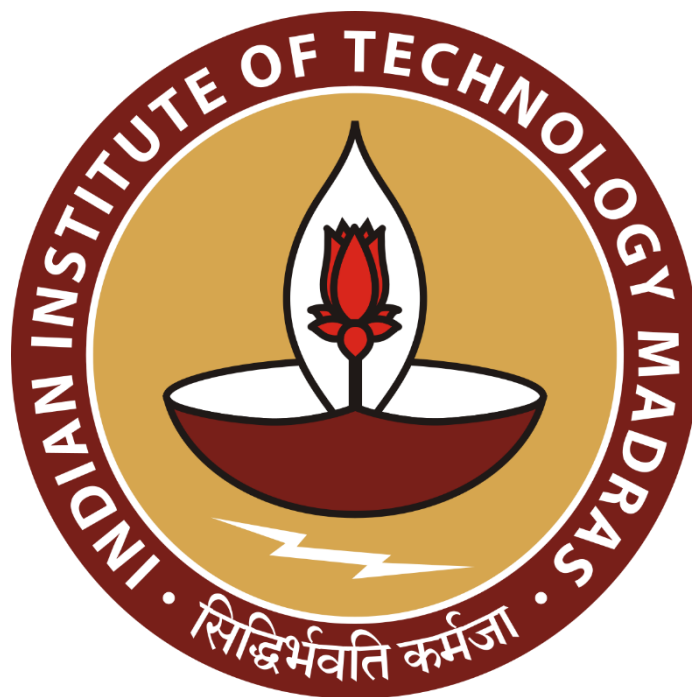# Fluctuations, Foes & Flows: Solving Business Challenges for an Electronics & IT Solutions Provider

A Final report for the BDM capstone Project

Submitted by

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1 Executive Summary

Silicon Systems, a Business-to-Business (B2B), MSME, West Bengal registered and ISO 9001:2015 certified brand, is an IT Solutions, Electronics and Lab Equipment provider for colleges across West Bengal with aspirations to become a one-stop solution for the educational institutions across the state.

Unfortunately, in the recent past, the business has faced certain challenges which have been a roadblock towards achieving its aims and aspirations. First, the business faces the challenge of inventory management due to the extremely fluctuating price and demand nature of the sector of its business. This hinders the business from improving profitability by optimizing inventory holding costs. Second, it faces external challenges due to market competition. New businesses in the market acquire orders by hook or crook which results in potential loss of customers and reduced customer retention of Silicon Systems. Third, the business fails to secure sufficient orders for certain Stock Keeping Units (SKUs) which were introduced in the stock to maintain distinguished Unique Selling Propositions (USPs).

To analyze the business bottlenecks, Sales Data and Customer Data were obtained directly from the business owner, in spreadsheet format, as maintained by the business owner himself. Excel has been used as the primary analysis tool with the help of formulae and pivot tables.

After thorough analysis of the Sales and Customer data provided by Silicon Systems, the shortcomings in inventory planning were identified and properly strategized. Prediction-based inventory management has been introduced to achieve efficiency and minimize losses.

To counter market competition, data analysis was carried out which revealed a decrease in revenues and loss of customers. Customer outreach programs were recommended along with offers and discounts to attract potentially losing customers. Specific sectoral analysis was also performed to strategize customer acquisition techniques for each segment of customer.

To solve the issue of slow-moving items, data was analyzed to identify such items. Existing customers for such orders were also identified. The sectors which were identified as the strength of the business were recommended to be targeted for marketing their slow-moving products via bundled packaging and discounted pricing. Moreover, the slow-moving items were recommended to be offered at discounted rates and freebies to potentially losing customers, solving two issues at the same time.

2   Explanation of Analysis Processes and Methods

2.1   Data Collection

Primary data was collected directly from the business owner of Silicon Systems. There was an initial hesitation regarding the sharing of business data. However, after multiple visits to the business owner's office, a proper explanation of the project work and potential improvements to business bottlenecks as an outcome of the project, the business owner was convinced to share business data. Initially, the data that was expected to be required included Sales Data, Customer Data and Inventory Data. The business owner was able to provide the properly maintained Sales Data as well as Customer Data for the last six months (July 2024 to December 2024) in spreadsheet format itself. The Inventory Data was not provided due to certain business constraints. It was realized that the project can be successfully accomplished with the data provided by the business owner, as per the requirements of the problem statements, also provided by the business owner. Proper consent has been taken from the business owner for the usage of business data for the purpose of the project while maintaining the required degree of confidentiality.

2.2   Data Cleaning and Preprocessing

The Sales and Customer Dataset provided by the business owner of Silicon System, although mentioned in structured format from beforehand itself, required a certain degree of cleaning and preprocessing.

For purchases under the same bill, the spreadsheet that was provided only had the item, quantity, price and amount. The date and bill numbers were kept empty for such entries. This caused null value anomaly in the analysis process. Hence, clear inspection was carried out and the same dates and bill numbers were used to fill the empty cells and null value errors were hence avoided.

For the purpose of trend analysis, the months of purchase of items were extracted from the billed dates in the dataset using the following Excel Formula:

$$= TEXT(A2, "mmmm")$$

The formula was expanded throughout and a new column named "Month" was introduced. This was essential to analyze various trends over a range of six months, as per the data provided.

The Sales Data originally included the specific item names of the Stock Keeping Units (SKUs) sold. This made general analysis more difficult. Hence, after manual inspection as well as discussion with the business owner regarding the products, each SKU was categorized in two ways – one representing the generic product description (like Antivirus, Desktop, Lamp, etc.) and the other representing the category of the product (IT, Electronics, Lab Equipment, Services). This enabled a more general analysis, as per our requirements. Table 1 shows the sample of the categorization.

Item Details	Product	Category
A.C. ELECTRONICS MILIVOLTMETER SES	MULTIVOLTMETER	Lab Equipment
ANNUAL MAINTENANCE SERVICE	SERVICE	Service
ANTI VIRUS	ANTIVIRUS	IT
ANTI VIRUS QUICK HEAL INTERNET SECUR. PR	ANTIVIRUS	IT
ANTI VIRUS QUICK HEAL TOTAL SECURITY	ANTIVIRUS	IT
ASSEMBLED DESKTOP PC	DEKSTOP	IT
BATTERY FOR NOTEBOOK	BATTERY	Electronics
BATTERY FOR UPS	BATTERY	Electronics

Table 1: Categorization of Products

The categorization data was stored in a new sheet named "CATEGORISATION". Next, to import the categories and products in the main Sales Dataset, two new columns – "Product" and "Category of Product" was introduced and filled using the following Excel Formulae:

$$= VLOOKUP(H2, CATEGORISATION! \$A\$2: \$C\$110, 2, FALSE)$$

$$= VLOOKUP(H2, CATEGORISATION! \$A\$2: \$C\$110, 3, FALSE)$$

The Customer Dataset contains the Industry and Sector of the customers. To import such information into the main Sales Dataset, the following Excel Formulae were used:

$$= VLOOKUP(D2, 'PROCESSED\ CUSTOMER\ DATA'! \$A\$1: \$G\$21, 2, FALSE)$$

$$= VLOOKUP(D2, 'PROCESSED\ CUSTOMER\ DATA'! \$A\$1: \$G\$21, 3, FALSE)$$

To avoid any leading or trailing spaces wherever necessary, the following Excel Formula was used and expanded accordingly:

$$= TRIM(D1)$$

2.3 Managing Market Fluctuation

As reported by Mr. Atanu Chowdhury, the business owner of Silicon Systems, the business has been facing the issue of inefficient inventory management due to the market fluctuations in their product market fit. The data provided has enabled the proper analysis of sales trends in identifying this business challenge and allowed the provision of relevant recommendations that could potentially solve the issue.

First, it is essential to identify the fluctuations of the business across the categories of products sold. As categorized earlier, primarily four types of products are sold by the business – Electronics, IT, Lab Equipment and Services. Since Services do not contribute to the inventory, its analysis has been omitted for the purpose of this problem statement. Table 2 shows a Pivot Table constructed to record the monthly sales of categories of products in terms of units sold. The Pivot Table was constructed by direct selection of the Sales Data in Excel and then by choosing the Months as Rows, Categories as Columns and Sum of Quantity as the Value.

Table 3 shows a Pivot Table constructed to record the monthly sales of categories of products in terms of revenue generated. The Pivot Table was constructed by direct selection of the Sales Data in Excel and then by choosing the Months as Rows, Categories as Columns and Sum of Amount as the Value.

Table 2 and 3 have been used to plot line-charts, that represents the fluctuations in sales of each category of product. The line-charts have been shown in Fig 1, 2, 3, 4, 5 and 6. Line charts were chosen based on their efficiency in representing temporal patterns and directional shifts.

By visualizing sales trends using line charts separately for each category, the variations in demand patterns specific to each segment were captured, rather than relying on aggregated figures that could obscure meaningful category-level dynamics.

Analyzing sales and revenue side by side allowed for a more nuanced understanding of demand behavior, not only in terms of quantity but also in terms of value, which may reflect factors such as pricing changes, customer preferences, or high-value item purchases. This dual perspective is critical in volatile markets, where fluctuations may differ significantly across product categories. Once volatile categories are identified, the analysis shall be fine-tuned further to identify the specific products that show certain high volatility trends.

Table 4 shows the Pivot Table of monthly sales of each product sold by Silicon Systems in terms of units sold. Table 4 has been used to calculate the standard deviation in each product's sell volume (month on month).

Let x1, x2, x3, x4, x5 and x6 be the unit of sales in each month from July to December 2024. Then:

$$\sigma = \sqrt{\frac{1}{6}\sum_{i=1}^{6}(x_i - \mu)^2}$$

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where, σ=Standard Deviation in Unit Sales across months

μ=Mean Sales across months

$$\mu = \frac{1}{6} \sum_{i=1}^{6} x_i$$

The following Excel Formula was used to calculate the standard deviation across months for each item and was extended for all items:

$$= STDEV.P(B65:G65)$$

where, B65 to G65 stores the monthly sales data for an item.

Once the standard deviation has been calculated, it is essential to calculate benchmarks for high and low volatility products. Quartiles for the standard deviation have been calculated using the following excel formulae

$$First\ Quartile = QUARTILE.INC(H65:H93,1)$$

$$Second\ Quartile = QUARTILE.INC(H65:H93,2)$$

$$Third\ Quartile = QUARTILE.INC(H65:H93,3)$$

where, H65 to H93 stores the standard deviations for each item

The quartiles have been utilized to assign the volatility levels for each product, as shown in Table 5. The products which were found to have standard deviation below the first quartile were segmented as "Stable", ones which has standard deviation between first and second quartile were segmented as "Moderate", and the rest were segmented "Volatile", as shown in Table 6.

The following Excel Formula has been used for this purpose:

$$= IF(H65 \leq \$M\$65, \text{Stable}, IF(H65 \leq \$M\$66, \text{Moderate}, \text{Volatile}))$$

where H65 is the product's standard deviation, M65 stores the first quartile and M66 stores the second quartile. The above strategy enabled a data-driven segmentation of items based on demand consistency, allowing more focused inventory decisions for high-risk products. The business owner mentioned that the current operation method of the business is receiving orders of specific quantities and supplying them according to the orders, instead of stocking the inventory, which slows down the process of sales and creates a lag between the demand and the supply, causing business losses. The data gathered and the Pivot Table constructed enables the calculation of a benchmark stock for each product using average and median sales across months.

From Pivot Table in Table 4, the average number of units sold of each item (up to closest integer) was calculated using and expanding the following Excel Formula across all rows:

$$= AVERAGE(B75:G75)$$

Similarly, median units sold were calculated using the following Excel Formula:

$$= MEDIAN(B75:G75)$$

where, B75 to G75 stores the unit sales of an item for the six months.

Skewness for the sales data was calculated as follows:

$$= SKEW(B75:G75)$$

A skewness of close to zero could confirm reliance on mean, whereas strongly skewed data either on the left (negative) or on the right (positive) would indicate median as better approximation.

The relative difference between the mean and the median was observed as follows:

$$= ABS(H75 - I75)/H75$$

where, H75 is the mean and I75 is the median of sales units for a product. The formulae have been extended for all products.

It was observed that ~50% of the relative difference was below 15% and the rest above it. Hence, considering 15% as a benchmark, the weighted prediction of sales has been made using the following formula:

$$= IF(ABS(H75 - I75) < 0.15 * H75, H75, I75)$$

which implies, considering mean as the prediction if the relative difference between mean and median is below 15% and median otherwise. This approach balances accuracy and robustness in predicting likely stock requirements, as has been represented in Table 7.

2.4 Coping with Market Competition

The business owner mentioned that market competition was resulting in loss of customers and was unable to find solutions for. The data provided was used to do the necessary analysis and provide potential relief to the same.

First, two Pivot Tables, as shown in Table 8 and 9, were constructed to note the monthly sales in terms of units sold and revenue generated. These two Pivot tables allowed the generation of line charts to represent this data. Trend lines were introduced in the line charts that revealed whether there was a massive hit on the sales or the revenue from the business due to market competition over the months, as shown in Fig. 7 and 8.

Next, Pivot Tables in Table 10 and 11 were constructed to observe the sectoral performance of the business (in terms of units sold and revenue). An inspection was conducted to assess whether there is any significant decrease or loss of business across

the industries in which the business operates. Grouped Bar charts were constructed with the industry sectors in x-axis and sales in y-axis. The colour codes represent the bars for each month. This helped in analyzing whether Silicon Systems has seen a hit to any specific industry of its product market fit, as shown in Fig. 9 and 10.

Following the industry analysis, each customer was individually inspected. Each customer's historical purchase history from the Customer Dataset was compared with their purchase history for the last six months to check whether any customer has potentially reduced their purchases from Silicon Systems. Table 12 was constructed with the count of purchases (in terms of bills generated) in the last six months and the total number of purchases (in terms of bills generated) in history. A column was introduced subtracting the last six months' numbers from the all the time numbers to allow the construction of 100% stacked column charts. The following formula has been used and extended across all products for this purpose:

$$= D95 - B95$$

where D95 is the sum of total purchases in history and B95 is the number of purchases in the last six months.

Using 100% stacked column charts on this data table, the ratios of each customer's purchases in the last six months were compared with their all-time purchases. This enabled the ability to understand whether there has been an increase, decrease or stability in a customer's purchase trend, as shown in Fig 11.

For a specific quantitative study of each individual customer and their purchasing trends, the slope of the linear regression line that best fits the six months purchasing data of each customer was calculated and analyzed from Table 13 and 14.

A simple linear regression line is of the form:

$$y = mx + c$$

where, y = units sold in a month,

x = numerical representation of months (July=7, August=8 and so on)

m = slope of the regression line

c = y-intercept of the regression line

The slop is given by:

$$m = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sum(x_i - \bar{x})^2}$$

where, x_i is the numerical representation of each month

$\bar{x}$ is the mean of numerical representation of each month

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y_i is the sales quantity in each month

$\bar{y}$ is the mean of sales quantity in each month

The above slope calculation was automated and extended using the following Excel Formula:

$$= INDEX(LINEST(B46:G46, \$B\$44:\$G\$44),1)$$

The same was also formulated for revenue as well. A negative slope indicated declining engagement, while a positive slope suggested retention or growth. This allowed a data-backed evaluation of customer stability amid competitive pressure, as shown in Table 15 and 16.

Essentially, a table was created to classify customers as loyal – good amount of purchase recently as well as in the past, leveraged – somewhat active customer, and lost – lack of purchases recently compared to the past, as shown in Table 17.

This classification helps in identifying the customers the business is potentially about to lose due to market competition and strategize revival plans accordingly.

2.5 Addressing Slow-Moving Goods

A major issue faced by Silicon Systems is its inability to find a solution for its slow-moving products – the ones for which enough orders have not been received. This clogs certain SKUs of their product market and prevents the business from introducing Unique Selling Propositions (USPs).

Pivot Table in Table 18 enables us to identify the products as well as the specific SKUs for which the business has found a lack of enough orders, as expected or aimed for.

The unit of sales data was utilized to find out the quartiles of sales. Quartiles of sales units have been calculated as follows:

$$First\ Quartile = QUARTILE.INC(H3:H31,1)$$
$$Second\ Quartile = QUARTILE.INC(H3:H31,2)$$
$$Third\ Quartile = QUARTILE.INC(H3:H31,3)$$

where, H3 to H31 stores the total number of units sold of each product.

Each product was assigned the labels "Slow Moving", "Moderate" and "Fast Moving" according to the following formula:

$$= IF(H3 <= \$S\$3, "Slow\ Moving", IF(H3 <= \$S\$4, "Average", "Fast\ Moving"))$$

where S3 stores the first quartile of unit sales and S4 stores the second quartile of unit sales. The quartile data is represented in Table 19.

According to this formula, if unit of sales is up to the first quartile of unit sales, the product is considered "Slow Moving", if it is up to the second quartile of unit sales, the product is considered "Average", otherwise it is considered "Fast Moving". This segmentation is essential to identify the slow-moving products in the first place. The segmentation is noted in Table 20.

Using certain qualitative ideation obtained by analyzing the business and communication with the business owner, the industries in which each "Slow Moving" product was a market fit was identified. Table 21 lists the "Slow Moving" items and their product market fits. This was necessary to identify the industry where Silicon Systems could potentially market their clogged products.

A new column named "Mobility" was introduced in the original processed Sales Data. Now with the use of this data, a Pivot Table was constructed as shown in Table 22. It lists the customers who purchased the slow-moving products and their quantities. This helps with understanding and further recommending the actionable strategies that can be adopted to increase the sales of such clogged items.

A Pivot Table was also constructed as shown in Table 23 and 24 to identify the Sales and Revenue Share of Silicon Systems across industries. A pie chart was constructed based on this data to identify the percentages of shares each industry had for the business, as shown in Fig. 12 and 13. This enabled the identification of a strong customer base for Silicon Systems and potential market for their slow-moving items.

3 Results and Findings

3.1 Analyzing Market Fluctuations

The Monthly Sales in terms of Quantity of Sales across Categories of Products is tabulated in Table 2.

Pivot Table For Monthly Sales Quantity	Categories				
Months	Electronics	IT	Lab Equipment	Service	Grand Total
July		115	550	155	30	850
August		117	628	260	0	1005
September		103	620	81	61	865
October		77	491	147	32	747
November		57	974	223	3	1257
December		272	1201	132	59	1664
Grand Total		741	4464	998	185	6388

Table 2: Pivot Table for Monthly Sales Quantity

As observed in Table 2, there are certain variations in the data from month to month across the categories. It is essential to plot the line chart based on this data to reveal the temporal trends in the data. The line chart is plotted in Fig. 1,2 and 3.

Pivot Table For Monthly Revenue	Categories						
Months	Electronics	IT		Lab Equipment	Service		Grand Total
July	₹4,06,999.32	₹25,17,064.76		₹4,95,131.67	₹57,950.00		₹34,77,145.75
August	₹43,144.12	₹41,82,795.59		₹3,09,816.06	₹0.00		₹45,35,755.77
September	₹89,280.00	₹49,42,379.87		₹47,423.41	₹61,422.90		₹51,40,506.18
October	₹27,780.00	₹14,74,956.28		₹11,785.63	₹15,623.98		₹15,30,145.89
November	₹35,819.82	₹33,06,197.00		₹1,29,376.67	₹4,500.00		₹34,75,893.49
December	₹1,05,683.84	₹41,15,567.83		₹5,668.06	₹64,849.04		₹42,91,768.77
Grand Total	₹7,08,707.10	₹2,05,38,961.33		₹9,99,201.50	₹2,04,345.92		₹2,24,51,215.85

Table 3: Pivot Table for Monthly Sales Revenue

Similarly, a data table is also constructed for revenue as well in Table 3. Line chart for the same is visible in Fig. 4,5 and 6.
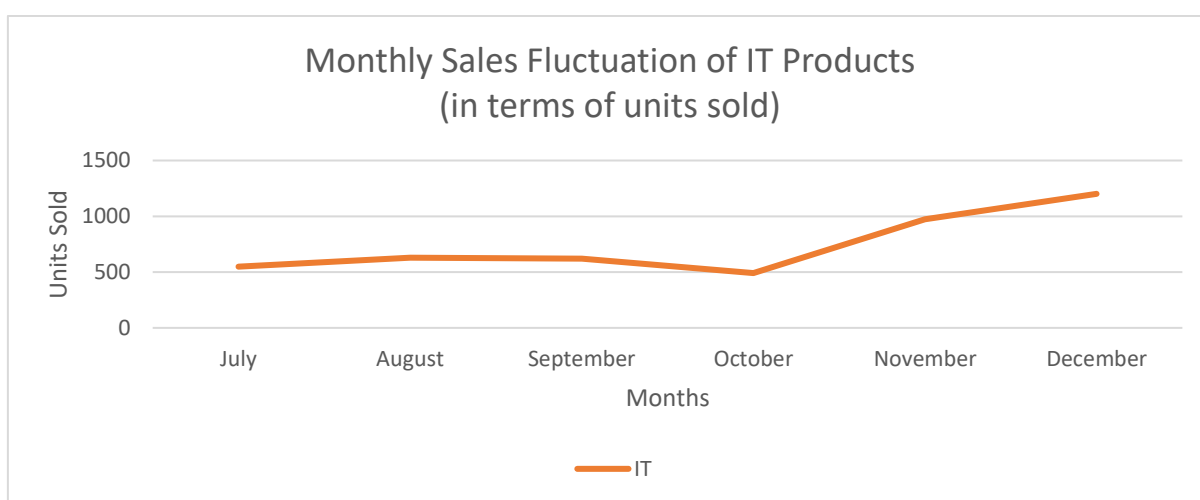

Fig. 1: Monthly Sales Trend of IT Products

Fig.1 reveals there has been a consistency in the sales of IT Products from the month of July to October, beyond which there is a sharp rise in sales. This indicates that the business needs to be cautious about their rising demand in IT products and prepare their inventory accordingly for ready sales to improve efficiency.
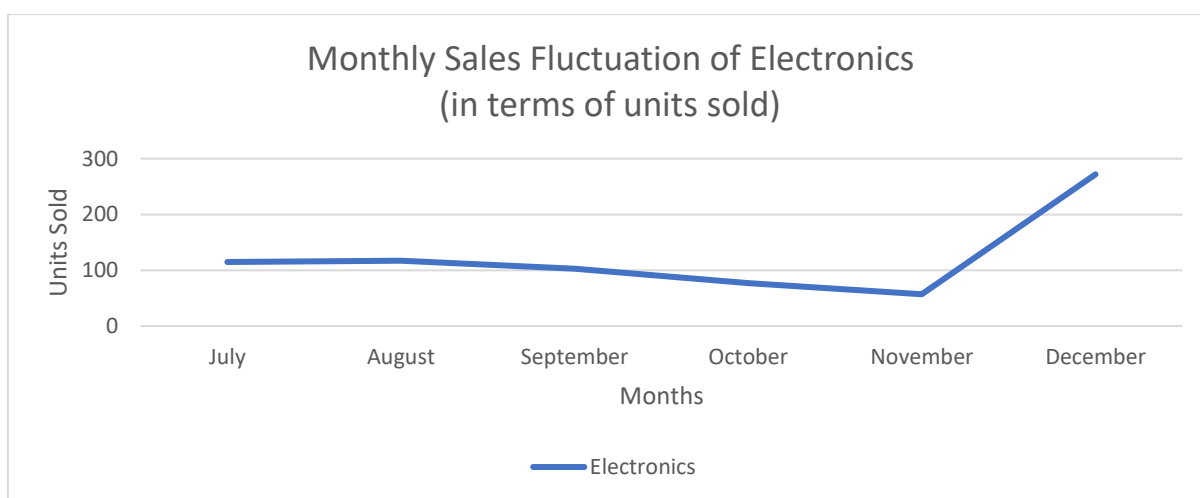

Fig. 2: Monthly Sales Trend of Electronic Products

Fig. 2 shows that the sales of electronic products have been quite stable for majority of the months. The month of December lies as an outlier in the data with a sharp rise from its preceding months.
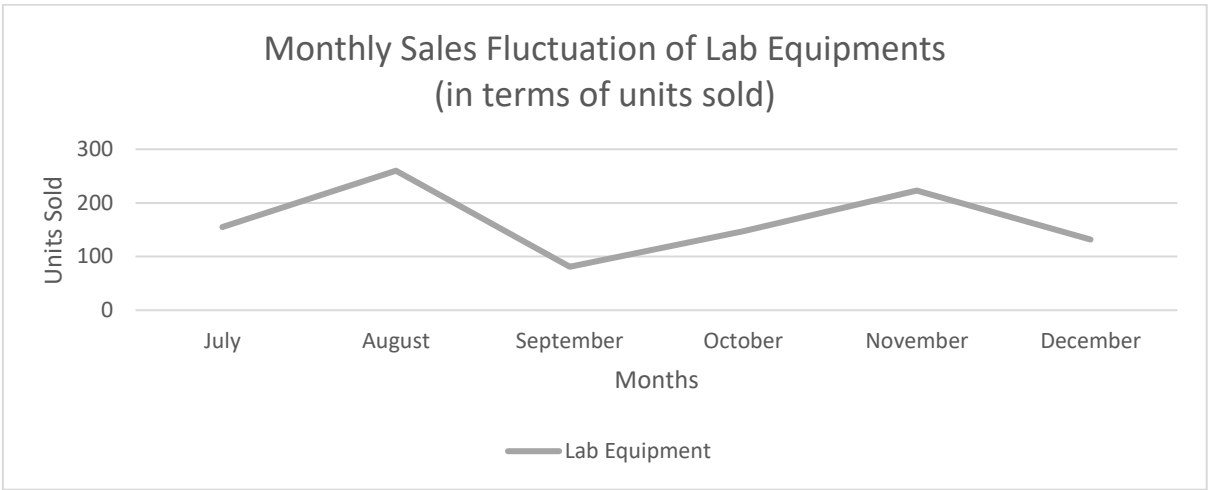

Fig. 3: Monthly Sales Trend of Lab Equipment

Fig. 3 is a testimony to the fact that Lab Equipment has seen a very volatile fluctuation across the months. Inventory management for such items is, hence, difficult and needs utmost care from the business end to ensure loss management and efficiency trade-off.
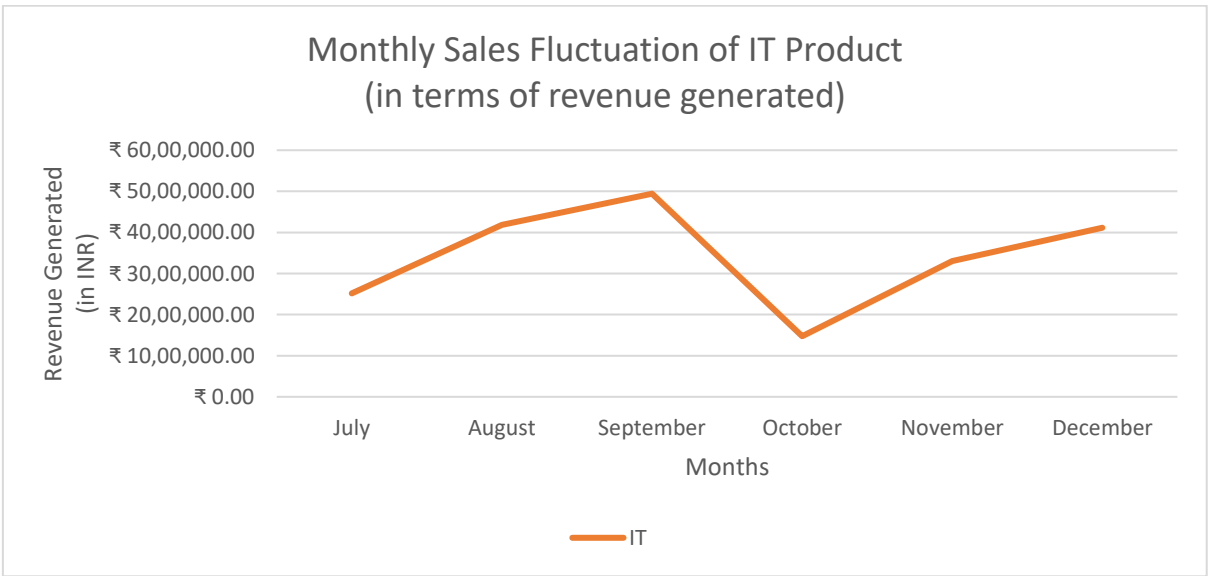

Fig. 4: Monthly Revenue Trend of IT Products

The line chart in Fig. 4 shows a striking contrast in the sales and revenue for IT Products. Although sale volumes have not seen much surge in the period of July to October, the revenue pattern has distinctively risen till September and saw a dip in October, succeeded by another rally from October onwards, though, still not reaching up to the levels of its peak. This indicates that although sale quantities have been relatively less in the earlier months, expensive products have been sold in these months.
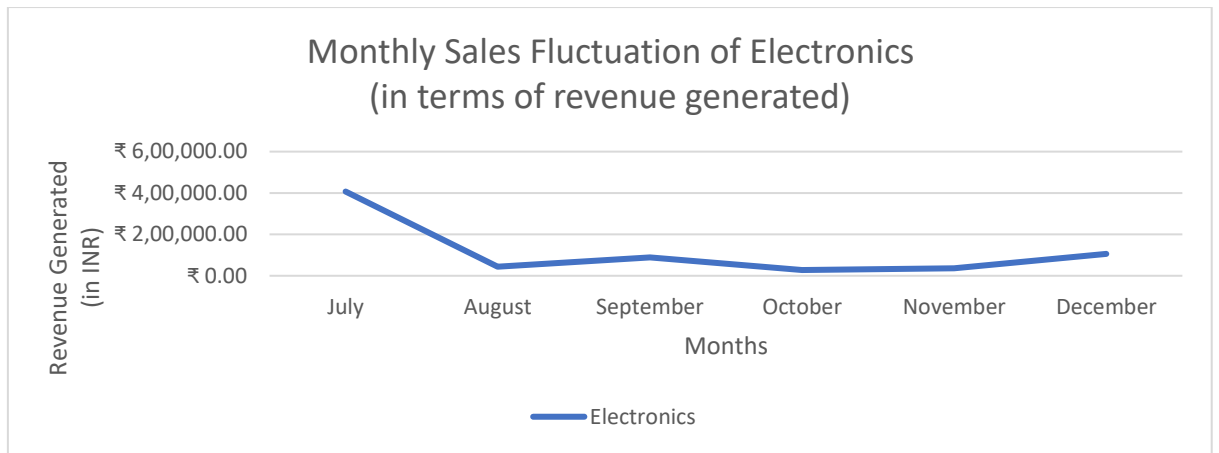
Fig. 5: Monthly Revenue Trend of Electronic Products

A matter of concern is visible from Fig. 5, which shows a fall in revenue in electronic products in the business after the month of July. This when compared with the sale quantity chart reveals that it is quite in sync as quantities have also fallen for most of the months.
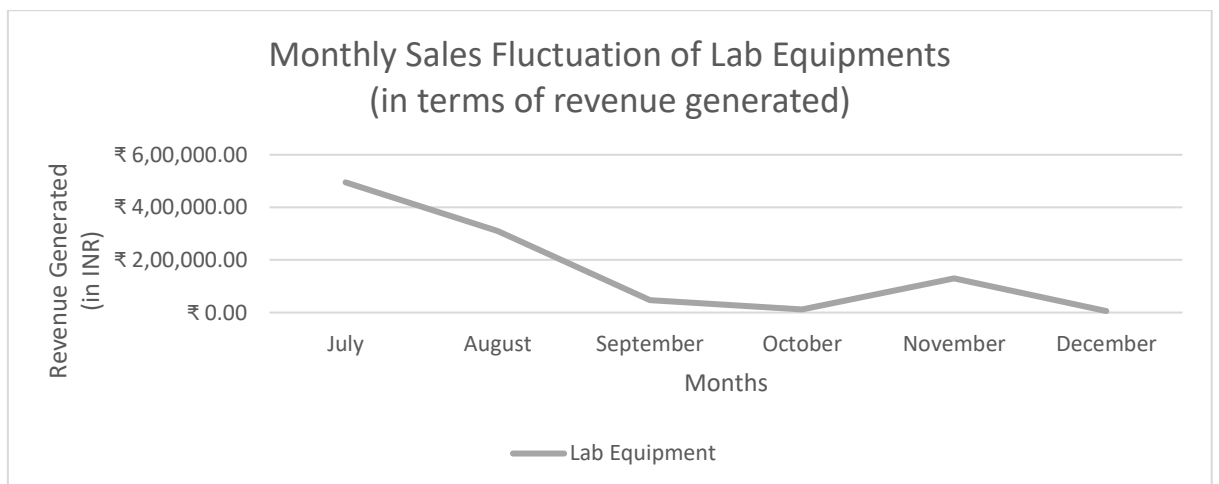

Fig. 6: Monthly Revenue Trend of Lab Equipment

While the sale volumes for Lab Equipment have been a rollercoaster ride, the revenue from this category has seen a sharp decline over the months. While July was an average month in terms of sale volumes, revenue-wise July was the peak. August and Novembers were peak in terms of sale quantities, but revenue does not comply with the sale volume, indicating that the sale from Lab Equipment categories in the peak months include mostly items that are inexpensive compared to the rest.

The erratic patterns in sales and the de-synchronization between volume and revenue, especially in the IT category, underline the need for differentiated inventory strategies by category.

Table 4 lists the item-wise sale quantities of each product across the six months of sale.

Pivot Table for Monthly Sales of Products	July	August	September	October	November	December	Grand Total
Products							
ACRYLICS	10	19	9	20	97	44	199
ANTIVIRUS	80	0	8	119	94	118	419
BATTERY	17	12	11	0	6	15	61
BEAKER	69	138	44	126	101	87	565
BIOMETRICS	17	10	2	3	28	161	221
CABLES AND WIRINGS	206	207	288	133	228	579	1641
CALCULATOR	0	0	35	17	0	16	68
CCTV	40	40	33	81	47	74	315
DEKSTOP	35	43	21	3	26	16	144
FURNITURE	55	109	49	4	25	94	336
HELIUM DISCHARGE TUBE	0	10	11	0	2	0	23
LAMPS	8	9	0	0	0	10	27
LAPTOP	3	0	4	7	6	9	29
MONITOR	24	55	56	23	15	39	212
MOTHER BOARD	5	4	0	0	2	10	21
MULTIVOLTMETER	45	6	0	0	0	0	51
PHOTOCOPY MACHINE	3	2	5	0	2	4	16
PRINTER	10	12	18	12	104	81	237
PRINTER COMPONENTS	110	147	77	80	219	106	739
ROUTER	13	0	1	4	20	10	48
SERVICE	5	0	6	15	3	6	35
SMPS	9	58	29	22	80	40	238
SOLAR LAMPS	6	0	0	0	19	0	25
SOLAR PANELS	18	0	0	0	0	0	18
SOLDERING IRON	1	6	0	1	0	1	9
SPEAKERS	1	0	10	5	5	0	21
STORAGE DEVICE	10	93	108	23	78	119	431
SWITCHES AND SOCKETS	42	21	40	49	40	22	214
UPS	8	4	0	0	10	3	25
Grand Total	850	1005	865	747	1257	1664	6388

Table 4: Pivot Table for Monthly Sales of Products

From Table 4, we observe the standard deviations in sale quantities across each product. The standard deviations are segmented into quartiles as represented in Table 5.

Quartiles	
Q1	4.597704741
Q2	12.90564046
Q3	32.10096918

Table 5: Quartiles of Standard Deviation

Table 5 holds the fact that the items whose standard deviation in sales quantity are approximately below 4.59 can be considered as stable as these items do not show much deviation from their means. The products up to the second quartile are moderate with some fluctuations, though the volatility is not vast. The products beyond have shown massive fluctuations and hence need better inventory planning and stocking.

Table 6 labels the volatility levels as well as gives a graphical representation of the trends of every product in the form of sparklines.

The point of highlight are the products that have been classified as Volatile as they need extra care in their inventory management. Such products are acrylics, antiviruses, beakers, biometrics, cables and wirings, CCTVs, desktops, furniture, monitor, voltmeter, printer and their components, SMPs and storage devices. These items are riskier to stock compared to the moderate and stable products, which show consistent demand, and need tighter demand forecasting in order to avoid losses and maintain efficiency in inventory management.

Products	Std. Deviation	Volatility	Sparkline
ACRYLICS	30.78645084	Volatile	
ANTIVIRUS	48.51946917	Volatile	
BATTERY	5.698440332	Moderate	
BEAKER	32.10096918	Volatile	
BIOMETRICS	56.22400634	Volatile	
CABLES AND WIRINGS	143.9499334	Volatile	
CALCULATOR	12.90564046	Moderate	
CCTV	18.24600413	Volatile	
DEKSTOP	12.90994449	Volatile	
FURNITURE	36.44173432	Volatile	
HELIUM DISCHARGE TUBE	4.775516261	Moderate	
LAMPS	4.536885863	Stable	
LAPTOP	2.910708199	Stable	
MONITOR	15.92342788	Volatile	
MOTHER BOARD	3.45205253	Stable	
MULTIVOLTMETER	16.46966909	Volatile	
PHOTOCOPY MACHINE	1.598610508	Stable	
PRINTER	38.13900016	Volatile	
PRINTER COMPONENTS	48.67380085	Volatile	
ROUTER	7.094598885	Moderate	
SERVICE	4.597704741	Stable	
SMPS	23.55607966	Volatile	
SOLAR LAMPS	6.986097305	Moderate	
SOLAR PANELS	6.708203932	Moderate	
SOLDERING IRON	2.061552813	Stable	
SPEAKERS	3.593976442	Stable	
STORAGE DEVICE	41.2852543	Volatile	
SWITCHES AND SOCKETS	10.46687898	Moderate	
UPS	3.760171391	Stable	

Table 6: Volatility in Products

From the insights collected in the above analyses, it brings to the idea of making an efficient prediction in the stocking quantities of items to manage inventory better and improve the efficiency of the business. Table 7 lists the items and their weighted predictions, with a selective approach of selection between mean and median with the use of a benchmark in relative differences. Since the business was initially non-stock driven and based on supply only after order is received mode, it was essential to provide a prediction of the amount of stock to store in inventory to make their business more efficient and work on a faster-delivery mode. Products with low deviation between mean and median had their expected stock levels aligned to the mean, while the rest were aligned to the median for a more conservative estimate. This approach adds robustness to demand prediction, essential for mitigating losses caused by mismatched stocking.

Table 7 suggests that the median is a better predictor for most of the items indicating the fact the several items have seen high demand in few of the months but have been low on demand in most of the other months.

Products	Mean	Median	Skewness	Relative Difference	Weighted Prediction
ACRYLICS	33	20	1.797	0.412	20
ANTIVIRUS	70	87	-0.662	0.246	87
BATTERY	10	12	-0.844	0.131	10
BEAKER	94	94	-0.178	0.002	94
BIOMETRICS	37	14	2.318	0.633	14
CABLES AND WIRINGS	274	218	1.916	0.205	218
CALCULATOR	11	8	0.974	0.294	8
CCTV	53	44	0.812	0.171	44
DEKSTOP	24	24	-0.170	0.021	24
FURNITURE	56	52	0.156	0.071	56
HELIUM DISCHARGE TUBE	4	1	0.896	0.739	1
LAMPS	5	4	0.066	0.111	5
LAPTOP	5	5	-0.329	0.034	5
MONITOR	35	32	0.268	0.108	35
MOTHER BOARD	4	3	1.049	0.143	4
MULTIVOLTMETER	9	0	2.358	1.000	0
PHOTOCOPY MACHINE	3	3	-0.248	0.062	3
PRINTER	40	15	1.080	0.620	15
PRINTER COMPONENTS	123	108	1.400	0.123	123
ROUTER	8	7	0.602	0.125	8
SERVICE	6	6	1.288	0.057	6
SMPS	40	35	0.632	0.130	40
SOLAR LAMPS	4	0	1.995	1.000	0
SOLAR PANELS	3	0	2.449	1.000	0
SOLDERING IRON	2	1	2.188	0.333	1
SPEAKERS	4	3	0.885	0.143	4
STORAGE DEVICE	72	86	-0.619	0.190	86
SWITCHES AND SOCKETS	36	40	-0.581	0.121	36
UPS	4	4	0.466	0.160	4

Table 7: Stock Management Prediction

3.2 Investigating Market Competition

Table 8 and 9 were constructed to note the monthly variation in sale quantities and revenues across the total stream of the business.

Months	Sum of Quantity
July	850
August	1005
September	865
October	747
November	1257
December	1664
Grand Total	6388

Months	Sum of Amount
July	₹ 34,77,145.75
August	₹ 45,35,755.77
September	₹ 51,40,506.18
October	₹ 15,30,145.89
November	₹ 34,75,893.49
December	₹ 42,91,768.77
Grand Total	₹ 2,24,51,215.85

Table 8: Monthly Sales Quantity   Table 9: Monthly Sales Revenue

Using Table 8 and 9, line charts were plotted as shown in Fig. 7 and 8 respectively. Trendlines were introduced to verify the uptrend or downtrend in demand and revenue for the business. This would indicate whether the business is indeed affected by the competitors in the market or not.
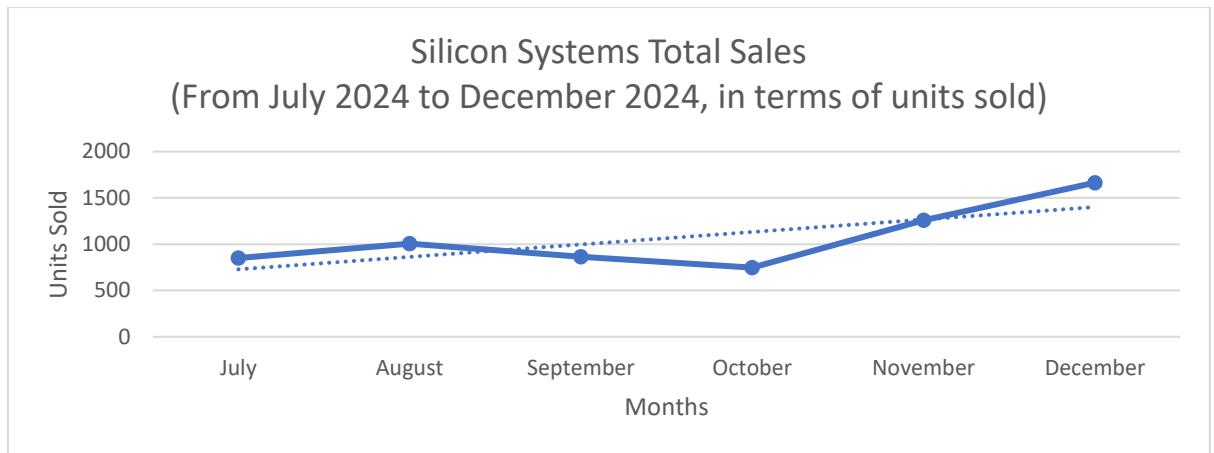
Fig 7: Monthly Sale Volume Trend

Fig. 7 reveals the Silicon Systems has seen a slight increase in demand over the period of six months. This alone does not approve of the fact that Silicon Systems is affected by market competition.
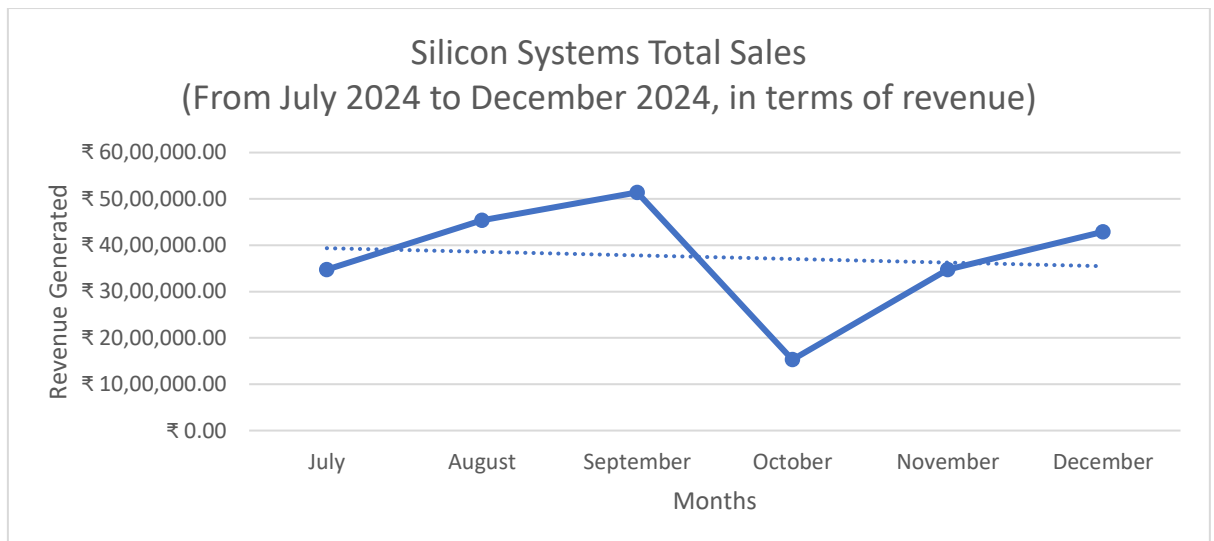

Fig 8: Monthly Revenue Trend

Fig. 8 suggests that Silicon Systems has seen a slight fall in its revenue over a period of six months, which is in accordance with the fact that market competition has indeed given a hit to the business. Fig. 7 and 8 combined suggest that though there is a rise in demand, there is a fall in revenue, which probably indicates that newer competitors have attracted customers by selling expensive products at cheaper rates.

Sum of Quantity	Months						
Industries	July	August	September	October	November	December	Grand Total
Education	430	608	315	448	706	773	3280
Finance	55	97	36	20	32	38	278
IT	76	0	33	47	88	238	482
Manufacturing	104	32	156	46	113	266	717
Retail	67	152	296	181	209	321	1226
Wholesale	118	116	29	5	109	28	405
Grand Total	850	1005	865	747	1257	1664	6388

Table 10: Monthly Sale Volume Across Industries

Sum of Amount	Months						
Industries	July	August	September	October	November	December	Grand Total
Education	₹ 20,70,884.87	₹ 25,55,795.99	₹ 11,13,874.33	₹ 7,24,597.04	₹ 20,49,797.54	₹ 12,52,606.30	₹ 97,67,556.07
Finance	₹ 2,38,192.00	₹ 1,50,694.49	₹ 1,48,490.00	₹ 24,150.00	₹ 1,51,350.00	₹ 30,200.00	₹ 7,43,076.49
IT	₹ 1,29,205.00	₹ 0.00	₹ 2,93,248.92	₹ 10,857.00	₹ 1,74,200.00	₹ 2,19,236.00	₹ 8,26,746.92
Manufacturing	₹ 3,28,193.04	₹ 1,15,245.21	₹ 2,26,373.77	₹ 1,41,174.40	₹ 3,89,895.00	₹ 18,42,719.02	₹ 30,43,600.44
Retail	₹ 4,39,214.46	₹ 13,78,514.38	₹ 31,55,632.49	₹ 6,15,465.14	₹ 4,86,844.95	₹ 8,58,879.00	₹ 69,34,550.42
Wholesale	₹ 2,71,456.38	₹ 3,35,505.70	₹ 2,02,886.67	₹ 13,902.31	₹ 2,23,806.00	₹ 88,128.45	₹ 11,35,685.51
Grand Total	₹ 34,77,145.75	₹ 45,35,755.77	₹ 51,40,506.18	₹ 15,30,145.89	₹ 34,75,893.49	₹ 42,91,768.77	₹ 2,24,51,215.85

Table 11: Monthly Revenue Across Industries

Table 11 and 12 note the monthly sales quantity and revenue across each of the customer sectors of the business. Table 11 and 12 were used to construct grouped bar charts as shown in Fig 9 and 10.
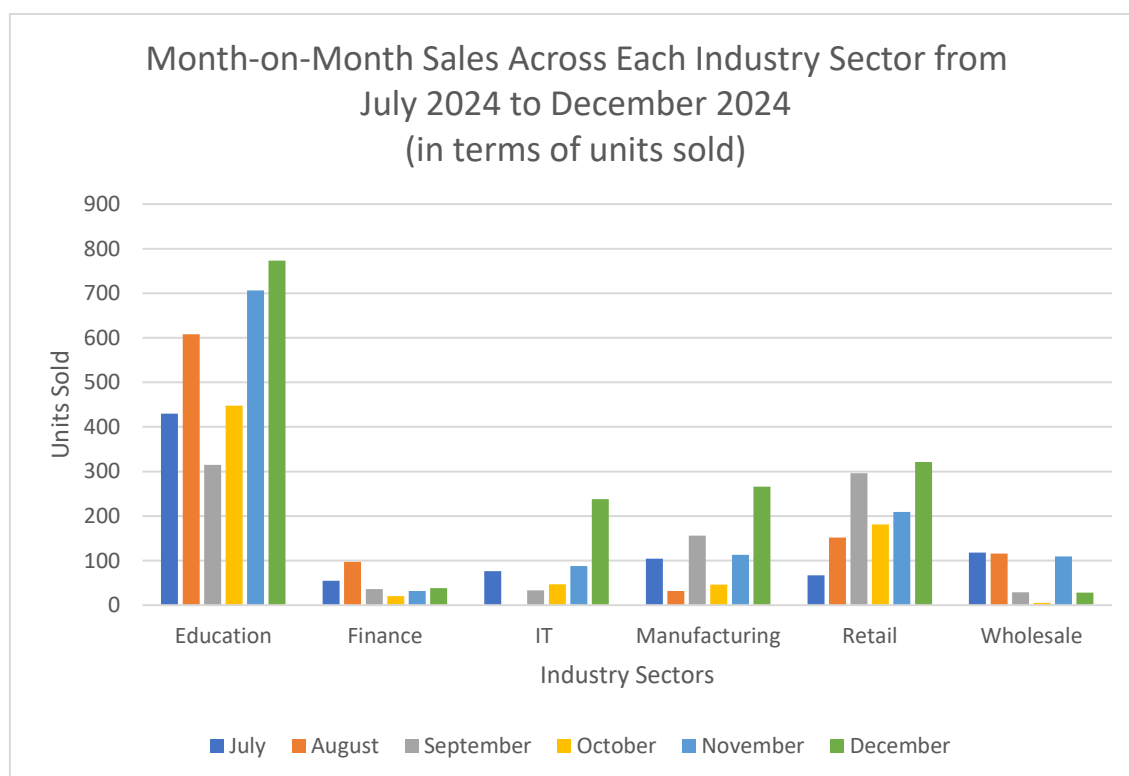

Fig 9: Grouped Bar Chart Representing Monthly Sales Trend Across Industries

Fig. 9 indicated that Education sector has seen an overall increase in demand over the months, though there was a dip in demand only for the month of September. The finance sector saw a fall after August. The IT sector has seen a consistent rise in demand. The manufacturing sector has been through ups and downs though an overall increase is visible. Retail has also witnessed a certain volatility in demand. Wholesale has undergone a downfall. This testifies that in terms of demand, Education, IT and Manufacturing have not seen much deterioration due to market competition. However, finance and wholesale industry has seen a dip.

Fig. 10 performs a similar analysis on the revenue patterns.
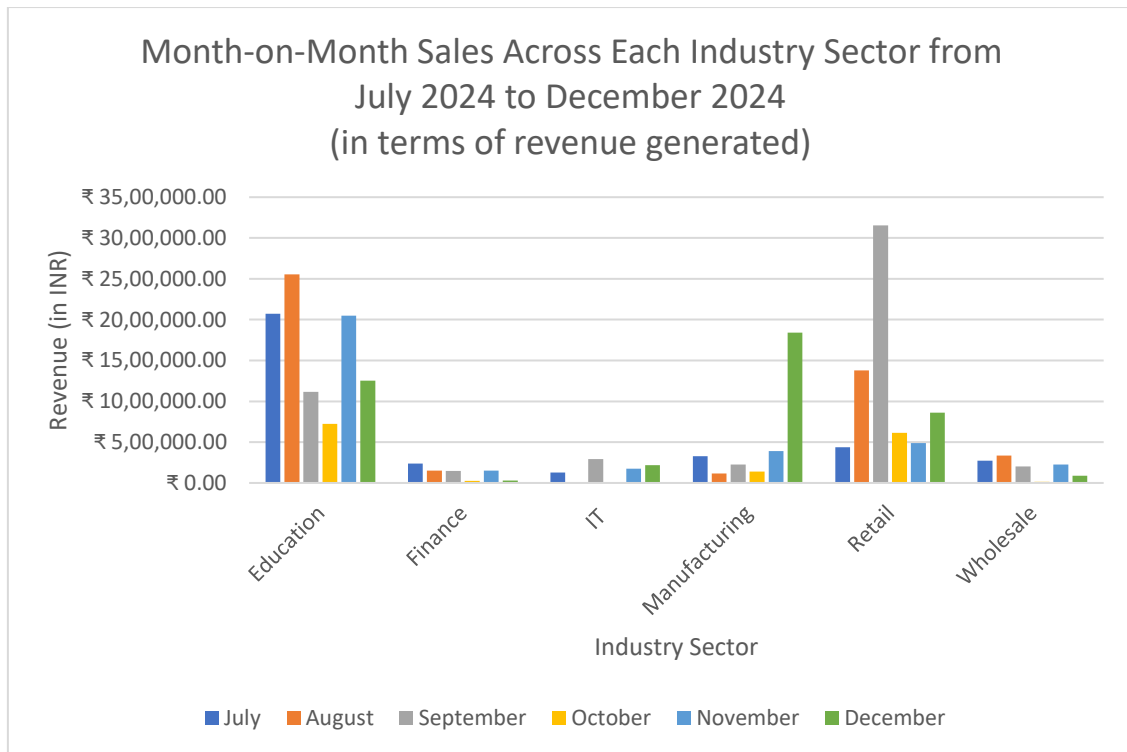
Fig 10: Grouped Bar Chart Representing Monthly Revenue Trend Across Industries

Fig. 10 reveals a contrasting story. Education, Retail, Wholesale and Finance have seen dips in revenues, IT has been consistent and only Manufacturing has seen a rise. This indicates that several sectors are impacted by market competition. While strong sectors like Education and Retail have seen a rise in demand, revenue fall indicates the presence of low-cost competitors in the market.

Customers	Number of Purchases in Last 6 Months	Number of Purchase Excluding Last 6 Months	Sum of Total Purchases
ARCTWIST TECHNOLOGY SOLUTIONS	28	313	341
BANARHAT KARTIK ORAON HINDI GOVT.COLLEGE	34	269	303
BARASAT GOVT.COLLEGE	23	447	470
BHUIYA CONTINENTAL AGENCY	29	38	67
BIRSA MUNDA COLLEGE	20	48	68
DR. APJ ABDUL KALAM GOVT. COLLEGE	20	466	486
EASTMAN HYDROQUIPMENTS PVT.LTD	27	291	318
GOVT. GENERAL DEGREECOLLEGE AT KALNA-1	15	394	409
GOVT.GENERAL DEGREE COLLEGE MURAGACHA	19	405	424
JAMINI MAJUMDAR MEMORIAL COLLEGE	17	180	197
JHANKAR SAREE	26	26	52
M.M.TRADING & CO	14	61	75
NETAJI NAGAR COLLEGE FOR WOMEN	26	350	376
PRASANTA CHANDRA MAHALANOBIS MAHAVIDYALA	23	418	441
R.K.METAL STORES	25	465	490
R.M.ELECTRIC CO	25	462	487
RUMA ISOLATOR COMPANY	26	83	109
SIDDHIVINAYAK DEALCOM PRIVATE LTD	16	125	141
VRINDA INTERNATIONAL	19	299	318
WEST BENGAL COUNCIL FOR RABINDRA	21	315	336

Table 12: Last Six Months v/s Earlier Purchases

Individually, an inspection of each customer was performed to segment out the customers who the business is potentially losing. The last six months purchase history and all-time purchase history data were compared side by side, as shown in Table 12. 100% stacked bar chart was used for this analysis as shown in Fig. 11.
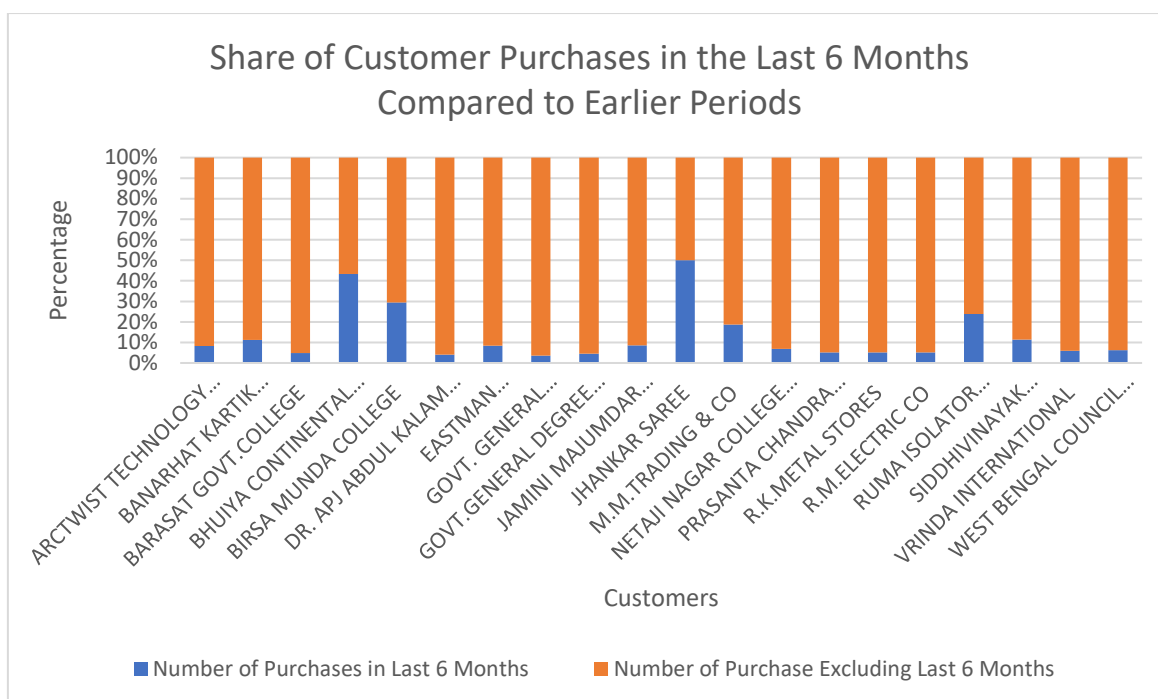
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Fig 11: 100% Stacked Bar Chart Representing Last Six Months vs Earlier Purchases

As observed in Fig. 11 certain customers like "Barasat Govt. College", "Dr. AJP Abdul Kalam Govt. College", "Govt. General Degree College at Kalna-1", etc. has seen very few number of purchases in the last 6 months compared to their earlier purchases, potentially indicating that these customers are reducing their purchases from Silicon Systems and perhaps found another business for dealing.

Sum of Quantity	Months						
Customers	July	August	September	October	November	December	Grand Total
ARCTWIST TECHNOLOGY SOLUTIONS	76	0	33	47	88	238	482
BANARHAT KARTIK ORAON HINDI GOVT.COLLEGE	102	59	25	90	146	74	496
BARASAT GOVT.COLLEGE	50	76	15	7	81	212	441
BHUIYA CONTINENTAL AGENCY	118	116	29	5	109	28	405
BIRSA MUNDA COLLEGE	32	42	34	23	58	85	274
DR. APJ ABDUL KALAM GOVT. COLLEGE	9	91	44	1	16	53	214
EASTMAN HYDROQUIPMENTS PVT.LTD	46	8	73	42	57	204	430
GOVT. GENERAL DEGREECOLLEGE AT KALNA-1	10	22	39	4	50	84	209
GOVT.GENERAL DEGREE COLLEGE MURAGACHA	64	54	3	64	94	89	368
JAMINI MAJUMDAR MEMORIAL COLLEGE	48	2	68	27	28	35	208
JHANKAR SAREE	15	35	37	71	16	24	198
M.M.TRADING & CO	1	12	20	18	86	15	152
NETAJI NAGAR COLLEGE FOR WOMEN	10	57	17	82	175	15	356
PRASANTA CHANDRA MAHALANOBIS MAHAVIDYALA	17	86	42	25	16	74	260
R.K.METAL STORES	13	55	42	59	76	198	443
R.M.ELECTRIC CO	38	50	197	33	31	84	433
RUMA ISOLATOR COMPANY	58	24	83	4	56	62	287
SIDDHIVINAYAK DEALCOM PRIVATE LTD	55	97	36	20	32	38	278
VRINDA INTERNATIONAL	34	56	12	50	15	19	186
WEST BENGAL COUNCIL FOR RABINDRA	54	63	16	75	27	33	268
Grand Total	850	1005	865	747	1257	1664	6388

Table 13: Monthly Customer-wise Sales Quantity

Table 13 and 14 shows the monthly purchase quantity and revenue of each customer across the six months.

Sum of Amount	Months						
Customers	July	August	September	October	November	December	Grand Total
ARCTWIST TECHNOLOGY SOLUTIONS	₹ 1,29,205.00	₹ 0.00	₹ 2,93,248.92	₹ 10,857.00	₹ 1,74,200.00	₹ 2,19,236.00	₹ 8,26,746.92
BANARHAT KARTIK ORAON HINDI GOVT.COLLEGE	₹ 7,29,605.00	₹ 98,931.00	₹ 1,92,053.45	₹ 1,56,515.15	₹ 4,94,800.00	₹ 1,37,608.70	₹ 18,09,513.30
BARASAT GOVT.COLLEGE	₹ 39,235.00	₹ 85,678.00	₹ 47,350.00	₹ 16,450.00	₹ 1,55,019.82	₹ 52,709.54	₹ 3,96,442.36
BHUIYA CONTINENTAL AGENCY	₹ 2,71,456.38	₹ 3,35,505.70	₹ 2,02,886.67	₹ 13,902.31	₹ 2,23,806.00	₹ 88,128.45	₹ 11,35,685.51
BIRSA MUNDA COLLEGE	₹ 33,995.00	₹ 3,034.11	₹ 3,97,372.00	₹ 79,374.58	₹ 71,130.00	₹ 47,374.04	₹ 6,32,279.73
DR. APJ ABDUL KALAM GOVT. COLLEGE	₹ 61,195.00	₹ 7,03,008.30	₹ 91,700.00	₹ 400.00	₹ 24,042.00	₹ 2,453.00	₹ 8,82,798.30
EASTMAN HYDROQUIPMENTS PVT.LTD	₹ 1,03,650.00	₹ 42,000.00	₹ 70,673.77	₹ 59,974.40	₹ 1,62,645.00	₹ 15,49,903.02	₹ 19,88,846.19
GOVT. GENERAL DEGREECOLLEGE AT KALNA-1	₹ 3,92,500.00	₹ 17,599.76	₹ 1,00,659.24	₹ 6,000.00	₹ 3,30,745.72	₹ 15,820.07	₹ 8,63,324.79
GOVT.GENERAL DEGREE COLLEGE MURAGACHA	₹ 1,23,120.00	₹ 3,81,425.00	₹ 4,350.00	₹ 41,153.52	₹ 2,41,355.00	₹ 59,399.46	₹ 8,50,802.98
JAMINI MAJUMDAR MEMORIAL COLLEGE	₹ 3,18,770.00	₹ 5,300.00	₹ 53,932.74	₹ 7,879.00	₹ 70,320.00	₹ 1,02,576.00	₹ 5,58,777.74
JHANKAR SAREE	₹ 74,446.08	₹ 64,900.00	₹ 1,78,017.00	₹ 2,23,726.14	₹ 1,43,244.95	₹ 2,57,750.00	₹ 9,42,084.17
M.M.TRADING & CO	₹ 28,975.00	₹ 1,54,050.00	₹ 2,06,472.00	₹ 37,500.00	₹ 2,01,750.00	₹ 2,50,500.00	₹ 8,79,247.00
NETAJI NAGAR COLLEGE FOR WOMEN	₹ 50,000.00	₹ 3,90,046.00	₹ 60,291.90	₹ 1,80,010.00	₹ 5,30,005.00	₹ 3,09,971.80	₹ 15,20,324.70
PRASANTA CHANDRA MAHALANOBIS MAHAVIDYALA	₹ 1,354.39	₹ 5,56,114.82	₹ 75,794.00	₹ 1,12,937.96	₹ 94,800.00	₹ 2,05,186.76	₹ 10,46,187.93
R.K.METAL STORES	₹ 1,81,800.00	₹ 71,638.38	₹ 3,36,098.49	₹ 3,04,289.00	₹ 53,650.00	₹ 1,73,359.00	₹ 11,20,834.87
R.M.ELECTRIC CO	₹ 1,53,993.38	₹ 10,87,926.00	₹ 24,35,045.00	₹ 49,950.00	₹ 88,200.00	₹ 1,77,270.00	₹ 39,92,384.38
RUMA ISOLATOR COMPANY	₹ 2,24,543.04	₹ 73,245.21	₹ 1,55,700.00	₹ 81,200.00	₹ 2,27,250.00	₹ 2,92,816.00	₹ 10,54,754.25
SIDDHIVINAYAK DEALCOM PRIVATE LTD	₹ 2,38,192.00	₹ 1,50,694.49	₹ 1,48,490.00	₹ 24,150.00	₹ 1,51,350.00	₹ 30,200.00	₹ 7,43,076.49
VRINDA INTERNATIONAL	₹ 1,00,276.00	₹ 1,47,769.00	₹ 22,672.00	₹ 30,706.83	₹ 4,080.00	₹ 30,800.00	₹ 3,36,303.83
WEST BENGAL COUNCIL FOR RABINDRA	₹ 2,20,834.48	₹ 1,66,890.00	₹ 67,699.00	₹ 93,170.00	₹ 33,500.00	₹ 2,88,706.93	₹ 8,70,800.41
Grand Total	₹ 34,77,145.75	₹ 45,35,755.77	₹ 51,40,506.18	₹ 15,30,145.89	₹ 34,75,893.49	₹ 42,91,768.77	₹ 2,24,51,215.85

Table 14: Monthly Customer-wise Revenue

Based on Table 13 and 14, Table 15 and 16 was constructed to indicate the slopes and trendlines.

Customers	Slope	Sparkline
ARCTWIST TECHNOLOGY SOLUTIONS	31.08571	
BANARHAT KARTIK ORAON HINDI GOVT.COLLEGE	5.314286	
BARASAT GOVT.COLLEGE	23.34286	
BHUIYA CONTINENTAL AGENCY	-14.1429	
BIRSA MUNDA COLLEGE	8.628571	
DR. APJ ABDUL KALAM GOVT. COLLEGE	-1.37143	
EASTMAN HYDROQUIPMENTS PVT.LTD	25.88571	
GOVT. GENERAL DEGREECOLLEGE AT KALNA-1	11.97143	
GOVT.GENERAL DEGREE COLLEGE MURAGACHA	8.742857	
JAMINI MAJUMDAR MEMORIAL COLLEGE	-0.8	
JHANKAR SAREE	0.628571	
M.M.TRADING & CO	8.285714	
NETAJI NAGAR COLLEGE FOR WOMEN	12.68571	
PRASANTA CHANDRA MAHALANOBIS MAHAVIDYALA	1.657143	
R.K.METAL STORES	28.71429	
R.M.ELECTRIC CO	0.257143	
RUMA ISOLATOR COMPANY	1.057143	
SIDDHIVINAYAK DEALCOM PRIVATE LTD	-8.45714	
VRINDA INTERNATIONAL	-4.57143	
WEST BENGAL COUNCIL FOR RABINDRA	-4.4	

Table 15: Customer-wise Identification of Increase or Decrease in Sales

Table 15 shows certain customers with a positive slope of purchase quantities and others with a negative slope. The negatively sloped customers are the ones who have reduced their purchase from Silicon Systems with time and hence indicate losing customers. A similar analysis has also been carried out regarding revenue, as shown in Table 16, the customers who witness a negative slop in Table 15 but positive in Table 16 indicate that although their demand is reduced, they have purchased expensive products from Silicon Systems. The converse case indicates those customers have found cheaper alternatives for expensive products but stick with Silicon Systems otherwise. In case of both positive,

it possibly indicates a loyal customer. A negative slope in both the tables indicate losing customers.
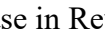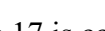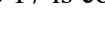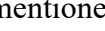
Customers	Slope	Sparkline
ARCTWIST TECHNOLOGY SOLUTIONS	19724.66	
BANARHAT KARTIK ORAON HINDI GOVT.COLLEGE	-51654.7	
BARASAT GOVT.COLLEGE	6985.662	
BHUIYA CONTINENTAL AGENCY	-41163.5	
BIRSA MUNDA COLLEGE	-1337.56	
DR. APJ ABDUL KALAM GOVT. COLLEGE	-69197.4	
EASTMAN HYDROQUIPMENTS PVT.LTD	216642.9	
GOVT. GENERAL DEGREECOLLEGE AT KALNA-1	-29674.9	
GOVT.GENERAL DEGREE COLLEGE MURAGACHA	-20057.4	
JAMINI MAJUMDAR MEMORIAL COLLEGE	-26627.5	
JHANKAR SAREE	34207.53	
M.M.TRADING & CO	30907.23	
NETAJI NAGAR COLLEGE FOR WOMEN	52555.83	
PRASANTA CHANDRA MAHALANOBIS MAHAVIDYALA	-9361.1	
R.K.METAL STORES	-3656.56	
R.M.ELECTRIC CO	-150511	
RUMA ISOLATOR COMPANY	20825.12	
SIDDHIVINAYAK DEALCOM PRIVATE LTD	-33209.5	
VRINDA INTERNATIONAL	-22011.8	
WEST BENGAL COUNCIL FOR RABINDRA	-1009.62	

Table 16: Customer-wise Identification of Increase or Decrease in Revenue

Based on the analysis done in Fig. 11, Table 15 and Table 16, Table 17 is constructed to segment the customers into Loyal, Leveraged and Losing, as mentioned in earlier sections.

Loyal	Leveraged	Losing
ARCTWIST TECHNOLOGY SOLUTIONS	GOVT. GENERAL DEGREE COLLEGE AT KALNA-1	BANARHAT KARTIK ORAON HINDI GOVT.COLLEGE
BARASAT GOVT. COLLEGE	GOVT.GENERAL DEGREE COLLEGE MURAGACHA	BHUJIYA CONTINENTAL AGENCY
EASTMAN HYDROEQUIPMENTS PVT.LTD	PRASANTA CHANDRA MAHALANOBIS MAHAVIDYALA	DR. APJ ABDUL KALAM GOVT. COLLEGE
NETAJI NAGAR COLLEGE FOR WOMEN	R.K. METAL STORES	JAMINI MAJUMDAR MEMORIAL COLLEGE
M.M. TRADING & CO	R.M. ELECTRIC CO	SIDDHIVINAYAK DEALCOM PRIVATE LTD
JHANKAR SAREE	RUMA ISOLATOR COMPANY	VRINDA INTERNATIONAL
BIRSA MUNDA COLLEGE		WEST BENGAL COUNCIL FOR RABINDRA

Table 17: Customer Segmentation

3.3 Diagnosing Slow-Moving Goods

Table 18 lists the monthly sale quantities of each item which is essential for the identification of Slow-Moving Goods.

Sum of Quantity Products	July	August	September	October	November	December	Grand Total
ACRYLICS	10	19	9	20	97	44	199
ANTIVIRUS	80	0	8	119	94	118	419
BATTERY	17	12	11	0	6	15	61
BEAKER	69	138	44	126	101	87	565
BIOMETRICS	17	10	2	3	28	161	221
CABLES AND WIRINGS	206	207	288	133	228	579	1641
CALCULATOR	0	0	35	17	0	16	68
CCTV	40	40	33	81	47	74	315
DEKSTOP	35	43	21	3	26	16	144
FURNITURE	55	109	49	4	25	94	336
HELIUM DISCHARGE TUBE	0	10	11	0	2	0	23
LAMPS	8	9	0	0	0	10	27
LAPTOP	3	0	4	7	6	9	29
MONITOR	24	55	56	23	15	39	212
MOTHER BOARD	5	4	0	0	2	10	21
MULTIVOLTMETER	45	6	0	0	0	0	51
PHOTOCOPY MACHINE	3	2	5	0	2	4	16
PRINTER	10	12	18	12	104	81	237
PRINTER COMPONENTS	110	147	77	80	219	106	739
ROUTER	13	0	1	4	20	10	48
SERVICE	5	0	6	15	3	6	35
SMPS	9	58	29	22	80	40	238
SOLAR LAMPS	6	0	0	0	19	0	25
SOLAR PANELS	18	0	0	0	0	0	18
SOLDERING IRON	1	6	0	1	0	1	9
SPEAKERS	1	0	10	5	5	0	21
STORAGE DEVICE	10	93	108	23	78	119	431
SWITCHES AND SOCKETS	42	21	40	49	40	22	214
UPS	8	4	0	0	10	3	25
Grand Total	850	1005	865	747	1257	1664	6388

Table 18: Monthly and Total Sales of Products

Using the total sale of each item, quartiles were calculated as shown in Table 19.

Quartiles	
1st	25
2nd	68
3rd	238

Table 19: Quartiles of Sales Units

As observed in table 19, the first quartile of total sales is 25 units, the second quartile is 68 units, and the third quartile is 238 units. The quartile values are essential to classify the products as "Slow-Moving", "Average" and "Fast Moving". The classification of each product has been shown in Table 20.

Products	Mobility
ACRYLICS	Fast Moving
ANTIVIRUS	Fast Moving
BATTERY	Average
BEAKER	Fast Moving
BIOMETRICS	Fast Moving
CABLES AND WIRINGS	Fast Moving
CALCULATOR	Average
CCTV	Fast Moving
DEKSTOP	Fast Moving
FURNITURE	Fast Moving
HELIUM DISCHARGE TUBE	Slow Moving
LAMPS	Average
LAPTOP	Average
MONITOR	Fast Moving
MOTHER BOARD	Slow Moving
MULTIVOLTMETER	Average
PHOTOCOPY MACHINE	Slow Moving
PRINTER	Fast Moving
PRINTER COMPONENTS	Fast Moving
ROUTER	Average
SERVICE	Average
SMPS	Fast Moving
SOLAR LAMPS	Slow Moving
SOLAR PANELS	Slow Moving
SOLDERING IRON	Slow Moving
SPEAKERS	Slow Moving
STORAGE DEVICE	Fast Moving
SWITCHES AND SOCKETS	Fast Moving
UPS	Slow Moving

Table 20: Product Mobility Segmentation

Products that have sale quantities below first quartile are identified as Slow-Moving items, the ones that have sale quantities up to second quartile are average, and beyond that are segmented as Fast-Moving. Table 21 lists the slow-moving items and the respective sectors where they find their use. As observed, most of the slow-moving items have important use cases in the Education sector. Hence, Education sector can be targeted by Silicon Systems to market these items.

Items	Sales Volume	USEFUL SECTORS
HELIUM DISCHARGE TUBE	Slow Moving	Education
MOTHER BOARD	Slow Moving	Education, IT
PHOTOCOPY MACHINE	Slow Moving	Education, IT
SOLAR LAMPS	Slow Moving	Education, IT, Wholesale
SOLAR PANELS	Slow Moving	Education, IT, Wholesale
SOLDERING IRON	Slow Moving	Manufacturing, Wholesale
SPEAKERS	Slow Moving	Education, IT
UPS	Slow Moving	Education, IT

Table 21: Target Sectors for Slow-Moving Goods

Table 22 lists the customers who have purchased the slow-moving items and the quantities of their purchases. This information aids in developing re-engagement plans for specific customers or bundling strategies to move stagnant inventory.

Sum of Quantity	Products								
Customers	HELIUM DISCHARGE TUBE	MOTHER BOARD	PHOTOCOPY MACHINE	SOLAR LAMPS	SOLAR PANELS	SOLDERING IRON	SPEAKERS	UPS	Grand Total
ARCTWIST TECHNOLOGY SOI	0	10	3	0	0	0	0	7	20
BANARHAT KARTIK ORAON H	0	0	2	0	0	0	1	3	6
BHUIYA CONTINENTAL AGEN	13	4	0	0	0	0	0	0	17
BIRSA MUNDA COLLEGE	0	0	2	0	0	0	0	0	2
DR. APJ ABDUL KALAM GOVT	0	0	0	0	0	0	0	3	3
EASTMAN HYDROQUIPMENT	7	0	0	0	0	0	0	0	7
GOVT. GENERAL DEGREECOL	0	0	3	0	0	6	0	0	9
GOVT.GENERAL DEGREE COL	0	0	0	0	0	1	3	0	4
JAMINI MAJUMDAR MEMOR	0	0	0	0	0	0	0	3	3
JHANKAR SAREE	2	0	0	0	0	0	6	0	8
M.M.TRADING & CO	0	2	2	0	0	0	5	0	9
NETAJI NAGAR COLLEGE FOR	0	0	4	0	0	0	6	0	10
PRASANTA CHANDRA MAHAL	0	0	0	0	0	1	0	0	1
R.K.METAL STORES	1	0	0	0	0	0	0	0	1
RUMA ISOLATOR COMPANY	0	0	0	0	9	1	0	1	11
SIDDHIVINAYAK DEALCOM PI	0	0	0	0	9	0	0	0	9
VRINDA INTERNATIONAL	0	0	0	6	0	0	0	8	14
WEST BENGAL COUNCIL FOR	0	5	0	19	0	0	0	0	24
Grand Total	23	21	16	25	18	9	21	25	158

Table 22: Customer-wise Purchase History of Slow-Moving Goods

Observations from Table 22 suggests that ARCTWIST TECHNOLOGY SOLUTIONS, BHUIYA CONTINENTAL AGENCY, NETAJI NAGAR COLLEGE FOR WOMEN, RUMA ISOLATOR COMPANY, VRINDA INTERNATIONAL and WEST BENGAL COUNCIL FOR RABINDRA have been the top buyers of slow-moving goods of Silicon Systems.

Table 23 and 24 notes down the overall total quantity and revenue of the business from the different sales channels.

Industries	Sum of Quantity
Education	3280
Finance	278
IT	482
Manufacturing	717
Retail	1226
Wholesale	405
Grand Total	6388

Industries	Sum of Amount
Education	₹ 97,67,556.07
Finance	₹ 7,43,076.49
IT	₹ 8,26,746.92
Manufacturing	₹ 30,43,600.44
Retail	₹ 69,34,550.42
Wholesale	₹ 11,35,685.51
Grand Total	₹ 2,24,51,215.85

Table 23: Sector-wise Sale Volume   Table 24: Sector-wise Sale Revenue

Based on Table 23 and 24, pie charts were constructed as shown in Fig. 12 and 13. These pie charts highlight dominant customer bases and indicate industries where the business already has a strong presence. Such sectors present promising opportunities to promote and reposition slow-moving products through tailored campaigns.
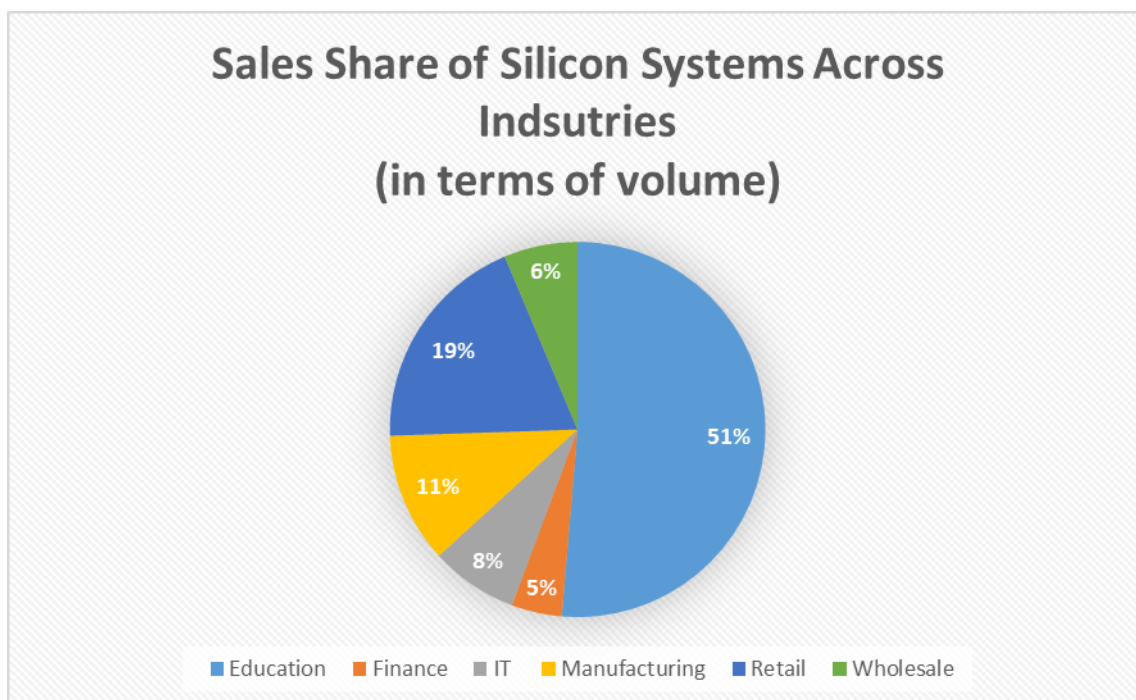
Fig 12: Sales Share Across Industries

In terms of volume, Education sector is the biggest market for Silicon Systems, followed by Retail, as observed in Fig. 12. The other sectors share almost evenly.
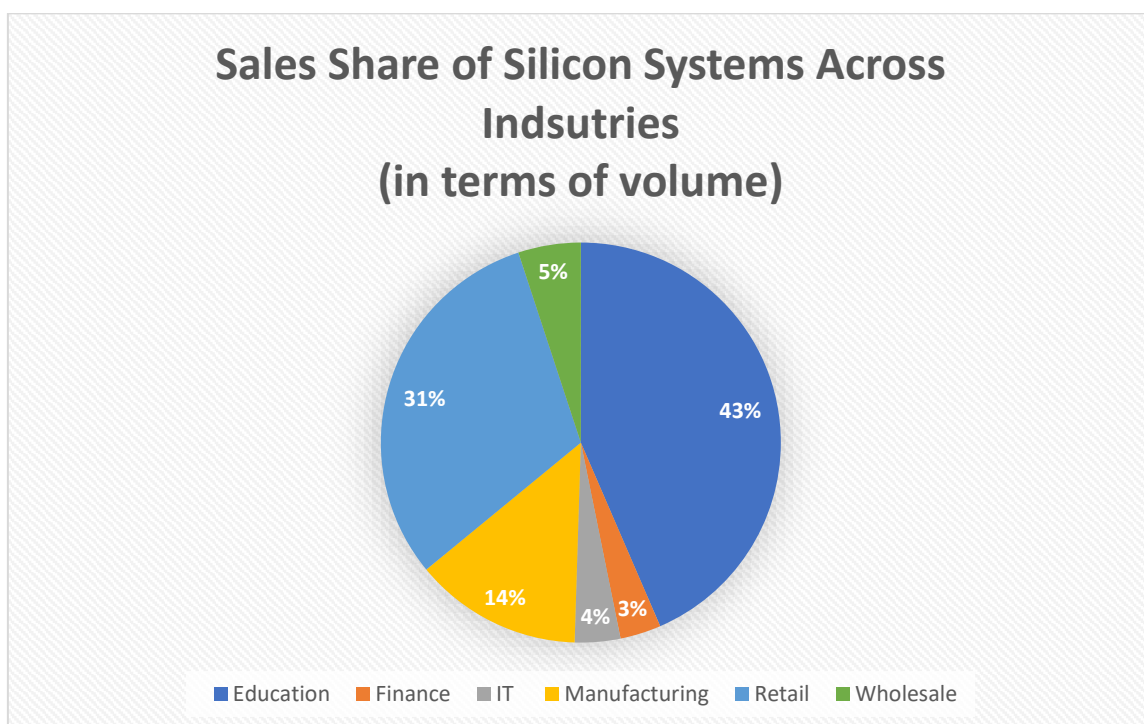

Table 13: Revenue Share Across Industries

In terms of revenue, Education sector is the front-runner once again followed by Retail. This indicates that Education and Retail are the segments where Silicon Systems could market and target to sell their slow-moving products.

4 Interpretation of Results and Recommendations

4.1 Formulating Solutions for Market Fluctuations

Interpretation: According to the analysis carried out, IT products have shown growth, Electronics have shown a slight decrease, and Lab Equipment has been very volatile. In-depth analysis of products using standard deviation segmented the products into Stable, Moderate and Volatile categories. High deviation products require careful monitoring over a longer period of time. The predictive stocking approach has been instrumental in formulating demand-aware inventory benchmarks, adjusting for skewed product performance.

Recommendations:

- **Short-Term (1-2 months):** Immediate classification of all products using the volatility segmentation provided and prioritization of tighter stock control for the highly volatile items mentioned is necessary. Predictive stocking using calculated benchmarks for faster delivery readiness needs to be begun.
- **Mid-Term (3-6 months):** Category-specific inventory strategy needs to be implemented. Introduction of minimum viable stocking buffers for volatile items as identified in the analyses is required while allowing automated replenishment of stable products.
- **Long-Term (>6 months):** A dynamic inventory model using rolling median logic can be established and volatility classification using updated sales data of every quarter can be performed using automation.

Implementation Impact: Adopting the measures mentioned can be instrumental in reducing stockouts, enhancing delivery speed and lowering excess inventory costs. Predictive inventory planning will eventually lead to proper alignment with market demand, enhancing operational efficiency and profitability.

4.2 Combating Market Competitions

Interpretation: According to the data, though demand has increased slightly, revenue has declined, indicating that low-cost competitors are gaining market share. From the sectoral analysis it was revealed that Finance, Wholesale and Retail segments are experiencing revenue losses. Customer-wise trends were used to identify that there are several customers who were previously active clients but have now declined their purchases, affirming the business' customer attrition concerns.

Recommendations:

- **Urgent (0-1 month):** The customers identified as "Losing" needs to be reached out to immediately. Tailored deals or engagement offers can be provided to recapture interest. Slow-moving items could be provided to these customers as promotional offer items, strategically solving both the issues of losing customers and slow-moving items.

- **Short-Term (1-3 months):** A competitive pricing strategy can be adopted, or value offers can be bundled in with orders in sections that were identified as vulnerable, like Finance, Retail and Wholesale, to regain market trust.

- **Long-Term (> 3months):** Introduction of customer loyalty programs can be instrumental in holding on to existing customers and gaining new customers at the same time. Customer trends need to be analyzed quarterly for consistent maintenance of engagement.

Implementation Impact: Retention of loyal and leveraged customers and reclamation of losing customers can be achieved by proactive customer re-engagement strategies and sector focused pricing plans. Strengthening brand loyalty and sustenance of revenue flow can also be achieved using the above-mentioned ideation, despite market competition.

4.3 Strategizing Remedies for Slow-Moving Goods

Interpretation: Slow-moving goods were identified as the products which fell under the lowest quartile in total sales. Though underperforming, these products can serve unique purposes and have specific sectoral relevance, particularly in the industries where Silicon Systems already has a strong hold – Education and Retail. A natural lead for sales expansion was obtained by the analysis that revealed customers who have shown interest in such products already.

Recommendations:

- **Urgent (0-1 month):** Initiation of targeted outreach to promote bulk or repeat purchases of slow-moving products by the already existing top buyers is recommended.

- **Short-Term (1-3 months):** To move stagnant inventory, bundled deals or discounted pricing can be performed. Such campaigns should be focused on Education and Retail sectors. Moreover, the slow-moving items can be utilized in form of offers or freebies to attract the customers that were categorized as "Losing". This solves two purposes at the same time.

- **Long-Term (>3 months):** Evaluation of product-market fit, and re-analysis of the underperforming stocks is essential in regularity. If certain SKUs keep underperforming even after multiple strategies implementation, it is recommended to retire such SKUs to reallocate inventory space for better-selling items.

Implementation Impact: Stock clogging and improvement of cash flow can be achieved by these strategies while allowing room for new offerings aligned with customer demand. Redirecting slow-moving goods through tailored marketing efforts can convert liabilities into revenue-generating assets.

5 Appendix

Link to the BDM Project Folder: Link