

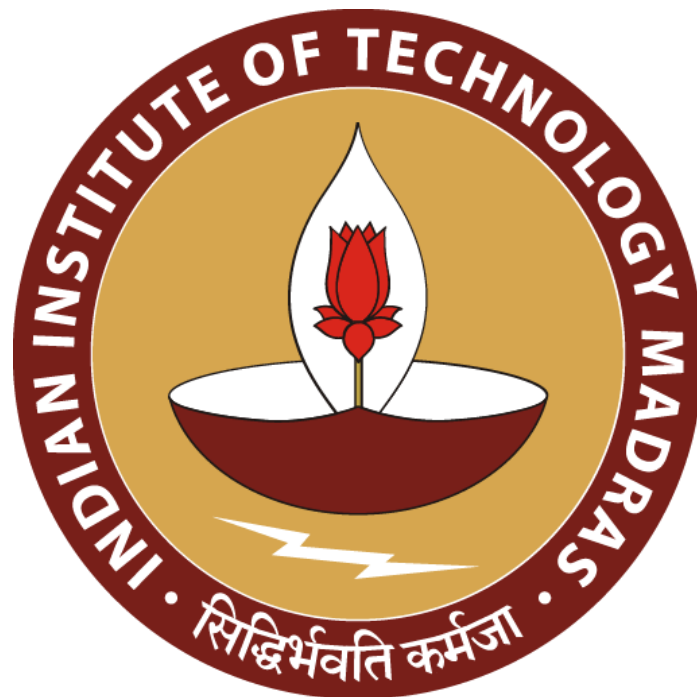
# ENHANCING OPERATIONAL EFFICIENCY, SPACE AND INVENTORY MANAGEMENT AT ‘JJ BEAUTY SALON’

Final-Submission Report for the BDM Capstone Project

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# Executive Summary and Title

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## Title:

### **ENHANCING OPERATIONAL EFFICIENCY, SPACE AND INVENTORY MANAGEMENT AT 'JJ BEAUTY SALON'**

JJ Beauty Salon, located in S.V. Nagar, Nagaram, Hyderabad, was established in August 2024 to provide a range of personal grooming services including skincare, haircare, nail art, makeup, and saree draping. The salon caters to both in-store clients and home service requests, especially for bridal and special occasion bookings. With a steadily growing clients, the salon has demonstrated strong potential in its market segment.

However, like many emerging businesses, JJ Beauty Salon currently faces certain operational challenges. These include limited physical space, manual inventory tracking, and reliance on paper-based scheduling and financial records. These factors collectively impact service throughput, inventory availability, and overall operational clarity.

This project aims to support the salon's transition into a more streamlined and data-informed model. Using data analysis techniques, various operational areas were studied to identify improvement opportunities ranging from resource allocation to client flow and inventory utilization. The broader objective is to enhance efficiency, reduce waste, and ultimately improve the customer experience.

The insights generated in this report are intended to guide the salon's decision-making in areas such as process automation, appointment optimization, and inventory management. The recommendations provided are practical, scalable, and aligned with the salon's long-term goal of delivering high-quality, customer-focused service in a growing competitive environment.

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## Detailed Explanation of Analysis processes and methods

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### **Data Collection:**

Data was collected directly from the salon owner's handwritten records, covering services rendered, fees charged, and inventory usage. The analysis period was Feb 1st to March 4th, 2025. Synthetic inventory data was also generated to estimate product usage tied to specific services.

### **Data Acquisition:**

The data acquisition phase posed several challenges that extended beyond technical effort. Early attempts to approach salon owners directly with data requests were met with resistance, primarily due to a lack of established trust. Over time, it became evident that building rapport and showing a genuine interest in their business operations was essential.

However, in the case of JJ Beauty Salon, being a regular client helped significantly in establishing trust and easing the data sharing process. The pre-existing relationship created a sense of familiarity and openness, which made discussions about the business and its data more comfortable and collaborative.

Initially, it was difficult to communicate the value of data analysis to the business owner, as they were unsure how such insights could translate into real improvements. By shifting the focus to mutual understanding and engaging in regular conversations, I was able to demonstrate how tracking services and inventory could reveal patterns to support decision-making. This iterative and empathetic engagement helped build credibility.

Ultimately, JJ Beauty Salon's owner responded positively to the structured approach. This cooperation marked a significant milestone in the project and emphasized the importance of relationship-building in successful data acquisition.

## **Identifying Challenges:**

Before initiating the analysis, several practical and contextual challenges were encountered. One key issue was the business owner's reliance on handwritten records, which were not organized for analytical purposes. This required careful manual transcription and verification.

Additionally, there was initial hesitation from the business owner about sharing internal details. Many small business owners, including at JJ Beauty Salon, perceive data analysis as unnecessary or too complex. The absence of a formal tracking system for inventory usage and appointment timings further complicated structured data collection.

Furthermore, understanding the actual data needs of the salon took time. Clarifying mutual expectations and shaping a focused data plan were essential steps in overcoming these challenges.

## **Data Cleaning and Preparation:**

Data was manually entered into Microsoft Excel. Inconsistencies in service names were standardized, and missing values were either imputed or excluded. All numeric columns were validated for accurate calculation.

## **Objectives of Analysis:**

1. Understand the general trends in service usage and revenue generation.
2. Assess the relationship between client volume, service types, and appointment characteristics.
3. Examine inventory utilization patterns to improve product stocking and reduce waste.

### **a) Service Revenue and Client Trends**

To understand service usage trends and how revenue fluctuates across services, a summary table was created that captures **total revenue**, **number of clients served**, and the **scaled revenue** per service. The revenue and client data were merged to assess each service's popularity and financial contribution. The revenue values were then scaled down to simplify cross-comparison.

In addition, **descriptive statistics** were computed across 42 individual appointment records, capturing mean and variation in revenue, profit, time spent per appointment, and inventory usage. This allowed an assessment of central tendencies (e.g., average profit per session) and revealed diversity in customer service types: from quick threading sessions to more intensive keratin or bridal packages. Key metrics such as **mean service duration (~59 minutes)** and **mean revenue per appointment (~₹1,012)** help benchmark operational capacity.

The client volume and time data were visualized through **histograms and boxplots**, examining variation in service duration and clustering of appointment lengths. These were used to understand **appointment structuring and staff workload distribution** over time.

### **b) Appointment Demand and Efficiency Insights**

By plotting revenue alongside client count, the presence of **large-value services** (such as bridal or keratin packages) was distinguished from periods of steady, high-volume traffic (like threading or facials).

To further explore efficiency, relationships between **time spent** and **profit earned** per session were plotted. This visualization helps assess whether longer services proportionally yield higher profits or if shorter, high-frequency services are more efficient in terms of revenue per minute of staff time.

### **c) Inventory Usage and ABC Classification**

An **ABC analysis** was performed to categorize products based on their contribution to total inventory cost. Inventory items were listed along with their usage cost, arranged in descending order of consumption value. The cumulative contribution percentage was calculated, and items were classified into **‘A’, ‘B’, and ‘C’ categories**, where:

- A: High-value, critical items (small in number, major cost contributors)
- B: Moderate-value, mid-tier items
- C: Low-value, bulk inventory

This categorization allows differentiated control for each inventory group. For example, ‘A’ items require close monitoring and frequent restocking, while ‘C’ items can be purchased in bulk and managed with relaxed oversight.

Further, a **service-wise inventory cost table** was developed by attributing average product consumption per service. This supports a form of **activity-based costing (ABC accounting)** and helps align product usage with revenue. A **gross margin approximation** was derived per service (Revenue – Inventory Cost), facilitating the identification of high-ROI services.

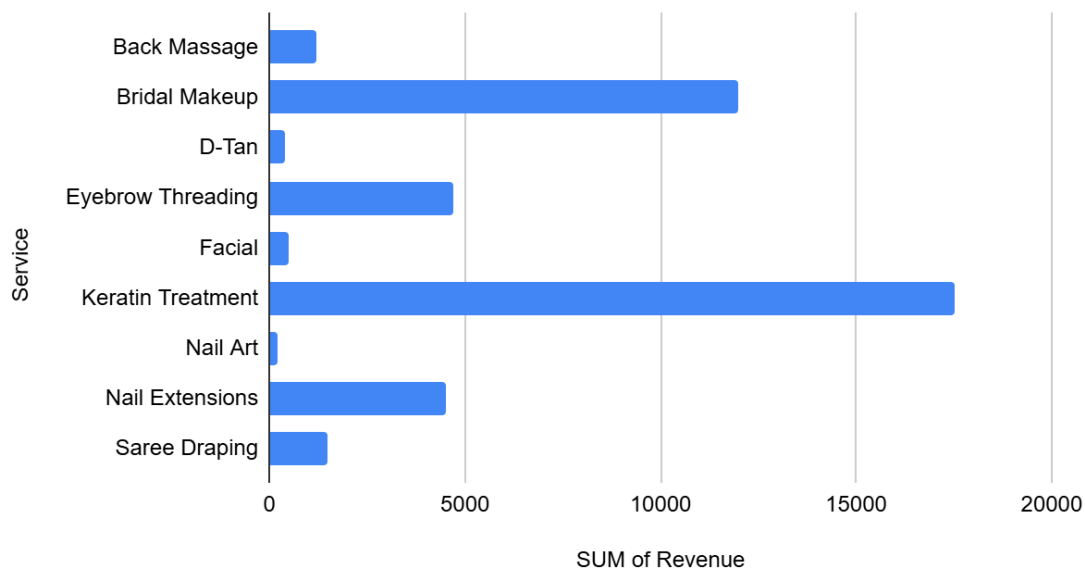
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## Results, Findings, and Interpretation of Results

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### Service-Wise Revenue Summary

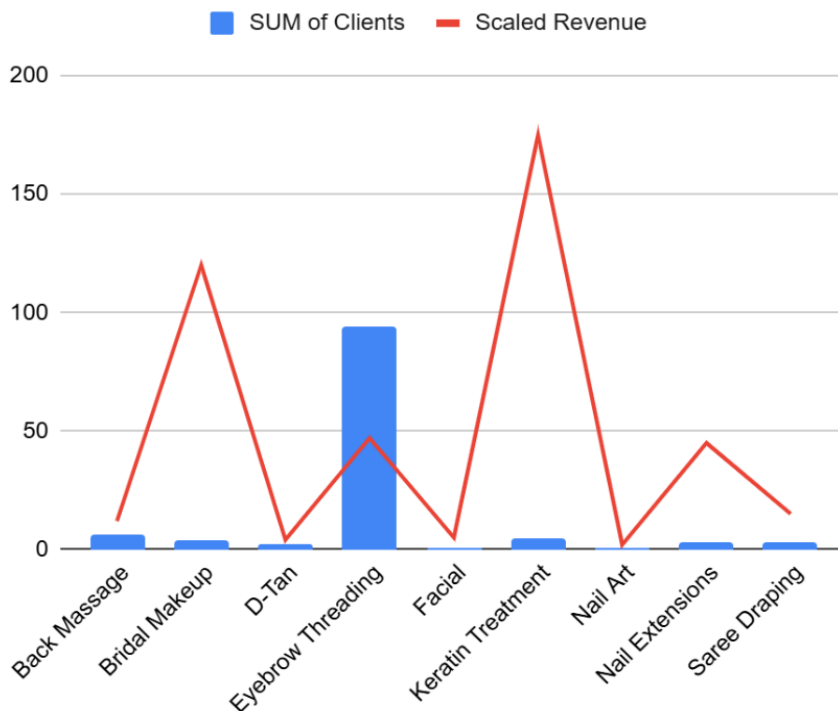
SUM of Revenue vs. Service



This graph shows the total revenue earned from each service, providing a clear breakdown of income generated by the salon's service offerings. Services like **Keratin Treatment (₹17,500)** and **Bridal Makeup (₹12,000)** dominate the revenue chart, whereas **D-Tan (₹400)** and **Nail Art (₹200)** are at the lower end. The methodology involves grouping transactional data by service type and summing the revenue associated with each. This analysis is crucial for identifying high-yield services and aligns with **Pareto's Principle (80/20 rule)**, helping the salon prioritize services that contribute the most to overall income. It informs marketing strategies, pricing models, and resource allocation by spotlighting the most profitable segments.

## Service Performance – Client Volume vs. Revenue Impact

Service Performance: Client Volume vs. Revenue Impact



The clustered chart is built to illustrate the comparative performance of various services at JJ Beauty Salon by plotting **total clients served (bars)** and **scaled revenue (line)** for each service type. This plot combines frequency of demand with financial contribution, helping to distinguish **volume-driven** services from **value-driven** ones.

### • Volume Leaders vs. Revenue Drivers:

**Eyebrow Threading** stands out with the highest number of clients, reflecting its popularity and accessibility. However, its scaled revenue remains modest compared to premium services, confirming it as a **volume-heavy, low-ticket service**. In contrast, **Keratin Treatment** and **Bridal Makeup** exhibit low client counts but exceptionally high scaled revenue, positioning them as **high-value, low-frequency services**.

### • Strategic Insights for Resource Allocation:

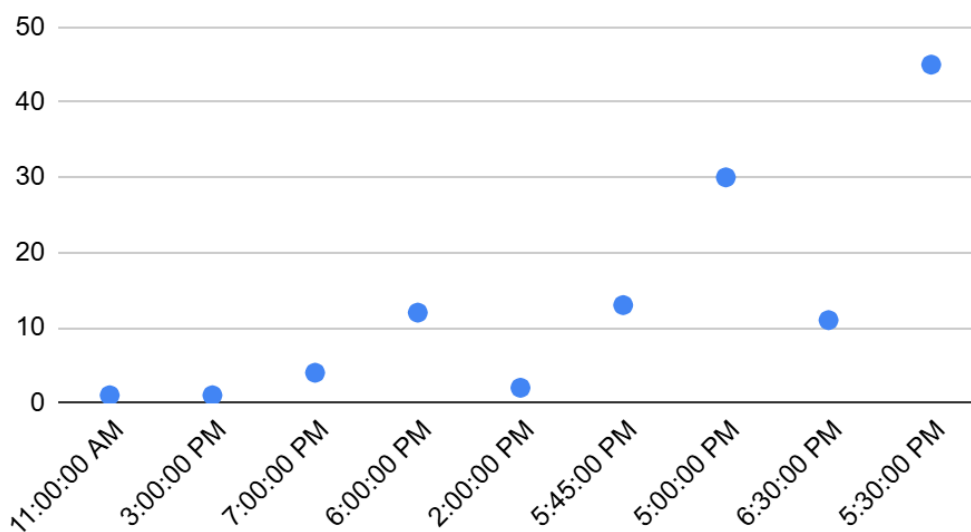
The divergence between client count and revenue for certain services highlights the need for **differentiated staffing and marketing strategies**. For example, frequent services like threading should be optimized for speed and handled by junior staff,



while high-revenue services deserve more senior attention and promotional focus. This contrast also helps prioritize **inventory budgeting**, ensuring high-cost resources are reserved for services with corresponding financial returns.

## **Peak Hour Visualization**

Peak Hour Visualization



A **scatter plot** showing the number of appointments across different times of the day, highlighting peak activity hours at the salon.

### **Identification of Rush Hours:**

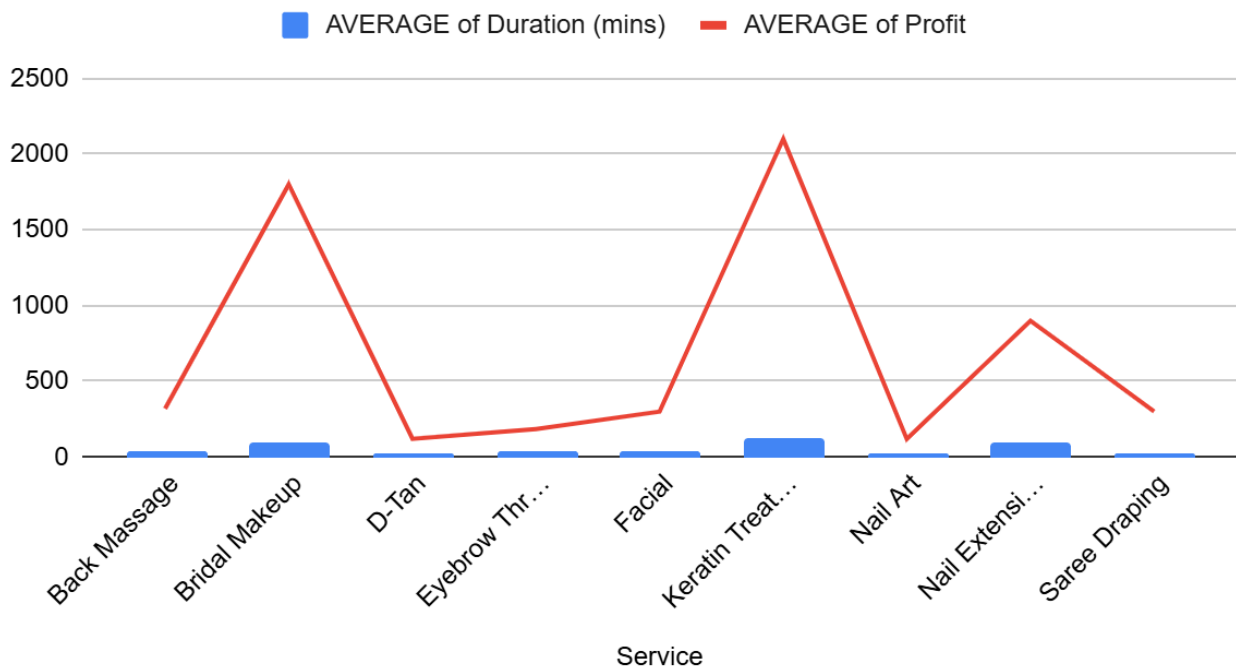
The graph reveals a clear concentration of appointments around the **late afternoon to early evening period**, especially **between 5:00 PM and 6:30 PM**. The highest spike appears around **5:30 PM**, suggesting that customers, likely post-work or post-school, prefer visiting during this slot.

### **Operational Implications:**

This time-based insight is crucial for **shift scheduling**, ensuring that more staff are available during evening hours to handle the surge and reduce wait times. It also supports **targeted promotions or combo offers** during off-peak hours to balance client load and make better use of idle capacity earlier in the day.

## Are Longer Services More Profitable?

Duration Vs Profit of each service



This plot is built each service is represented along the X-axis, allowing direct comparison between time investment and profitability.

### 1. High-Profit, High-Duration Services:

- **Keratin Treatment** and **Bridal Makeup** stand out with the highest average profits, both above ₹1,800.
- These also have the longest durations, indicating they are time-intensive but highly lucrative.

Implication: These services justify their time investment and are key revenue drivers.

### 2. Moderate-Duration, Moderate-Profit Services:

- **Nail Extensions** show a balanced profile i.e., moderate time (~~60 mins~~) and ~~decent profit~~ (₹800).
- **Facial** has a longer duration compared to its relatively lower profit, possibly suggesting inefficiency.

### 3. Short-Duration, Low-Profit Services

- Services like **Eyebrow Threading**, **D-Tan**, and **Nail Art** show low average durations and low profits.

Implication: These are quick turnover services, likely volume-driven and better suited for peak-time fillers.

### 4. Back Massage and Saree Draping

- **Back Massage** and **Saree Draping** show short durations with modest profits, suggesting they are low-risk, stable offerings.

### 5. Operational Implications

- **Optimize time slots** by assigning longer appointment windows for Bridal/Keratin during quieter periods.
- Use short, low-profit services (e.g., threading, D-Tan) during high-traffic hours for higher client throughput.
- Consider **bundling low-duration services** with others to boost per-appointment profitability.
- **Review pricing or efficiency** of services like Facial that require more time than the revenue they generate.

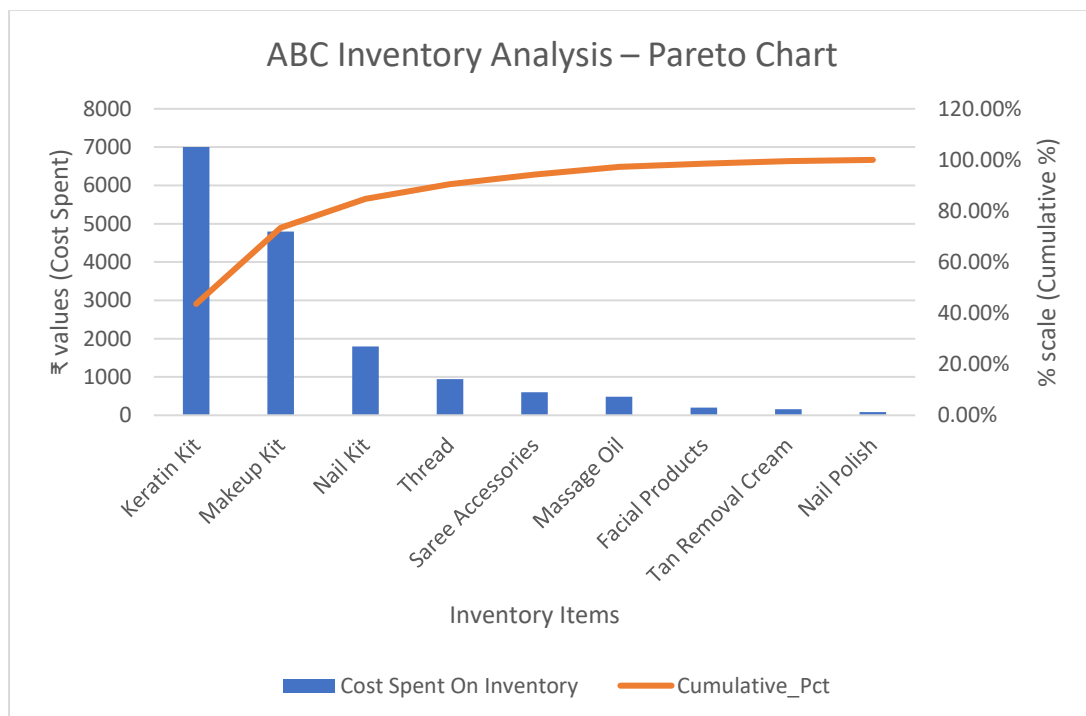
## ABC Inventory Classification

**Method:** *ABC Analysis based on Cumulative Inventory Usage Percentage*

Inventory Used	Cost Spent On Inventory	Cumulative Pct	ABC
Keratin Kit	7000	43.60%	A
Makeup Kit	4800	73.50%	B
Nail Kit	1800	84.70%	C
Thread	940	90.50%	C
Saree Accessories	600	94.30%	C
Massage Oil	480	97.30%	C
Facial Products	200	98.50%	C
Tan Removal Cream	160	99.50%	C
Nail Polish	80	100.00%	C

**ABC analysis** is an inventory categorization technique based on the **Pareto Principle**, used to prioritize items according to their relative importance in terms of consumption value. In this method, inventory is divided into three categories:

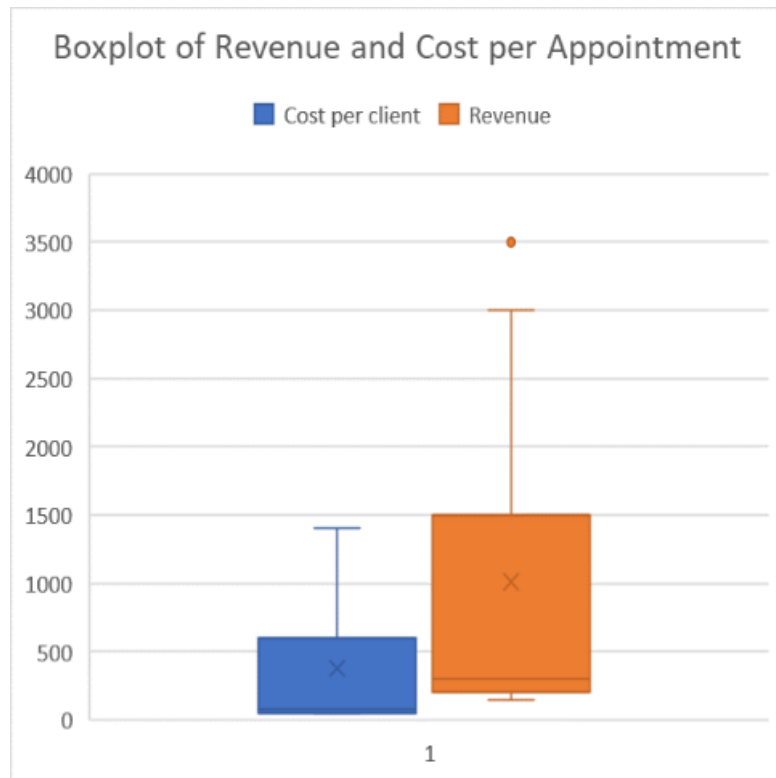
- **‘A’ items** are the most valuable, typically accounting for a large portion of the inventory cost with fewer items.
- **‘B’ items** are of moderate value and quantity.
- **‘C’ items** are the least significant in terms of cost but often represent the bulk of the inventory list.



This classification, drawn from both the ABC analysis table and the corresponding Pareto chart, segments inventory items into 'A', 'B', and 'C' categories based on their cumulative contribution to total inventory expenditure. The visual representation in the chart clearly illustrates that the **Keratin Kit alone accounts for over 43%** of inventory costs, positioning it as a critical 'A' category item that demands frequent monitoring and stock control. The **Makeup Kit**, contributing next in line, falls under the 'B' category i.e., moderate in both importance and consumption value. All other inventory items collectively form the 'C' class, each having a marginal individual impact on total cost. The chart's steep cumulative line in the initial segment further reinforces the Pareto Principle, visually confirming that a small subset of items contributes to a large portion of spending. Together, the table and chart aid in procurement planning, allowing JJ Beauty Salon to focus efforts on stocking and

managing high-impact items while minimizing excess inventory of low-priority products.

### **Boxplot of Revenue and Cost per Appointment**



This plot is built to show the **distribution** and **spread** of revenue earned and cost incurred per appointment. It highlights differences in variability and central tendency between the two financial metrics.

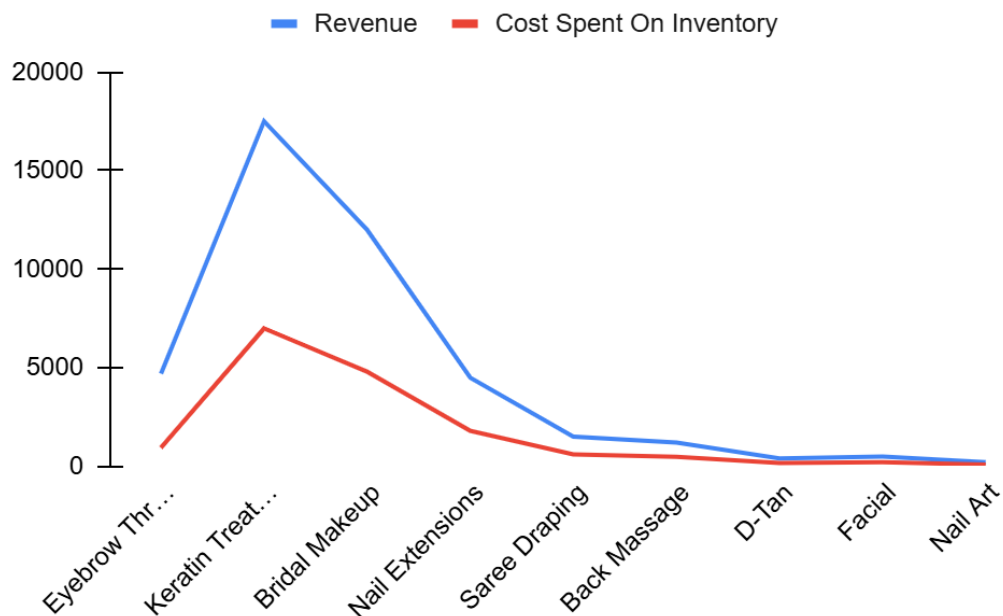
#### **Revenue Variability:**

Revenue values show **high variability** with a large interquartile range and a clear outlier above ₹3,500. This suggests that most services fall in the lower-to-mid revenue range, but a few premium appointments create sharp spikes.

#### **Cost Stability:**

Cost per appointment is more **concentrated**, with minimal spread and no visible outliers, indicating **uniform inventory usage** across most services.

## Revenue vs Inventory Cost by Service



This plot is built to compare the **total revenue generated** and **total inventory cost incurred** across all services. It helps evaluate which services yield the most income relative to their product consumption.

### **High-Impact Services:**

**Keratin Treatment** and **Bridal Makeup** stand out for their high revenue and high inventory cost, forming the most resource-intensive services. The gap between revenue and cost is still substantial, indicating profitability.

### **Lean Services:**

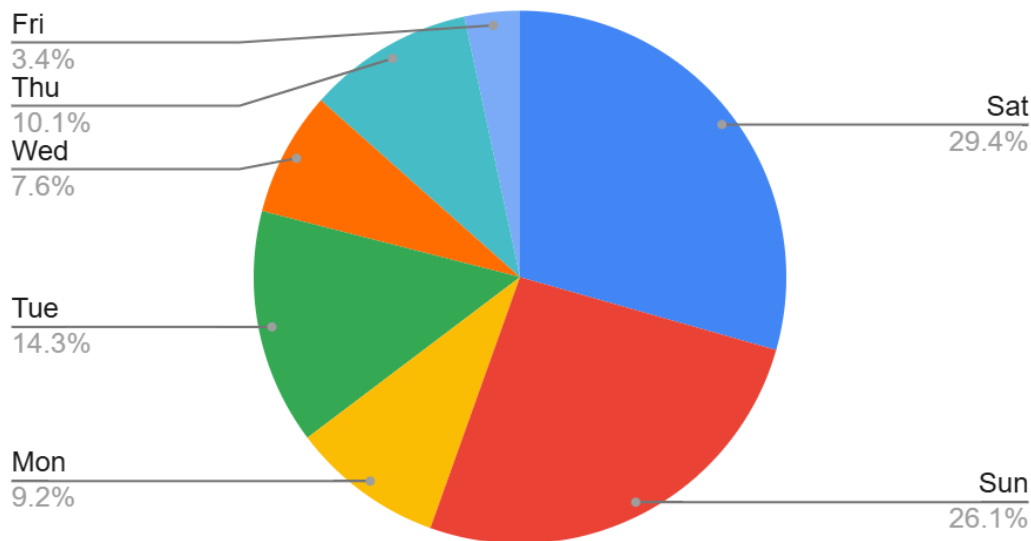
Services like **Eyebrow Threading** and **Facials** show relatively low revenue and low inventory use, suggesting their role in **high-frequency, low-resource** operations.

### **Operational Implication:**

Services must be managed using a **tiered operational model**, i.e., allocate more time, skilled staff, and supply control to high-revenue services, while optimizing turnover and space for quick, low-cost ones.

## Weekly Client Distribution (Pie Chart)

When Do Clients Visit? (Weekly Distribution)



This pie chart is built to show **how client visits are distributed across the week**, offering insight into customer behavior patterns by day.

### **Weekend Dominance:**

A majority of appointments are concentrated on **Saturday (29.4%)** and **Sunday (26.1%)**, confirming weekends as peak activity periods.

### **Operational Implication:**

Staff scheduling and inventory usage should follow a **demand-responsive pattern**, with more availability and resources allocated to weekends. Lower-traffic weekdays may allow for staff training, deep cleaning, or offloading maintenance tasks.

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## Interpretation of Results

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### **1. Revenue and Profitability Insights**

The revenue and cost analysis across appointments reveals clear differences in profitability among service types. The boxplot comparing revenue and inventory cost

per appointment shows a wide spread in revenue with significant outliers, while costs remain relatively stable. This suggests that although some appointments generate exceptionally high revenue, they are infrequent. The bulk of the salon's business comes from moderately priced services with consistent inventory usage. Services like Keratin Treatment and Bridal Makeup, while expensive in terms of resources, offer substantial returns. Conversely, services like Eyebrow Threading and Nail Art are low-cost, low-revenue but high in frequency.

## **2. Service-Level Performance**

The service-wise breakdown of client volume versus scaled revenue reveals two clear trends: high-volume, low-value services (e.g., Eyebrow Threading) and low-volume, high-value services (e.g., Bridal Makeup, Keratin Treatment). This dual nature of the business implies the need for different operational handling for each category. Services with high client volume contribute to daily footfall and repeat visits, while premium services boost monthly revenue targets.

## **3. Time and Efficiency Analysis**

Longer services tend to bring in higher revenue and profit. However, the spread indicates that not all long appointments are equally profitable, emphasizing the importance of cost control. Additionally, the histogram of revenue shows a right-skewed distribution, reinforcing that most services fall within a moderate revenue range with a few high-value outliers.

## **4. Weekly and Hourly Demand Trends**

Client visit distribution over the week indicates that Saturdays and Sundays are peak business days, accounting for more than half of the total weekly appointments. Midweek days, especially Wednesday and Friday, show significantly lower engagement. Time-of-day analysis identifies late afternoons and early evenings, particularly around 5:00 to 6:30 PM, as peak operational hours. Mornings and early afternoons see much lower footfall.

## **5. Inventory Consumption Patterns**

The line chart comparing revenue and inventory cost per service indicates a proportional relationship for most services, especially high-value ones. Services like Keratin Treatment and Bridal Makeup are clearly resource-heavy but justified by their



revenue returns. Meanwhile, low-cost services use minimal inventory, allowing them to run at scale without resource strain.

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## Recommendations to the Business

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### 1. Service Optimization

- Segment services into high-frequency and high-margin categories.
- Allocate high-frequency services to quick, skilled staff.
- Schedule high-margin services during low-traffic hours to balance load.
- Evaluate time-consuming services for pricing adequacy or bundling opportunities.

### 2. Staffing and Scheduling

- Increase staff coverage on weekends, particularly Saturday and Sunday.
- Use midweek (e.g., Wednesday, Friday) for internal tasks like training or inventory checks.
- Align shift timing with peak hours (5:00–6:30 PM) to meet client demand.

### 3. Inventory Planning

- Prioritize procurement for services under the 'A' and 'B' categories in the ABC inventory classification, specifically the **Keratin Kit** and **Makeup Kit** as these two items together contribute over 70% of the total inventory cost. Ensuring their consistent availability is essential to maintaining uninterrupted delivery of high-revenue services like Keratin Treatment and Bridal Makeup, which are critical to overall business performance.
- Monitor low-consumption items like “Threads, Nail polishes, Oils, etc” for potential overstocking.

### 4. Performance Monitoring

- Prefer median over mean in reporting revenue/profit per appointment.
- Track service-level revenue vs cost monthly to identify shifts in demand.

- Update data dashboards with time and day performance metrics for better decisions.

## **5. Client Demand and Promotions**

- Design weekday offers to attract clients during low-traffic periods.
- Consider peak-hour pricing or reservation incentives.
- Use client visit data to guide timing of marketing campaigns.

## **6. Service Packages**

- Introduce bundled service packages to encourage higher-value bookings (e.g., "Weekend Glow Package" combining Facial, Threading, and D-Tan).
- Offer bridal or event-based packages that group premium services (e.g., Bridal Makeup + Hair Styling + Saree Draping).
- Create loyalty-focused combo offers for frequent services (e.g., Eyebrow Threading + Facial at discounted price).
- Use off-peak hours to promote discounted package slots for better resource utilization.

## **7. Space Utilization**

- Reorganize the floor layout to dedicate space for high-frequency services like threading, which require minimal equipment but high turnover.
- Use mobile trolleys and foldable furniture to free up space during service transitions.
- Convert unused corners or reception space into quick-service areas for express treatments.
- Store bulk inventory off-site if possible, keeping only daily-use items at the salon to reduce congestion.

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## Conclusion

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Implementing the recommended measures collectively will enable JJ Beauty Salon to maintain an effective balance between operational efficiency and customer satisfaction. Through consistent data monitoring and flexible resource management, the salon can respond better to evolving client needs and service trends. The insights from this analysis, such as profitability distribution, time-efficiency, and inventory usage, offer actionable foundations for strategic planning.

In particular, optimizing space usage, strengthening staff deployment, and tailoring service packages can help maximize performance within the salon's physical constraints. Furthermore, maintaining a feedback-oriented approach and continuously refining appointment structuring will enhance both service quality and client experience. Adopting scalable scheduling practices, using data to guide promotions, and prioritizing high-impact inventory will be key for staying competitive in a dynamic beauty service market.

Ultimately, by embracing a culture of informed decision-making, adaptability, and customer focus, JJ Beauty Salon is well-positioned to achieve long-term operational growth, financial sustainability, and improved brand loyalty in a demanding service environment.