1,865.00	₹ 780.00	₹ 7,200.00	₹ 2,677.70	₹ 358.00	4.86%
R RWIFEFER	₹ 8,700.00	₹ 8,700.00	₹ 8,700.00	₹ 8,700.00	₹ -	₹ 30.00	4.53%
F/S PAPER	₹ 330.00	₹ 2,095.00	₹ 1,400.00	₹ 5,250.00	₹ 2,014.96	₹ 24.00	4.36%
GOS ROLL	₹ 7,200.00	₹ 7,200.00	₹ 7,200.00	₹ 7,200.00	₹ -	₹ 360.00	3.75%
SHARP 6200	₹ 5,600.00	₹ 5,600.00	₹ 5,600.00	₹ 5,600.00	₹ -	₹ 1.00	2.92%
A4 PAPER - CASE	₹ 2,600.00	₹ 2,650.00	₹ 2,650.00	₹ 2,700.00	₹ 50.00	₹ 2.00	2.76%
SPIRAL BINDING MACHINE	₹ 4,960.00	₹ 4,960.00	₹ 4,960.00	₹ 4,960.00	₹ -	₹ 1.00	2.58%
GEOMETRY BOX	₹ 250.00	₹ 1,091.25	₹ 400.00	₹ 3,315.00	₹ 1,285.34	₹ 33.00	2.27%
DISTILLER	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ -	₹ 10.00	2.08%

Figure 9: B2C October - Amount Generated

[Link To Workbook](#)



## **DETAILED EXPLANATION OF ANALYSIS PROCESS/METHOD:**

### **Data Collection**

The sales data was in the form of GST tax invoices for B2B transactions, and cash memos for B2C transactions. All of these paper records were manually put into Excel to enable further analysis.

B2B data has been collected for the whole of October-2022.

B2C data has been collected for the following periods: (25/7/22 – 3/8/22), (11/8/22 – 18/8/22), and (14/10/22 – 21/10/22). More data collection is still underway.

### **Data Clean-up**

**Missing Dates:** Some pages of the cash memos lacked a date. In such cases, the missing date was filled from the adjacent pages, front-to-back approach.

J-21	26-07-22	W.C CAKE	₹ 750.00	10.00	₹ 75.00
J-22	-	BADGE COVER AND LACE	₹ 250.00	21.00	₹ 11.90
J-23	27-07-22	WHITEBOARD MARKER	₹ 1,680.00	6.00	₹ 280.00



J-21	26-07-22	W.C CAKE	₹ 750.00	10.00	₹ 75.00
J-22	26-07-22	BADGE COVER AND LACE	₹ 250.00	21.00	₹ 11.90
J-23	27-07-22	WHITEBOARD MARKER	₹ 1,680.00	6.00	₹ 280.00

*Figure 10: Imputing Missing Data*

**Item Consolidation:** There were multiple items with similar names and similar prices. Such items were grouped under the same head whenever appropriate. Brand names were separated from item names whenever possible.

**Outliers:** Outliers were flagged based on their Unit Price. The major cause of these outliers was that there was often a lack of info regarding what 1 unit of an item represented (1 Pencil OR 1 Packet of Pencils), and brand differentiation. Identifiers for what 1 unit represented were placed whenever possible.

**Illegible Item Names:** A minor portion of the item names in the cash memos were illegible. These items were marked and included as part of the dataset since they can still be useful in plotting the trends in revenue.

**Formatting:** General formatting fixes were done such as the trimming of extra white spaces.

## **RESULTS AND FINDINGS:**

- There is considerable variation in the price of goods, even in as short of a period as a week. There are three main reasons for this:
  - **Fluctuations in Cost Price:** According to the owner, the cost price of paper goods fluctuates almost daily. As such, they have to adjust their sale prices in reaction to the market forces.
  - **Unrecorded Discounts:** During my visits, I observed the owner giving cash discounts to his regular customers. These discounts were not recorded properly in the cash memos and could be a reason for the variation in prices.
  - **Different Brands of Products:** The shop stores a wide range of brands for a lot of its goods. However, these again were not properly recorded in the paper receipts.
- The revenue generated from B2C transactions is a lot higher than expected. It is roughly 63% of the revenue generated from B2B transactions. Though the period for them was only 1 week.