BUSINESS DATA MANAGEMENT - CAPSTONE PROJECT

Title : Optimizing Business Operations and Growth Strategies for Balaji Computer Shop

Final report for the BDM Capstone Project

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CONTENTS PAGE NUMBER

1. Executive Summary

The Capstone project on Business Data Management (BDM) focuses on Balaji Computer & Emitra Services, a business-to-customer (B2C) shop located at Iscon Plaza, Sadar Bazar, Sirohi, Rajasthan. The shop offers a broad spectrum of digital and documentation services, including printouts, Xerox, online application form filling, Aadhar card printing, PVC card printing, PAN card creation, and driving license etc. Data over a three month period , November 2024 to January 2025 has been analysed for this project to address the primary objectives which include resolving the operational challenges that hinder its efficiency, scalability, and overall profitability and expanding the revenue from adding the marketing strategy.

A detailed analysis of the data provided was carried out to understand monthly trends and patterns in revenue and services, seasonal demand effect on services, analyze customer trends and find the pattern between the day and services.

The analysis was carried out using structured data collection, statistical analysis, and visualization techniques. The dataset, spanning three months, was cleaned and analyzed using Excel sheets and Python to uncover critical business patterns. The analysis involved descriptive analytics, trend identification, and root cause analysis, enabling a deeper understanding of monthly trends, service demand, and revenue generation trends. Monthly trends in revenue, detailed breakdown of service specific details like day, opening time, MRP, cost, revenue, week etc was visualised to understand the gaps. The visualization such as Service-wise contribution to overall business income is very useful to find trends. Key insights drawn from the analysis and breakdown of the data revealed that November 2024 was the most profitable month, witnessing a significant increase in service demand compared to the preceding and succeeding months.

Some important conclusions from these analyses were that November and January were significantly better than December, which was an off-season in terms of income and service utilization. Services like color printing and online forms bring in a lot of money. Although driving licenses also have high MRP service, they are not very common. According to day-by-day statistics, Tuesday is the day with the biggest revenue, and Xerox has the highest amount. This is typical as everyone needs Xerox, and the quantity of Xerox is frequently very high. The shop rent is extremely exorbitant, according to an analysis of monthly expenses. We only generate ten to twelve thousand rupees, which is really little, if we subtract our typical monthly revenue from our monthly expenses.

To address these challenges, this report outlines several strategic recommendations that focus on improving automation, optimizing workforce allocation, enhancing customer engagement, and upgrading technical infrastructure. Introducing an online appointment booking system would help regulate customer flow, thereby reducing waiting times.

2. Detailed explanation of analysis process/method

The data was originally recorded as handwritten daily entries. I collected it by capturing images and then manually transferring the information into an Excel sheet. The shop owner provided three months of data, covering November to January, which I organized into separate sheets for each month. Additionally, they shared monthly expense records. Once compiled, I saved the file in CSV format.

To analyze the data, Python and its libraries were utilized, and several pre-processing steps were applied to ensure the data was ready for further analysis.

- **Loading the data and before proceeding, we need to ensure that all three datasets have the same structure:** I used python and pandas library in this proceeding. And I ensure that all the data have the same structure.

```python
import pandas as pd
import numpy as np

# Loading the Data From each CSV File
Nov = pd.read_csv('November_sales.csv')
Dec = pd.read_csv('December_sales.csv')
Jan = pd.read_csv('January_sales.csv')

#Before proceeding,
# we need to ensure that all three datasets have
# the same structure.

print(f"November Data:  {Nov.info()}")
print(f"December Data: {Dec.info()}")
print(f"January Data: {Jan.info()}")
```

```
RangeIndex: 131 entries, 0 to 130
Data columns (total 8 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   Date                      131 non-null    object
 1   Day                       131 non-null    object
 2   Opening_time_(AM)_(App.)  128 non-null    object
 3   Types_of_services         128 non-null    object
 4   MRP_Rupees                128 non-null    float64
 5   Quantity                  128 non-null    float64
 6   Total_sale_amount         128 non-null    float64
 7   Week                      131 non-null    object
dtypes: float64(3), object(5)
memory usage: 8.3+ KB
November Data:  None
```

- **Finding missing values in each column for all the three files:** I used a function in python for finding the missing value in the database and used data.isnull() for finding null value and then sum of all the counts.

```python
import pandas as pd
import numpy as np

# Loading the Data From each CSV File
Nov = pd.read_csv('November_sales.csv')
Dec = pd.read_csv('December_sales.csv')
Jan = pd.read_csv('January_sales.csv')

# Loading the data and finding the missing values in each file
def print_missing_values(data,file_name):
    print(f"Mising value in {file_name}:")
    check = data.isnull().sum()
    print(check[check>0],"\n")

# Print all the missing values in each file
print_missing_values(Nov,'November_sales.csv')
print_missing_values(Dec,'December_sales.csv')
print_missing_values(Jan,'January_sales.csv')
```

```
Mising value in November_sales.csv:
Opening_time_(AM) (App.)    3
Types_of_services           3
MRP_Rupees                  3
Quantity                    3
Total_sale_amount           3
dtype: int64

Mising value in December_sales.csv:
Opening_time_(AM) (App.)    5
Types_of_services           5
MRP_Rupees                  5
Quantity                    5
Total_sale_amount           5
dtype: int64

Mising value in January_sales.csv:
Opening_time_(AM) (App.)    5
Types_of_services           5
MRP_Rupees                  5
Quantity                    5
Total_sale_amount           5
dtype: int64
```

- **Handling missing values** : I encountered some missing values due to shop closures on certain days. To address this, I replaced missing values in numerical columns with **0**. Since service types are categorical, I filled their missing entries with **"Day Off"**, allowing them to be handled separately during analysis.

```python
# Filling the missing values in each file by numerical and categorical columns
# Numerical value with 0
numerical_column = ['Opening_time_(AM)_(App.)','MRP_Rupees','Quantity','Total_sale_amount']
Nov[numerical_column] = Nov[numerical_column].fillna(0)
Dec[numerical_column] = Dec[numerical_column].fillna(0)
Jan[numerical_column] = Jan[numerical_column].fillna(0)

# Categroical value with Day off
catgroical_column = ['Types_of_services']
Nov[catgroical_column] = Nov[catgroical_column].fillna('Day off')
Dec[catgroical_column] = Dec[catgroical_column].fillna('Day off')
Jan[catgroical_column] = Jan[catgroical_column].fillna('Day off')
```

- **Monthly revenue analysis**: For the monthly total revenue by service type, I excluded days marked as **"Day Off"** from the dataset. Then, I calculated and added the total revenue for each month.

```python
# Calculate monthly revenue by service type, excluding "Day off"
def calculate_monthly_revenue(data, month_name):
    filtered_data = data[data['Types_of_services'] != 'Day off']
    revenue_by_service = filtered_data.groupby('Types_of_services')['Total_sale_amount'].sum()
    print(f"Monthly Revenue for {month_name}:\n{revenue_by_service}\n")
    print(f"Total Revenue for {month_name}: {filtered_data['Total_sale_amount'].sum()}\n")

# Calculate and print revenue for each month
calculate_monthly_revenue(Nov, 'November')
calculate_monthly_revenue(Dec, 'December')
calculate_monthly_revenue(Jan, 'January')
```

- **Total Revenue Analysis**: Analysing Total revenue for all three months by types of services and at the end total revenue of all three months, thus helping us to identify the revenue.

```python
#Combine all three months data into one DataFrame
Total_dataset = pd.concat([Nov, Dec,Jan], ignore_index=True)

#Total revenue by service type, excluding Day_off
filtered_data = Total_dataset[Total_dataset['Types_of_services'] != 'Day off']
total_revenue = filtered_data.groupby('Types_of_services')['Total_sale_amount'].sum()
print(f"Total Revenue by Service Type:\n{total_revenue}\n")
print(f"Total Revenue for all three months: {filtered_data['Total_sale_amount'].sum()}\n")
```

- **Monthly Service Utilisation Analysis**: The analysis focuses on the distribution of services provided each month and calculates the total count of services while excluding "Day off" entries.
  - analyze_service_distribution() : In this function I compute the total number of services provided in a month. In addition, it determines unauthorized utilization by comparing service counts to the average utilization.
  - plot_service_distribution() : Plot the Bar graph using Seaborn Library. And save all the plot.

```python
# Analyze the distribution of services in each month and find the total count of services, excluding "Day off"
def analyze_service_distribution(data, month_name):
    filtered_data = data[data['Types_of_services'] != 'Day off']
    service_count = filtered_data.groupby('Types_of_services')['Quantity'].sum().reset_index()
    service_count.columns = ['Types_of_services', 'Total_Quantity']
    total_services = service_count['Total_Quantity'].sum()
    average_utilization = service_count['Total_Quantity'].mean()
    unauthorized_utilization = service_count[service_count['Total_Quantity'] < average_utilization]

    print(f"Service Distribution in {month_name} :\n{service_count}\n")
    print(f"Total Services in {month_name} : {total_services}\n")
    print(f"Unauthorized Utilization in {month_name}:\n{unauthorized_utilization}\n")
    return service_count

# Analyze and plot service distribution for each month, excluding "Day off"
def plot_service_distribution(data, month_name):
    plt.figure(figsize=(12, 6))
    sns.barplot(x='Types_of_services', y='Total_Quantity', data=data, palette='viridis')
    plt.title(f"Distribution of Services in {month_name}")
    plt.xlabel("Types of Services")
    plt.ylabel("Total Quantity of Services")
    plt.xticks(rotation=45)

    # Annotate each bar with the count value
    for index, row in data.iterrows():
        plt.text(index, row['Total_Quantity'], f"{row['Total_Quantity']}", color='black', ha="center", va="bottom")

    plt.tight_layout()
    plt.savefig(f"assest/{month_name}_service_distribution.png")


# November
Nov_service_count = analyze_service_distribution(Nov, 'November')
plot_service_distribution(Nov_service_count, 'November')

# December
Dec_service_count = analyze_service_distribution(Dec, 'December')
plot_service_distribution(Dec_service_count, 'December')

# January
Jan_service_count = analyze_service_distribution(Jan, 'January')
plot_service_distribution(Jan_service_count, 'January')
```

- **Total service utilisation:** The three-month service utilization analysis highlights seasonal patterns in service demand, enabling better marketing strategies and resource management to enhance client engagement.

```python
# Total Three Months Service Distribution
Total_service_count = analyze_service_distribution(Total_dataset, 'Total Three Months')
plot_service_distribution(Total_service_count, 'Total Three Months')
```

- **Day wise analysis**:A day-wise analysis of service types helps uncover usage patterns across different days. To identify these trends, I utilized a pivot table in an Excel sheet for better data organization and visualization.

Sum of Quantity	Types_of_services							
Day	Color Print	Driving Licence	Lamination	Online form	Pan card	Print	Xerox	Total
Sunday	27	2	8	59	7	48	334	485
Monday	65	25	36	152	36	74	335	723
Tuesday	28	17	15	93	7	61	793	1014
Wednesday	22	12	16	48	12	52	262	424
Thursday	16	9	21	103	29	104	230	512
Friday	36	14	19	103	12	94	244	522
Saturday	33	17	33	97	20	110	265	575
Total	227	96	148	655	123	543	2463	4255

- **Total revenue by service type over three months**: Analyzing total revenue by service over three months is valuable for identifying trends and patterns in service utilization across the period. And also draw the line chart between them using python.

```python
# Plot total revenue by service type over three months using a line chart
def plot_total_revenue_line_chart(data):
    filtered_data = data[data['Types_of_services'] != 'Day off']
    revenue_by_month = filtered_data.groupby(['Types_of_services', 'Month'])['Total_sale_amount'].sum().reset_index()

    # Ensure the month order is November, December, January
    month_order = ['November', 'December', 'January']
    revenue_by_month['Month'] = pd.Categorical(revenue_by_month['Month'], categories=month_order, ordered=True)
    revenue_by_month = revenue_by_month.sort_values('Month')

    plt.figure(figsize=(14, 8))
    sns.lineplot(data=revenue_by_month, x='Month', y='Total_sale_amount', hue='Types_of_services', marker='o', palette='tab10')

    plt.title("Total Revenue by Service Type Over Three Months")
    plt.xlabel("Month")
    plt.ylabel("Total Revenue")
    plt.xticks(month_order)
    plt.legend(title="Types of Services", bbox_to_anchor=(1.05, 1), loc='upper left')
    plt.tight_layout()
    plt.savefig("assest/Total_Revenue_Line_Chart.png")

# Add a 'Month' column to the datasets for plotting
Nov['Month'] = 'November'
Dec['Month'] = 'December'
Jan['Month'] = 'January'

# Combine the datasets again with the 'Month' column
Total_dataset_with_month = pd.concat([Nov, Dec, Jan], ignore_index=True)

# Plot the line chart
plot_total_revenue_line_chart(Total_dataset_with_month)
```

- **Total revenue monthly trend**: Analyzing the trend between the total revenue by month. This is very helpful for finding which month revenue is lowest and which month is highest. And also create line chart for better visualization.

```python
# Calculate total revenue by month
def calculate_total_revenue_by_month(data):
    total_revenue_by_month = data.groupby('Month')['Total_sale_amount'].sum().reset_index()

    # Ensure the month order is November, December, January
    month_order = ['November', 'December', 'January']
    total_revenue_by_month['Month'] = pd.Categorical(total_revenue_by_month['Month'], categories=month_order, ordered=True)
    total_revenue_by_month = total_revenue_by_month.sort_values('Month')

    print("Total Revenue by Month:")
    print(total_revenue_by_month)

    return total_revenue_by_month

# Plot total revenue by month using a line chart
def plot_total_revenue_by_month(data):
    plt.figure(figsize=(10, 6))
    sns.lineplot(x='Month', y='Total_sale_amount', data=data, marker='o', color='blue')

    plt.title("Total Revenue by Month")
    plt.xlabel("Month")
    plt.ylabel("Total Revenue")
    plt.xticks(rotation=45)

    # Annotate each point with the revenue value
    for _, row in data.iterrows():
        plt.text(row['Month'], row['Total_sale_amount'], f"{row['Total_sale_amount']:.2f}", color='black', ha="center", va="bottom")

    plt.tight_layout()
    plt.savefig("assest/Total_Revenue_By_Month_Line_Chart.png")

# Calculate and plot total revenue by month
total_revenue_by_month = calculate_total_revenue_by_month(Total_dataset_with_month)
plot_total_revenue_by_month(total_revenue_by_month)
```

- **Week wise Analysis**: Analyzing the weekly trends between service types and weeks is highly beneficial in identifying the most engaged services and determining the best-performing weeks. A pivot table was used for this analysis.

Sum of Quantity	Week							
Types of services	Color Print	Driving Licence	Lamination	Online form	Pan Card	Print	Xerox	Grand Total
2024-44	8	3	3	17	2	36	48	117
2024-45	22	7	7	61	12	36	60	205
2024-46	24	10		85	6	30	283	438
2024-47	12	11	14	42	9	38	181	307
2024-48	21	5	21	75	8	31	146	307

2024-49	23	8	17	27	10	31	78	194
2024-50	12	7	10	38	18	22	118	225
2024-51	23	7	2	22	6	78	371	509
2024-52	10	8	11	62	11	25	140	267
2025-1	13	1	12	33	7	18	321	405
2025-2	16	2	11	49	7	44	198	327
2025-3	16	7	12	61	12	30	265	403
2025-4	22	13	21	40	10	79	161	346
2025-5	5	7	7	43	5	45	93	205
Grand Total	**227**	**96**	**148**	**655**	**123**	**543**	**2463**	**4255**

- **Finding the top 3 average types of services based on quantity and amount**: Identifying the top three services based on average quantity and revenue helps in strategizing ways to improve underperforming services while enhancing the demand and pricing of high-performing ones. Additionally, it provides insights into customer satisfaction with various services.

```python
# Find the top 3 average types of services based on quantity and amount
def find_top_3_services(data):
    # Exclude "Day off" services
    filtered_data = data[data['Types_of_services'] != 'Day off']

    # Calculate average quantity and amount by service type
    avg_metrics = filtered_data.groupby('Types_of_services').agg(
        Avg_Quantity=('Quantity', 'mean'),
        Avg_Amount=('Total_sale_amount', 'mean')
    ).reset_index()

    # Sort by average quantity and amount to find the top 3
    top_3_quantity = avg_metrics.nlargest(3, 'Avg_Quantity')
    top_3_amount = avg_metrics.nlargest(3, 'Avg_Amount')

    print("Top 3 Services by Average Quantity:")
    print(top_3_quantity, "\n")

    print("Top 3 Services by Average Amount:")
    print(top_3_amount, "\n")

    return top_3_quantity, top_3_amount

# Find and print the top 3 services
top_3_quantity, top_3_amount = find_top_3_services(Total_dataset_with_month)
```

```
Top 3 Services by Average Quantity:
  Types_of_services  Avg_Quantity  Avg_Amount
6             Xerox     32.840000   65.680000
3       Online form      8.733333  698.666667
5             Print      7.647887   76.478873

Top 3 Services by Average Amount:
  Types_of_services  Avg_Quantity  Avg_Amount
3       Online form      8.733333  698.666667
0       Color Print      3.783333  302.666667
1   Driving Licence      2.232558  178.604651
```

- **Analyze the relationship between opening time and types of service quantity** : Analyzing the relationship between opening hours and service types helps identify peak customer visit times and the most utilized services during specific hours. Additionally, a line chart was plotted to visualize these trends effectively.

```python
# Analyze the relationship between opening time and types of service quantity
def analyze_opening_time_with_service_quantity(data):
    # Exclude "Day off" services
    filtered_data = data[data['Types_of_services'] != 'Day off']

    # Group by opening time and types of services to calculate total quantity
    opening_time_analysis = filtered_data.groupby(['Opening_time_(AM)_(App.)', 'Types_of_services'])['Quantity'].sum().reset_index()

    print("Analysis of Opening Time with Types of Service Quantity:")
    print(opening_time_analysis)

    return opening_time_analysis

# Plot the relationship between opening time and types of service quantity
def plot_opening_time_with_service_quantity(data):
    plt.figure(figsize=(14, 8))
    sns.lineplot(data=data, x='Opening_time_(AM)_(App.)', y='Quantity', hue='Types_of_services', marker='o', palette='tab10')

    plt.title("Opening Time vs Types of Service Quantity")
    plt.xlabel("Opening Time (AM) (Approx.)")
    plt.ylabel("Total Quantity of Services")
    plt.xticks(rotation=45)
    plt.legend(title="Types of Services", bbox_to_anchor=(1.05, 1), loc='upper left')
    plt.tight_layout()
    plt.savefig("assest/Opening_Time_vs_Service_Quantity.png")

# Perform analysis and plot
opening_time_analysis = analyze_opening_time_with_service_quantity(Total_dataset_with_month)
plot_opening_time_with_service_quantity(opening_time_analysis)
```

- **Finding exact monthly revenue by subtracting expenses** : The shop owner also provided monthly expense data. By subtracting the total expenses from the monthly revenue, I obtained the net revenue, which highlighted a significantly low income rate.

```python
# Calculate exact monthly revenue by subtracting expenses
def calculate_exact_monthly_revenue(data, monthly_expense):
    exact_revenue_by_month = data.groupby('Month')['Total_sale_amount'].sum().reset_index()
    exact_revenue_by_month['Exact_Revenue'] = exact_revenue_by_month['Total_sale_amount'] - monthly_expense

    # Ensure the month order is November, December, January
    month_order = ['November', 'December', 'January']
    exact_revenue_by_month['Month'] = pd.Categorical(exact_revenue_by_month['Month'], categories=month_order, ordered=True)
    exact_revenue_by_month = exact_revenue_by_month.sort_values('Month')

    print("Exact Monthly Revenue (after subtracting expenses):")
    print(exact_revenue_by_month)

    return exact_revenue_by_month

# Plot exact monthly revenue using a line chart
def plot_exact_monthly_revenue(data):
    plt.figure(figsize=(10, 6))
    sns.lineplot(x='Month', y='Exact_Revenue', data=data, marker='o', color='green')

    plt.title("Exact Monthly Revenue by Month")
    plt.xlabel("Month")
    plt.ylabel("Exact Revenue")
    plt.xticks(rotation=45)

    # Annotate each point with the exact revenue value
    for _, row in data.iterrows():
        plt.text(row['Month'], row['Exact_Revenue'], f"{row['Exact_Revenue']:.2f}", color='black', ha="center", va="bottom")

    plt.tight_layout()
    plt.savefig("assest/Exact_Monthly_Revenue_Line_Chart.png")

# Calculate and plot exact monthly revenue
monthly_expense = 18400
exact_monthly_revenue = calculate_exact_monthly_revenue(Total_dataset_with_month, monthly_expense)
plot_exact_monthly_revenue(exact_monthly_revenue)
```

📷 Analysis

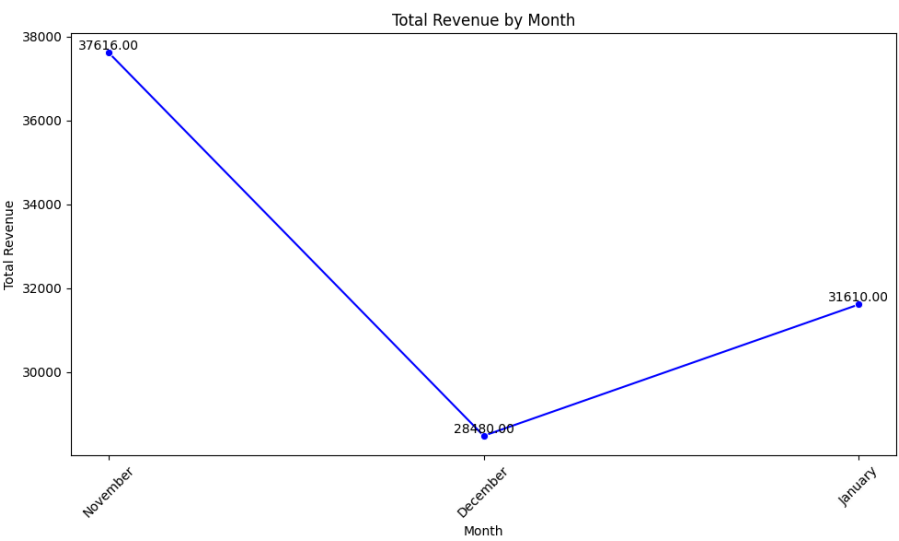# 3. Results and Findings

3.1 Monthly revenue analysis

Fig 3.11

- Figure 3.11 clearly illustrates a noticeable drop in total revenue from November to December, followed by an increase in January. November records the highest revenue, largely due to the start of private college and university admission processes during this month. In contrast, December, being the year's end, sees a decline. Revenue rises again in January as it marks the beginning of the year, with many new application forms opening during this period.

3.2 Service distribution by services (Quantity Based)

Fig 3.21

Fig 3.22

Distribution of Services in January
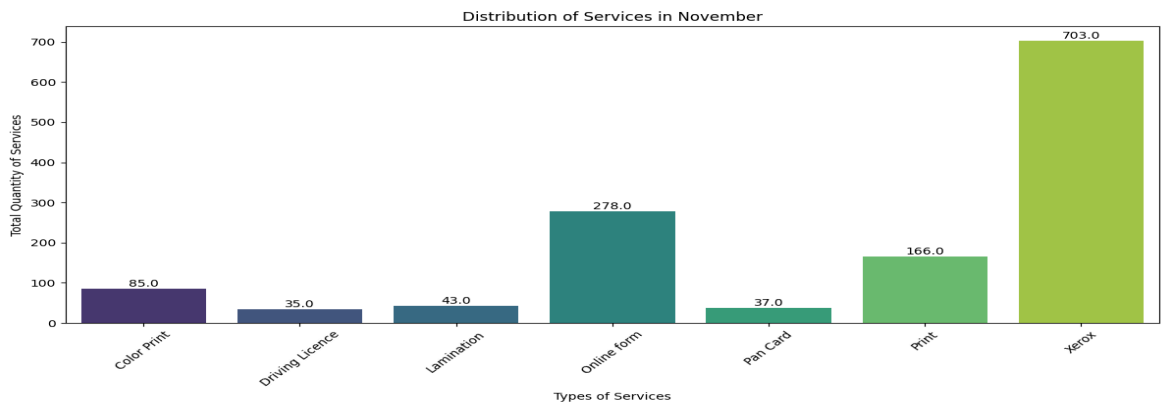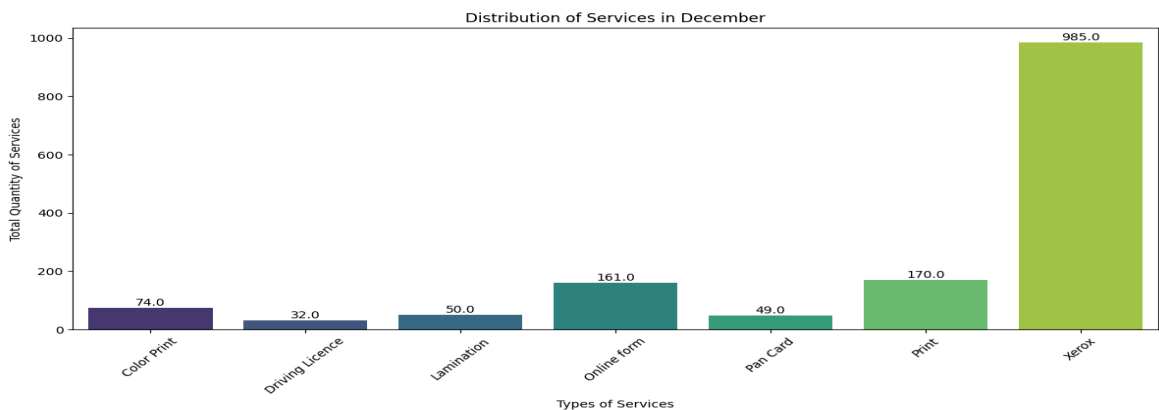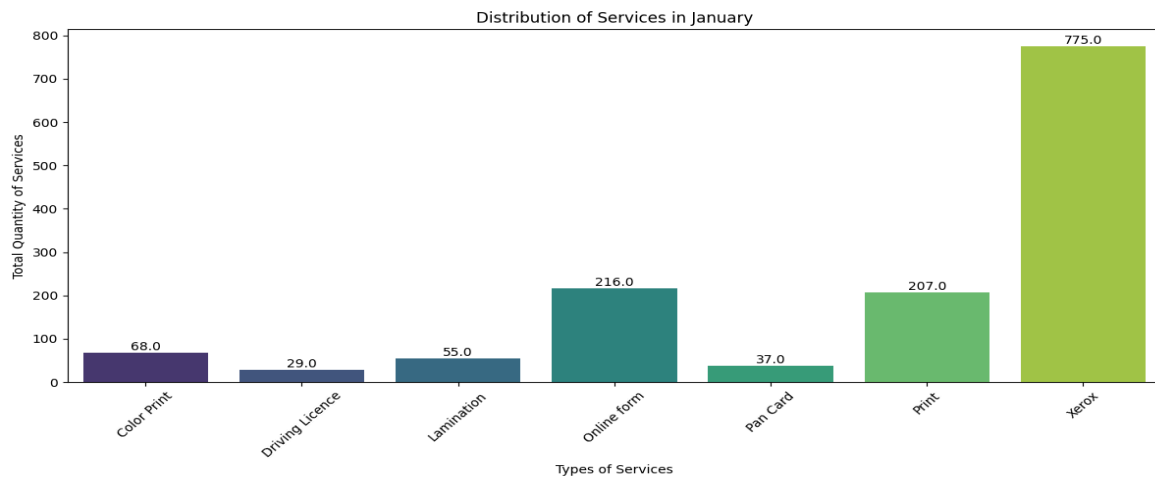
Fig 3.23

- Figure 3.21 shows that in November, services like Xerox, Online Form, and Print generated the highest quantities. Xerox, in particular, had a significantly higher quantity compared to other services due to its high demand. However, despite its volume, it contributed minimally to the total revenue, as it is a low-cost service. Nevertheless, Xerox remains valuable because it is quick and efficient. Online Form services recorded the second-highest quantity in November, driven by the beginning of numerous college and university admission processes

- Figure 3.22 shows that the distribution of services in December is quite similar to that of November, with a few differences. While Xerox services remain very high, the use of Online Form services drops significantly compared to November. Print and other services show relatively similar patterns between the two months. The decline in Online Form services is likely due to December being the end of the year.

- Figure 3.23 shows that the distribution of services in January is quite similar to November, with a slight increase compared to December. Xerox and Online Form services are higher in January than in December, while Print services are much lower than in November but remain close to December levels. Other services show little change. In my opinion, the rise in Online Form services is due to the start of the new year.
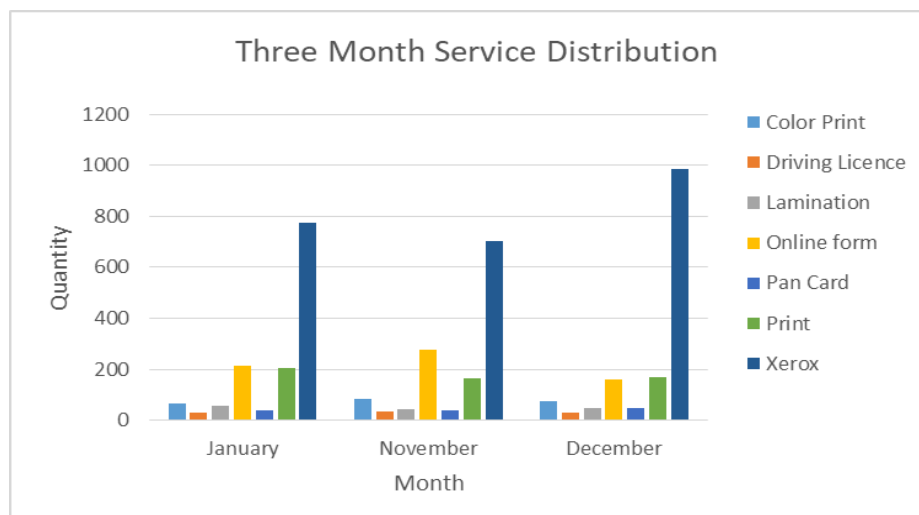
Fig 3.24

- Figure 3.24 indicates the overall distribution of services from November to January. Xerox, Online form and Print services are higher than other services.

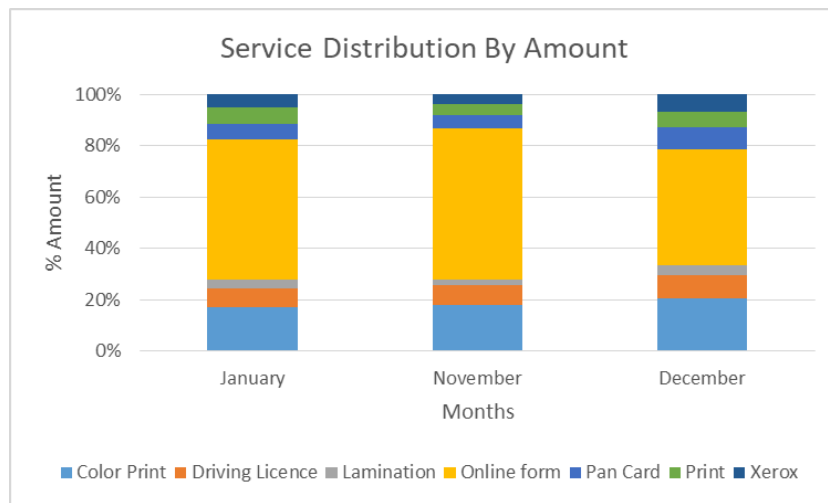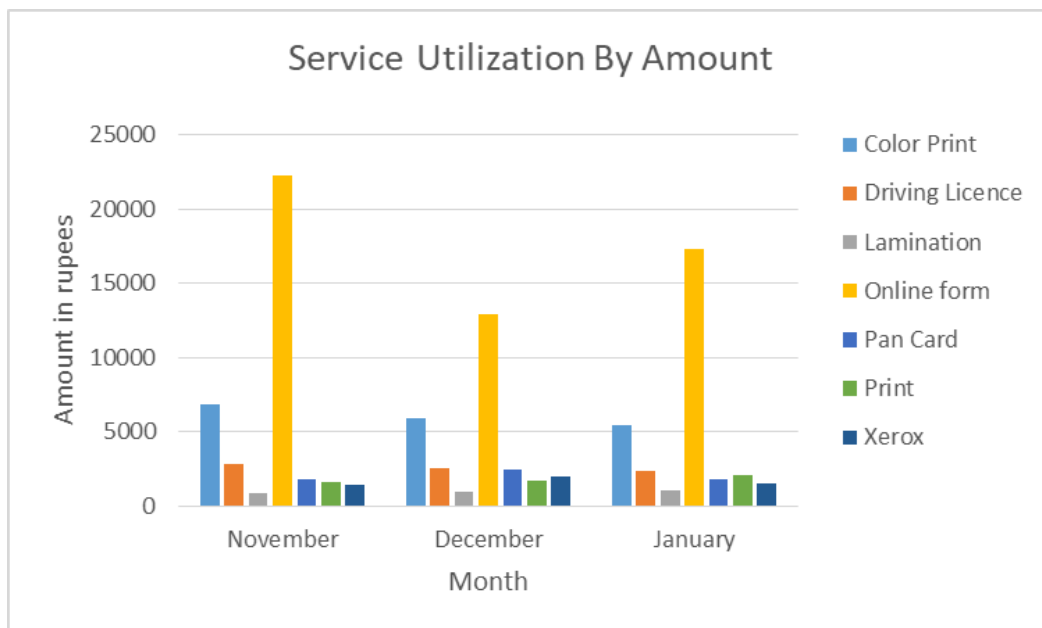## 3.3 Service distribution by months (Amount Based)

Fig 3.31

Fig 3.32

- Figure 3.31 displays the distribution of services by total amount using a pie chart. Across all three months, Online Form services contribute the highest percentage to the total amount, while Lamination and Xerox contribute the least. Although Xerox has a high quantity, its contribution to the overall revenue is minimal, a trend also seen with Print services. An important observation is that Color Print, despite having a relatively low quantity, accounts for around twenty percent of the total revenue.
- Figure 3.32 presents the same information in a different format. The pie chart highlights the percentage distribution, while the bar chart reveals the monthly trends for each service. It is observed that the amount for Color Print remains relatively constant, whereas the trend for Online Form services follows a parabolic pattern.
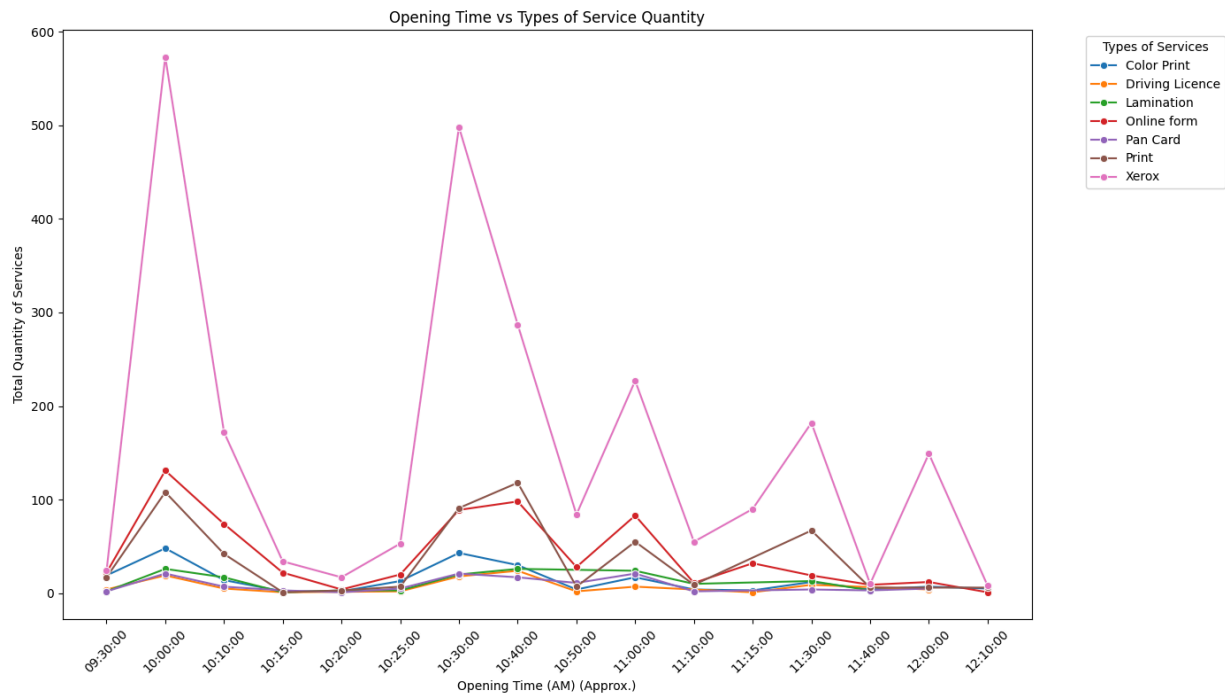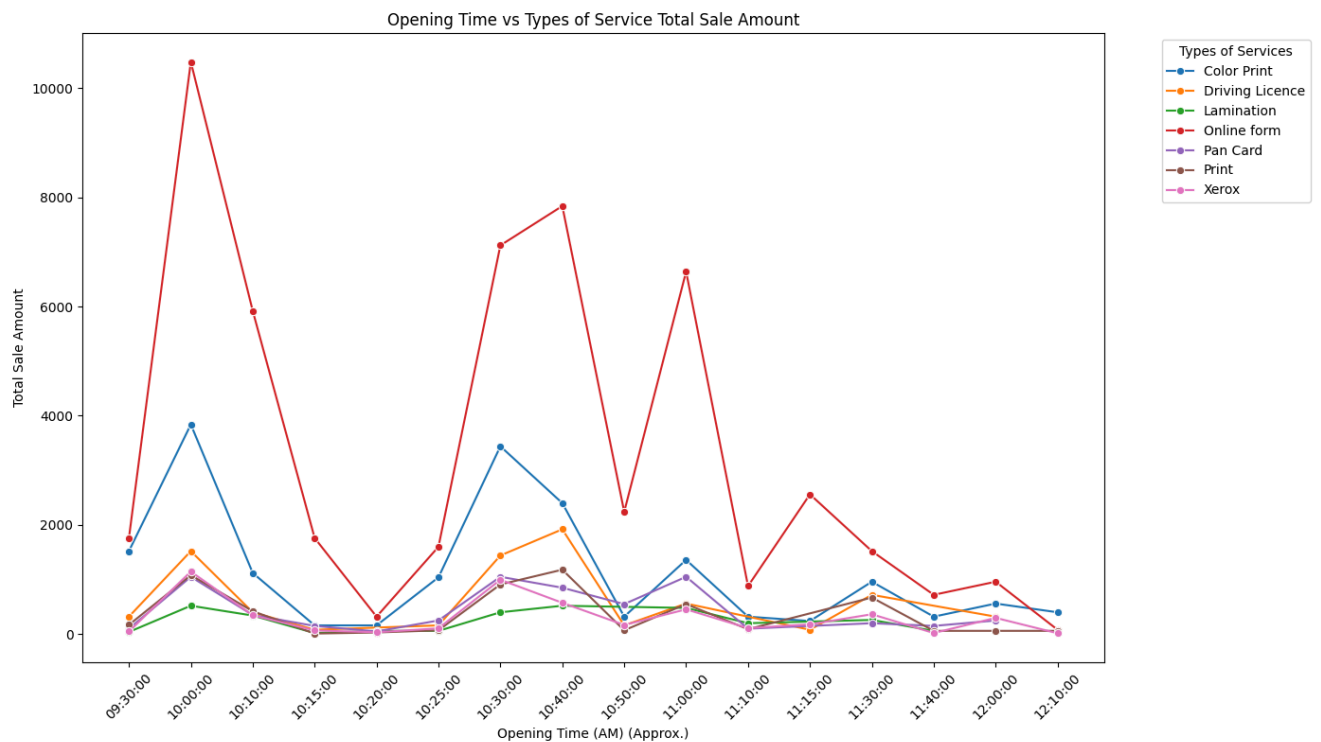
3.4 Opening Time Analysis

Fig 3.41

Fig 3.42

- Fig 3.41 the graph *"Opening Time vs Types of Service Quantity"* shows the total quantity of different services provided from 9:30 AM to 12:10 PM. I noticed that the busiest time is between 9:50 AM and 10:40 AM, especially for Xerox and Print services. After 11:00 AM, the demand across all service types

declines gradually. Online form submissions peak around 10:00 AM and 10:40 AM, similar to Print services, but their quantity remains significantly lower than Xerox.

- Fig 3.42 this graph indicates the total revenue generated by different service types between 9:30 AM and 12:10 PM. Online Form services dominate the sales performance, showing multiple significant peaks.Color Print services also contribute noticeably, with smaller peaks around 10:00 AM and 10:30 AM. Meanwhile, services like Xerox, Lamination, and Pan Card consistently generate smaller amounts of revenue throughout the morning.
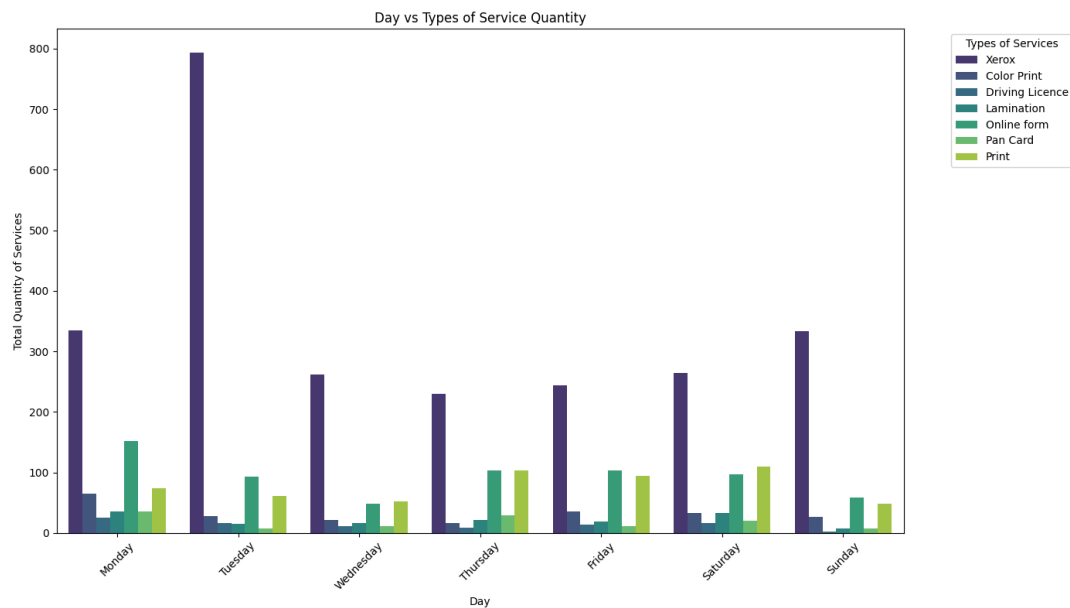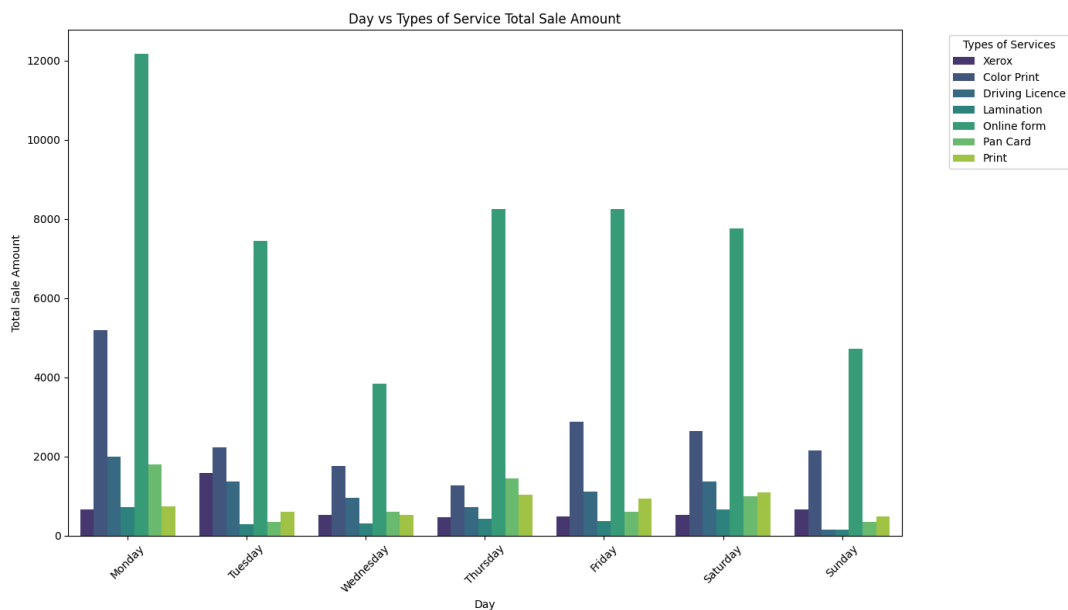
3.5 Day and Types of Services Analysis

Fig 3.51

Fig 3.52

- Fig 3.51 clearly shows the total quantity of different services provided throughout the week.Xerox services clearly dominate every day of the week, especially on Tuesday. Online Form services are the

second most popular, particularly on Monday. Print, Color Print and other services maintain steady but smaller volumes throughout the week.

- Fig 3.52 indicates the total revenue generated by different service types across each day of the week. Online Form services dominate sales throughout the week, especially on Monday. Color Print services also show significant sales, particularly on Monday. Driving Licence and Lamination services contribute steadily. Print services show consistent earnings every day, peaking a bit on Thursday and Saturday. Xerox and other services generate relatively low total revenue.
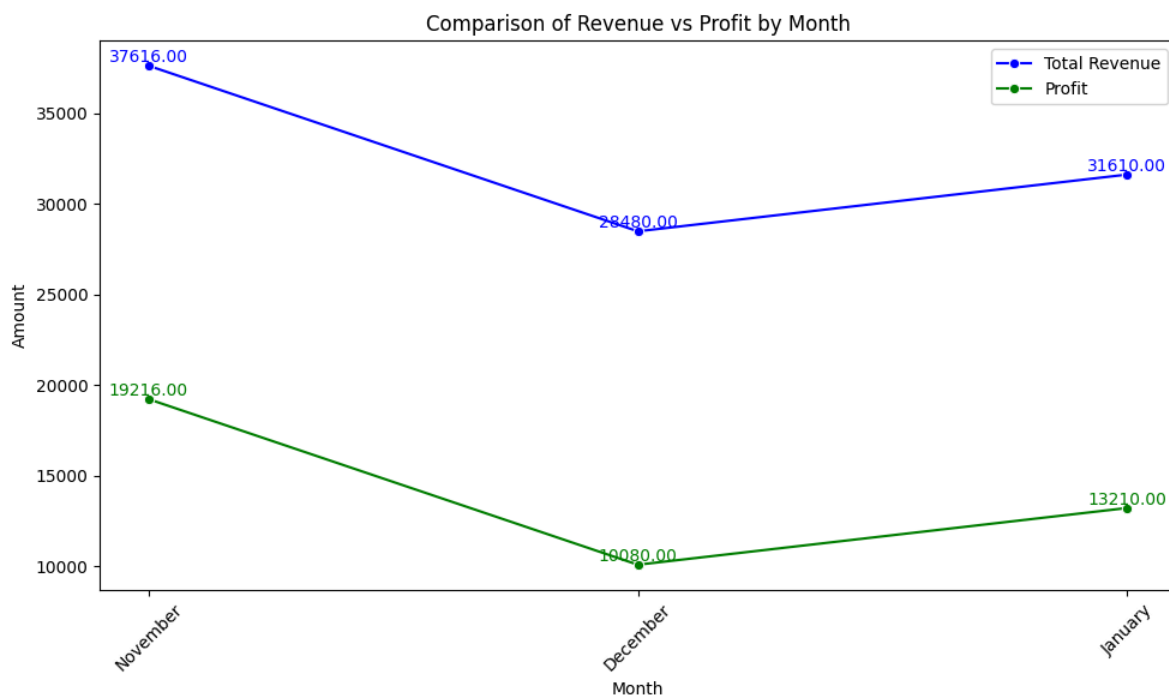
3.6 Profit Analysis

Fig 3.61

- Figure 3.61 illustrates the monthly comparison between total revenue and Profit between November to January. The Profit represents the actual revenue after deducting a fixed monthly expense of ₹18,400 from the total revenue. From the graph, it is evident that monthly expenses are significantly high. It was identified that the high shop rent is a major contributor to these elevated monthly expenses

4. Interpretation of Results and Recommendation

4.1 **Monthly revenue analysis**

- Interpretation : There is a sharp decline in revenue from November to December, followed by a recovery in January. November is the highest revenue month, likely due to the open admission form in private colleges and universities, which typically open during this month. December experienced a revenue drop, coinciding with the end-of-year period when academic activities slow down and many Online forms are closed. In January, revenue rebounded as new academic and admission cycles began, leading to an increase in application form openings.

- Recommendation: Increasing marketing and operational efforts in November and January to maximize the benefits of the admission cycles. Offering discounts in charging could further boost revenue during these high-demand months. To counter the December slowness, targeted promotional campaigns and early bird offers could be introduced before the holiday season to maintain engagement and revenue. Introduce services and create marketing that are less seasonal to maintain a steady income during low-demand periods like December.

4.2 **Service distribution by services (Quantity Based)**

- Interpretation : The most popular services are *Xerox* and *Online form* in the three months. Xerox is reflecting their high demand due to affordability and efficiency. Online Form services ranked second because many online forms are filling in one month just as College form, Cast Certificate, Bonafide etc. Other services such as Color Print , Driving License , Lamination , and Pan Card showed relatively lower quantities. Other services show minimal variation, maintaining their lower demand.

- Recommendation :
  a. Focus on High-Demand Services : Xerox consistently generates the highest quantity across all months. While it contributes minimally to revenue due to its low cost, it is essential for maintaining customer flow. Consider optimizing operations for Xerox services by investing in faster machines or increasing service points.
  b. Promote Online Form Services:Online Form services exhibit seasonal demand tied to academic and administrative cycles. Develop marketing strategies targeting peak periods (e.g., November and January). Collaborate with educational institutions or government offices for bulk service opportunities.

c. Diversify Revenue Streams: Low-demand services like Color Print, Driving License assistance, Lamination, and Pan Card processing could be bundled with other offerings or promoted during off-peak times to increase their utilization.

4.3 Service distribution by months (Amount Based)

- Interpretation : The analysis of service utilization by amount reveals distinct trends across November, December, and January.Online Form services consistently contribute the highest revenue, despite fluctuations in demand. In December, Online Form services experienced a decline in revenue compared to November. In December, Online Form services experienced a decline in revenue compared to November. However, Color Print, which is the second highest revenue generation service, maintains a steady contribution to total revenue, indicating consistent usage and pricing stability. Xerox and Print continue their trend of high quantity but low revenue impact. Lamination and Pan Card services show minimal changes in revenue generation.
- Recommendation :
  a. Capitalize on Online Form Services: Develop targeted marketing campaigns aligned with academic and administrative cycles to maximize demand.
  b. Enhance Color Print Offerings: Consider introducing premium options such as advanced designs or high-quality materials to further increase profitability.

4.4 Opening Time Analysis

- Interpretation :
  a. Based on total sale amount: The peak hours are 9:30 to 10:50 AM. Online Form services generate the highest revenue during peak hours. Color Print services maintain relatively consistent revenue throughout the observed time. Other services, such as Driving License, Lamination, Pan Card, and Print, show minor fluctuations but contribute less to total sales. Xerox services generate minimal revenue despite their high quantity.
  b. Based on total quantity of services : The peak hours are the same which is 9:30 to 10:50 AM. Xerox services dominate in terms of quantity. Online Form services exhibit a parabolic trend in quantity.Other services, including Color Print, Driving License assistance, Lamination, and Pan Card processing, show relatively low quantities across all time slots.
- Recommendation : Focus on Online Form services during peak hours (9:30 AM and 10:50 AM) by ensuring adequate staffing and resources to handle the demand efficiently.Combine low-revenue services like Lamination and Pan Card processing with more popular offerings (e.g., Xerox or Online Form) to enhance their utilization and overall revenue. Develop marketing strategies targeting Online Form services during peak hours to maximize profitability.

4.5 Opening Time Analysis:

- Interpretation : Monday is the busiest day for both sales revenue and service quantity, indicating higher customer demand.Weekends (Saturday and Sunday) show moderate activity but are still significant contributors.Mid-week days (Tuesday to Thursday) generally have lower sales and service quantities compared to Monday and Friday.

- Recommendation : Focus on the marketing efforts on promoting high-revenue services like Online Forms on peak days (Monday and Friday) to maximize profits. Allocate at least one staff and resources on peak days (Monday and Friday) to handle increased demand efficiently. Introduce discounts or loyalty programs for mid-week days (Tuesday to Thursday) to boost sales during slower periods. Monitor customer preferences closely for any shifts in demand patterns over time to adjust strategies accordingly.

4.6 Profit Analysis:

- Interpretation : The gap between Total Revenue and Profit is substantial across all months, indicating high costs or inefficiencies. December experiences the lowest revenue figures for both metrics, potentially due to seasonal factors or operational challenges. January shows signs of recovery but does not reach November's performance levels.

- Recommendation :
  a. Cost Optimization: Investigate the reasons for the large gap between Total Revenue and Profit. Analyze operational costs (e.g., staffing, materials) to identify areas for cost reduction. Review pricing strategies to ensure profitability without compromising competitiveness
  b. Operational Efficiency: Conduct a detailed audit of processes contributing to revenue deductions (e.g., refunds, discounts) to improve efficiency. Optimize resource allocation during peak months like November to maximize profitability.
  c. Long-Term Planning : Develop contingency plans for periods of low demand (e.g., December) by diversifying service offerings or targeting new customer segments.
  d. Monitor monthly revenue trends closely to adjust strategies proactively based on performance patterns.

4.7 Conclusion:

- **Revenue Optimisation :** To maximize revenue, targeted marketing campaigns during peak months and promotional offers during off-peak periods are essential. Introducing loyalty programs and discounts can further boost client retention and engagement.

- **Service Utilisation** : High-demand services like Online Form and Color Print should be prioritized for marketing and operational focus. Additionally, services like Money Transfer, Account Opening Forms, and Business Registration Forms should be introduced. A targeted marketing campaign should be launched to promote and boost the visibility of lower-demand services.

- **Cost effectiveness and Quality** : The gap between total revenue and profit highlights high operational costs, largely driven by elevated shop rent. You can replace your shop location with high engagement and low rent. Upselling premium services like advanced Color Print options can further increase profitability without significant resource investment.

- **Customer Behaviour** : Allocating resources effectively during peak hours and days can improve customer satisfaction while maintaining operational efficiency. Discounts or loyalty programs during slower periods can help boost sales.

- **Marketing efficiency**: Use social media platforms to build strong engagement with customers. Utilize WhatsApp community groups for marketing purposes and to keep customers informed about upcoming forms. Post classified ads in newspapers and across various social media channels. To create great customer engagement, make use of the latest technologies.

- **Operational Problem Solution**:
  a. Staff Shortage Problem : To address the issue of staff shortages, classified advertisements can be placed in newspapers and other social media outlets to attract potential candidates. Additionally, spreading the word through personal networks, such as colleagues, relatives, and acquaintances, can help find suitable individuals for the job. This approach leverages both formal advertising and informal referrals to fill staffing gaps effectively.
  b. Server Failure :Server failure is a common yet significant challenge. To mitigate this issue, adopting high-speed broadband services can improve network reliability. Identifying the specific type of error, such as a 404 error for internal problems, is crucial for timely resolution. During server downtime, engaging with customers proactively can maintain their interest. For example, collecting customer contact information allows businesses to notify them when the server is restored, ensuring better communication and customer retention.

- **Dedicated data analysis** : As data availability continues to grow alongside a wide range of analytical tools, establishing a dedicated data analysis team has become increasingly important. This team would consistently track the shop's performance in both services and marketing, helping to ensure steady growth in the years ahead.