Enhancing Operational Efficiency and Employee Retention for Sustained Growth in HSK Enterprises Firm

A Final Report for the BDM Capstone Project

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Contents

1. Executive Summary 2
2. Detailed Explanation of Analysis Methods 3
   - 2.1. Problem Identification and Initial Consultation 3
   - 2.2. Data Collection and Cleaning 3
   - 2.3. Selection of Analytical Methods 4
   - 2.4. Implementation of Solutions: Automating and Optimizing Business Operations 7
3. Result and Findings 7
   - 3.1. Overview of Data Insights 7
   - 3.2. Distribution Charts 8
   - 3.3. Conclusion of Results 16
4. Interpretation of Results and Recommendation 16
5. Final Conclusion 18
6. Complete Project Links 19

Executive Summary

This project aims to address the operational inefficiencies and high employee turnover at HSK Enterprises, a service provider specializing in printer solutions for B2B clients across Delhi. Building on the mid-term analysis, this final report highlights the data-driven insights gathered over six months and the proposed solutions to improve operational and workforce management.

Key Findings and Progress:

Employee Turnover and Satisfaction: The business has faced significant employee turnover, especially among technical staff. Through in-depth analysis of employee data and few interviews, it became evident that competitive salary packages and job satisfaction were major drivers behind this issue. I recommended revisions to the hiring process and emphasized the need for competitive salaries and perks. I also recommended feedback mechanisms to improve job satisfaction and potentially reduce turnover rates over time.

Operational Efficiency: The automated billing script developed for HSK Enterprises has been well-received, streamlining the invoicing process and allowing for one-click billing to clients. This solution will help lower the chances of manual errors and administrative workload, contributing to enhanced operational efficiency. Though still in the early stages, this automation promises to improve productivity significantly as it is completely customizable according to the needs of the owner. Working of the script with demo proofs can be found here.

Customer and Service Insights: Analyzing customer data revealed regional disparities in service requests and revenue, with specific areas like North Delhi generating more hardware-related issues and Gurugram generating more software-related issues. This highlighted the need for optimizing the assignment of engineers based on location and type of service demand. These findings have been shared with the owner to help plan future resource allocation better.

Looking Ahead:

While these improvements are encouraging, further work is needed to ensure sustained growth. The automation of printer reading data, once integrated, could further streamline the operations, but it requires collaboration with an external MNC. Additionally, investing in employee retention strategies such as career development programs and competitive perks will be key to long-term success.

Overall, this project has laid the groundwork for ongoing operational improvements, and I look forward to seeing HSK Enterprises benefit from these changes. With consistent focus on automation and employee engagement, the business is well-positioned to enhance its profitability and operational efficiency in the future.

Detailed Explanation of Analysis Methodology

The analysis process for HSK Enterprises was a multi-step journey that involved a deep understanding of the business's operational structure, challenges, and future aspirations. Throughout this process, I took a hands-on approach, working closely with the business owner, gathering and preprocessing data, selecting appropriate analytical methodologies, and implementing digital tools to solve key issues.

Problem Identification and Initial Consultation

The project began with a thorough consultation with the business owner to identify the most pressing problems affecting both employee satisfaction and operational efficiency. During these initial discussions, the business owner emphasized issues like high employee turnover, dissatisfaction with salary and overtime, and a lack of effective operational management, particularly in tracking printer service logs and client billing. Understanding these root problems was crucial in shaping our analysis strategy.

At this stage, I knew that a holistic approach was necessary – one that would look beyond the symptoms and uncover deeper operational inefficiencies. Thus, I framed the project objectives around addressing employee satisfaction, optimizing business operations, and implementing digital tools to automate manual processes.

Data Collection and Cleaning

Once the key challenges were identified, the next step was data collection. The business provided the raw datasets, including customer service logs, employee records, and billing details. Although the data was generally well-maintained by their temporary accountant, it contained a few missing entries, unstructured problem descriptions, and some other small inconsistencies. As a result, a significant portion of the early analysis focused on data cleaning and preprocessing.

For example, the "Problem Description" column in the customer service logs featured inconsistent phrasing. To address this, I utilized Python's Natural Language Processing (NLP) libraries, including

Sentence Transformers, to normalize the problem descriptions, converting them into a more structured and consistent format.

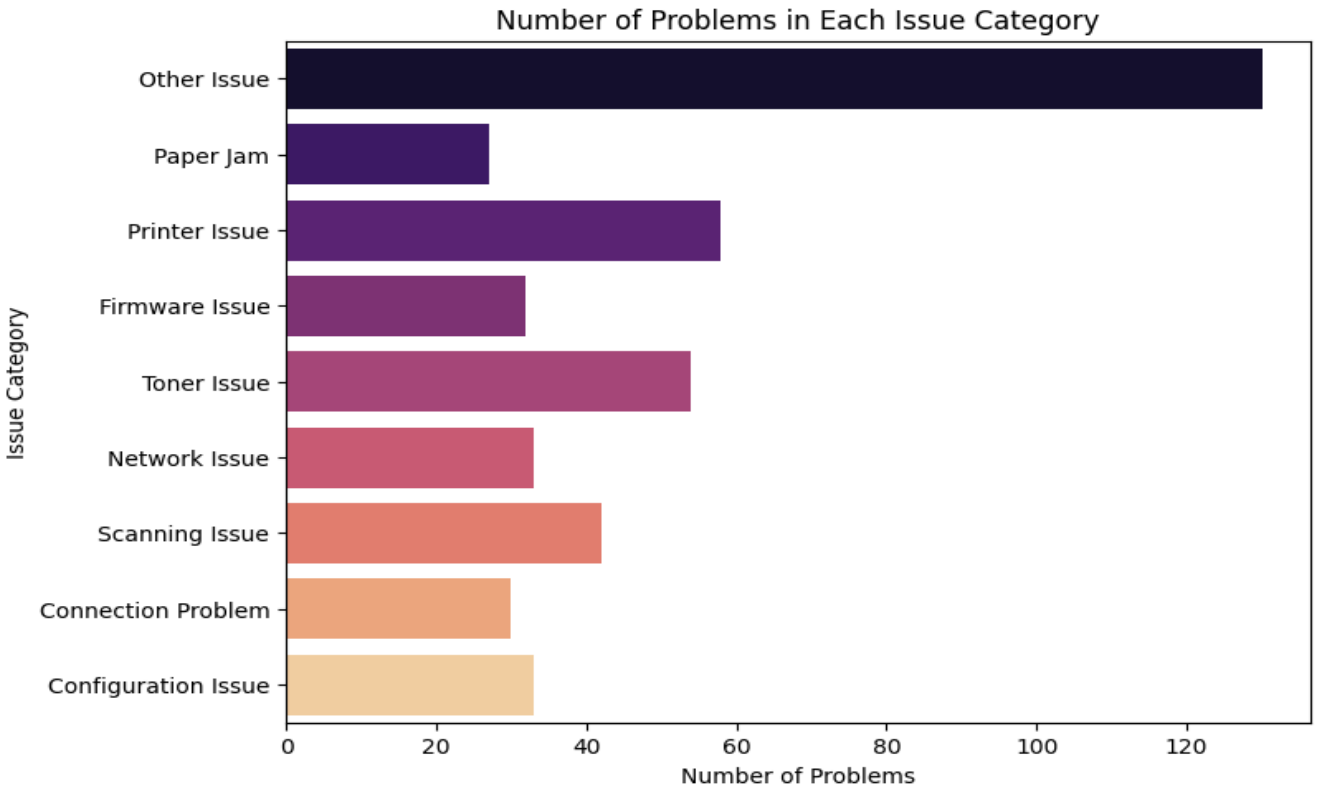

Fig 1: Updated Normalised Problem description (more precise than mid-term)

Selection of Analytical Methods

Choosing the right analysis methods was critical. Given the range of challenges—employee turnover, customer service inefficiencies, and operational bottlenecks—multiple analytical frameworks were considered.

1. SWOT Analysis: Strategic Overview

To gain a holistic view of HSK Enterprises, I began with a SWOT analysis. This provided a high-level understanding of the internal strengths and weaknesses, as well as the external opportunities and threats. The insights gained from the SWOT analysis were critical in framing the subsequent analyses. For example, the company's strong relationships with clients were listed as a strength, but the inability to manage operational data efficiently was a significant weakness.

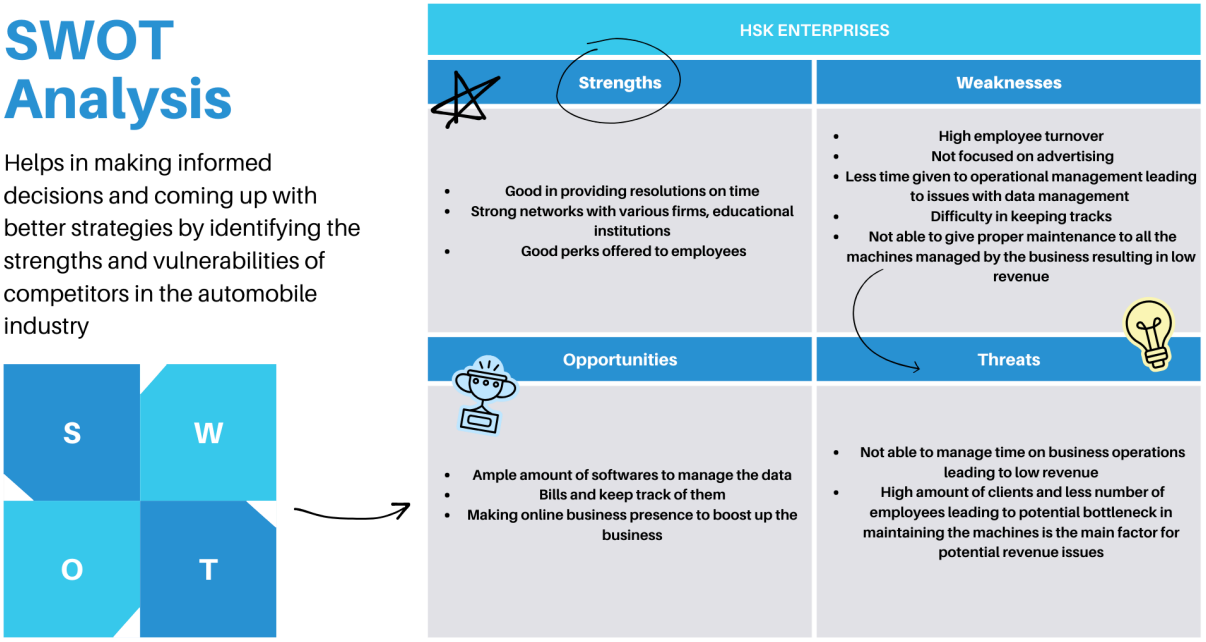

Fig 2: SWOT Analysis for HSK Enterprises

2. Root Cause Analysis (RCA) and the 5 Why's Technique: Addressing Employee Turnover

With employee satisfaction being a top priority, I conducted a Root Cause Analysis to understand why employees were leaving. Through a series of interviews with the business owner, combined with the analysis of employee data, the 5 Why's technique was applied. This revealed that dissatisfaction stemmed from overtime work and a lack of proper salary compensation relative to industry standards.

The RCA process didn't just focus on salary alone; it uncovered deeper operational inefficiencies that led to overworked staff. Without sufficient time to focus on employee management and feedback mechanisms, the business struggled to offer competitive compensation. This realization led me to recommend restructuring employee schedules and developing a formal HR strategy which I have discussed in the "**Interpretation of Results & Recommendation**" section Pg. No. 16.

3. Pareto Analysis: Identifying Key Customer Service Problems

For operational inefficiencies, particularly in servicing clients, Pareto Analysis was a suitable method. By analyzing the normalized problem descriptions from customer logs, I applied the 80-20 rule to identify whether 80% of customer service delays stemmed from only 20% of common issues.

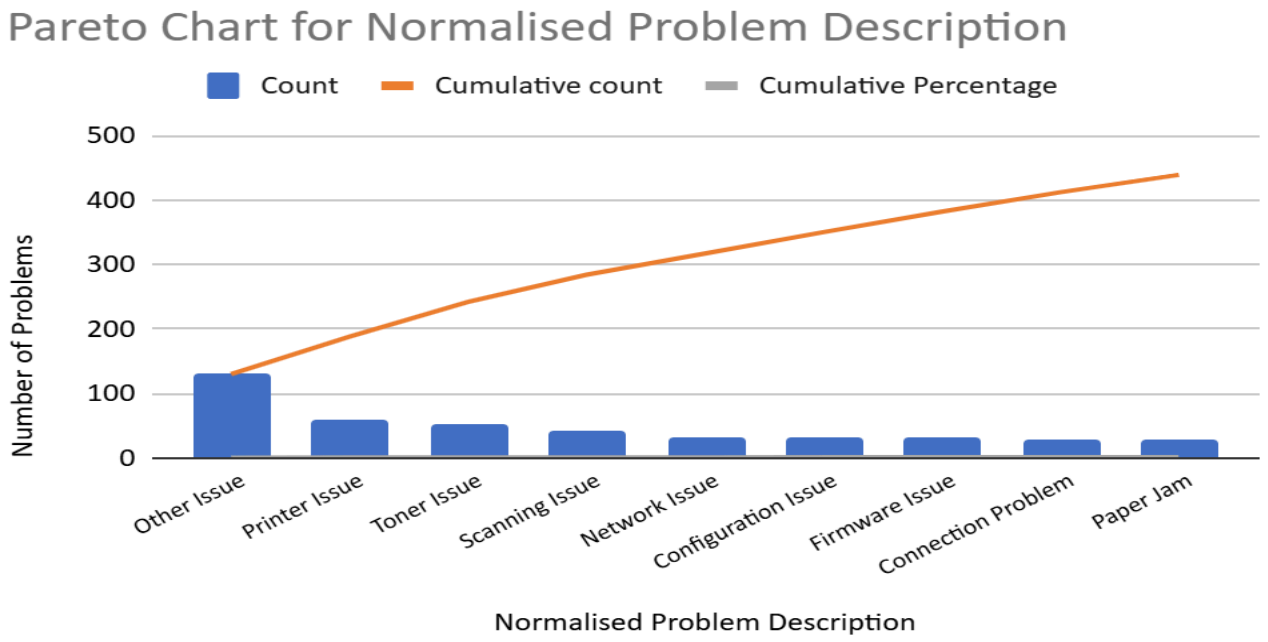

Fig 3: Updated Pareto Analysis for HSK Enterprises

By visualizing the most common problem descriptions in a Pareto chart, I was able to help the business prioritize solutions, focusing on addressing the most recurring issues first. This allowed HSK Enterprises to optimize its resources and address customer complaints more efficiently.

4. Statistical Quality Control (SQC) & Fishbone Analysis: Ensuring Service and Process Efficiency

I created a Statistical Quality Control (SQC) chart to monitor how efficiently customer complaints were resolved. This analysis provided insights into whether the resolution time was within acceptable limits or if it required improvements. By plotting resolution times, we found that most issues were resolved within a day, confirming that the business was effective in this particular area. However, we also flagged outliers, such as unresolved complaints due to inconsistent data entries in the system.

5. Location-Based Customer Analysis (Map)

HSK Enterprises' customers are concentrated around New Delhi and Gurgaon. High-density areas include Karol Bagh, Janakpuri, and Pitampura, indicating strong demand. Gurgaon also shows a notable client cluster, suggesting corporate demand. Faridabad, Noida, and Ghaziabad show fewer clients, representing growth opportunities. To optimize operations, HSK should focus more resources in the New Delhi-Gurgaon corridor whilst expanding marketing in low-density areas like Faridabad or Noida diversifying the client base more.

Implementation of Solutions: Automating and Optimizing Business Operations

After analyzing the data and identifying key inefficiencies, it was clear that HSK Enterprises needed to transition from manual, paper-based processes to automated digital systems. Here, I played a critical role in implementing solutions:

***Automated Billing System:** *One of the most valuable learning achievement for me was to develop a JavaScript-based billing automation script. This script integrated with the business's existing Excel sheets, allowing the owner to send invoices to all the clients with a single click and store all those invoices in a folder. By automating this process, HSK Enterprises can hopefully significantly reduce errors in billing and save time on administrative tasks. [The script was made using Google Spreadsheet Apps Script {used javascript} and the sample examples can be found here.]*

Online Presence: As a secondary focus, I helped the business set up a LinkedIn profile to enhance its visibility in the market. This was part of a broader initiative to modernize the company's client outreach strategies and expand its online presence, which had previously been neglected. Although I've been working to provide the owner with the necessary guidance, he has been quite busy and hasn't been able to dedicate sufficient time to properly setting up the profile. However, he has assured me that once he has some spare time, he will prioritize completing it.

These solutions were crucial in not only addressing immediate operational challenges but also in setting the stage for future growth. The billing automation script, in particular, has already been embraced by the business owner, and further automation tools (such as automatic printer readings) are currently still under discussion with a major MNC client.

Result and Findings

Overview of Data Insights

The customer logs data provided a rich source of information, allowing me to derive actionable insights. The dataset included details such as call dates, customer names, machine models, problem descriptions, resolutions provided, and billing amounts. Analyzing this data was crucial for identifying patterns in service requests, understanding regional demand, and calculating profits based on the services and maintenance activities offered by the business.

The analysis helped to break down how services were provided, which problems were common, and

how efficiently they were resolved. It also allowed us to track revenue generation and identify key profit drivers.

Sum	Mean	Median	Mode	Standard Deviation	Range
₹18,34,178.00	₹4,178.08	₹3,574.00	₹3,086	2398.78561	₹1660-₹16759

Descriptive Statistics for Revenue by Machine Model

Machine model	count	mean	std	min	25%	50%	75%	max
Brother HL-L2370DW	35.0	3632.8285714285716	775.0541721375992	2148.0	3138.0	3442.0	3951.0	5959.0
Canon	23.0	3424.521739130435	262.03623440717604	3040.0	3175.0	3399.0	3598.0	3950.0
Canon 2870	45.0	3568.688888888889	303.7108240521971	3008.0	3317.0	3629.0	3832.0	3975.0
Canon 3025	12.0	3520.25	342.57265320990336	2746.0	3373.0	3614.5	3733.5	3956.0
Dell B2360dn	24.0	8311.958333333334	5119.613474533326	3063.0	3475.0	7069.5	12871.25	16655.0
Epson EcoTank L3150	18.0	4581.777777777777	1067.9784948019678	3045.0	3684.5	4859.0	5292.0	5996.0
HP	12.0	3492.4166666666665	310.3451036077955	3016.0	3202.0	3529.0	3762.5	3884.0
HP 3015	6.0	13971.0	1895.4528746450017	11350.0	12818.5	14233.5	14735.75	16759.0
HP 438 NDA	46.0	3402.2608695652175	610.6382247664272	2037.0	3148.5	3492.5	3717.5	5735.0
Konica	24.0	3708.5833333333335	1071.51659755721	2131.0	2893.5	3514.0	4079.75	5970.0
Kyocera 1800	30.0	3764.3333333333335	602.0787743931127	3038.0	3329.25	3683.0	3971.75	5525.0
Lexmark MB2236adw	35.0	3470.3714285714286	364.8451795515692	2318.0	3291.5	3474.0	3657.5	4428.0
Ricoh SP C262SFNw	41.0	5019.634146341464	3519.671829560943	2366.0	3348.0	3587.0	3968.0	16634.0
Sharp 6020	18.0	3459.277777777778	379.38073465855564	2350.0	3278.5	3572.5	3699.5	3973.0
Toshiba	23.0	3511.391304347826	307.70599000439523	3034.0	3280.5	3433.0	3851.0	3967.0
Xerox	47.0	4021.276595744681	1797.7381163214834	1660.0	3172.0	3676.0	3912.5	9632.0

Fig 4: Descriptive Customer Data Statistics Recap

➔ Week-Wise Revenue Distribution

To gain insights into potential profits trend, we conducted a week-wise revenue distribution analysis. By examining the profits generated from services provided each week, we were able to identify periods of higher or lower revenue generation.

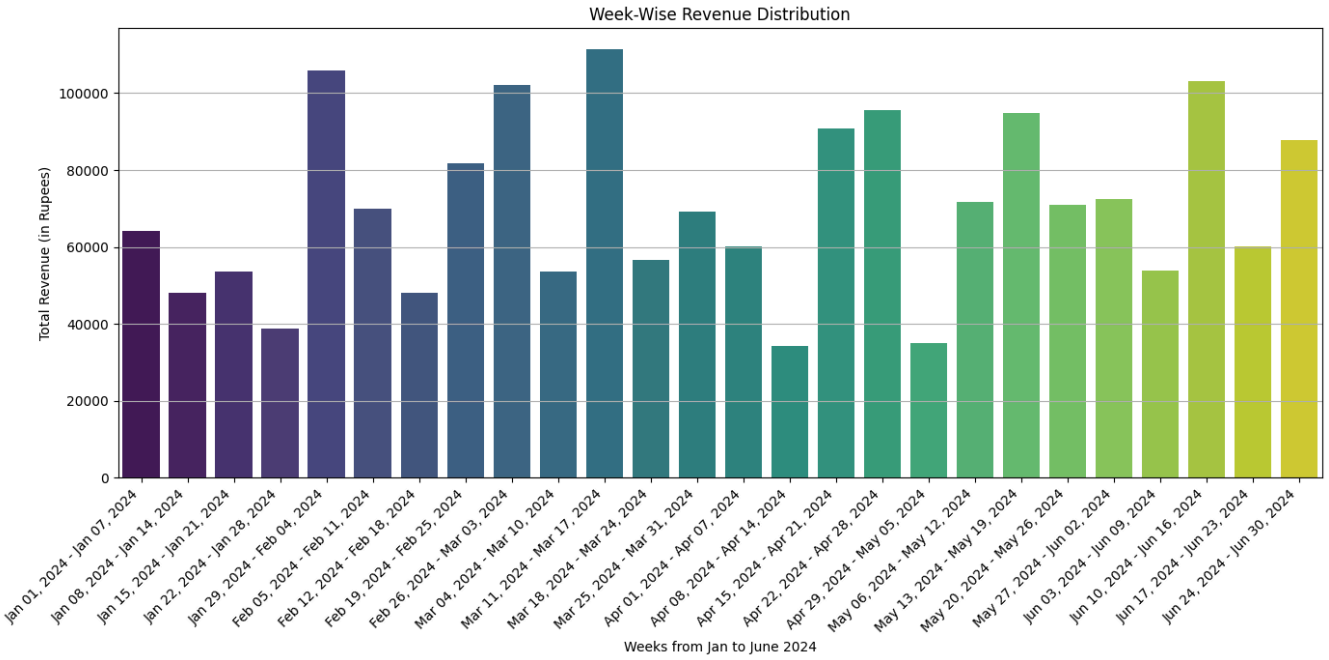

Fig 5: Week-wise Revenue Distribution from Jan' 24 - June' 24

In this chart, we can see the revenue distribution across different weeks, identifying peak performance periods and potential downturns. Weeks with higher revenues were likely influenced by factors such as increased demand for services or quick resolution of high-billing issues.

Key Findings

- Some weeks showed a noticeable spike in revenue generation that might be due to the resolution of high-value problem issues.
- Low-revenue weeks could be attributed to employee availability or delays in addressing key service requests.

➔ Location-Wise Service and Profit Distribution

The location-wise analysis provided further insight into regional demand for services. I examined service requests and profits based on customer location, which revealed important patterns in how different regions contributed to the overall revenue.

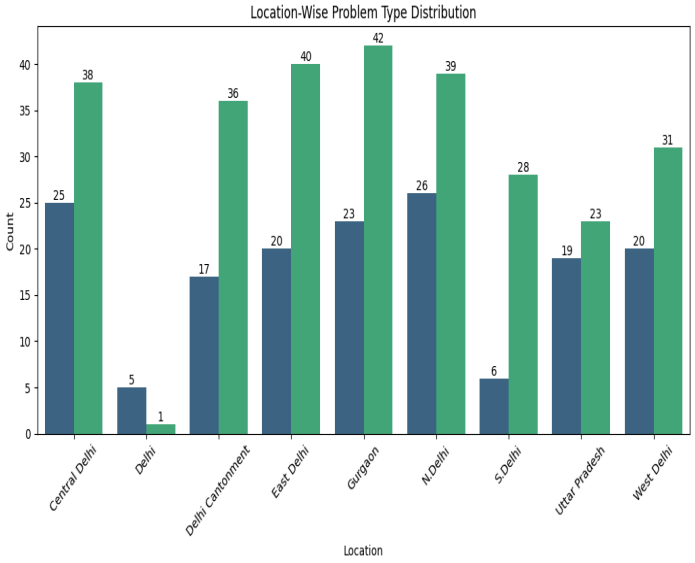

Fig 5: Location-Problem type Count Distribution Chart

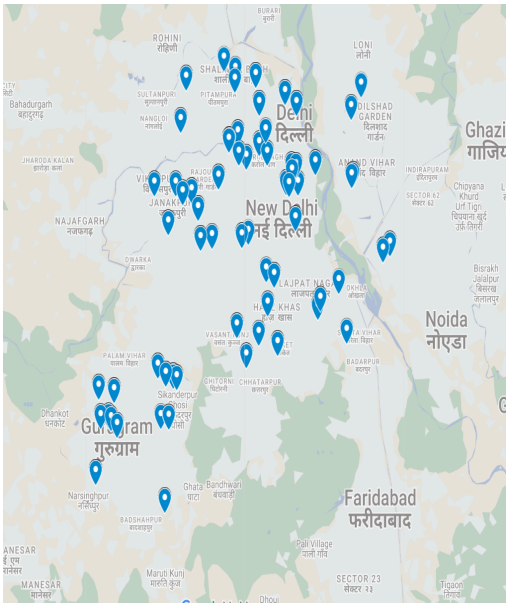

Fig 6: Mapped Customer Locations

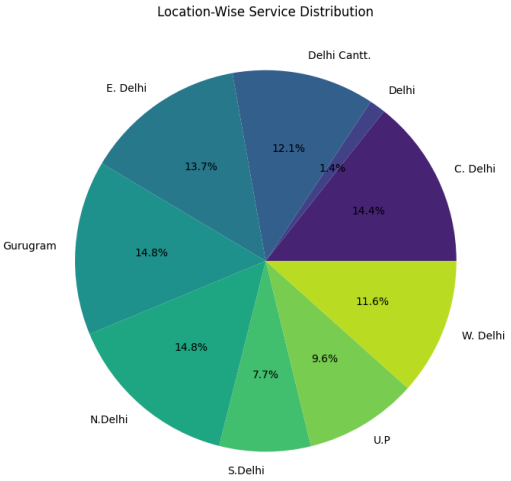

Fig 7: Location-wise Service Distribution Chart

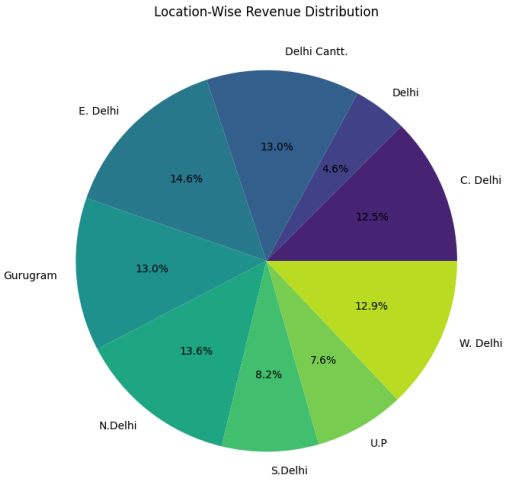

Fig 8: Location-wise Revenue Distribution Chart

The charts above illustrates the percentage of total services and profits contributed by each location, with regions such as Gurugram and East Delhi showing significant contributions. This allowed us to identify the most profitable locations for the business.

Key Findings

- Locations like Gurugram, East Delhi had higher service volumes, leading to increased profit generation.

- Certain regions saw a higher volume of software-related issues, which were quicker to resolve, but had lower billing amounts compared to hardware issues in other regions.

➔ Monthly Revenue Analysis

In addition to week-wise and location-wise analysis, we explored monthly revenue trends. This allowed us to understand how the business performed over time and to identify any seasonal or recurring patterns in service demand and profitability.

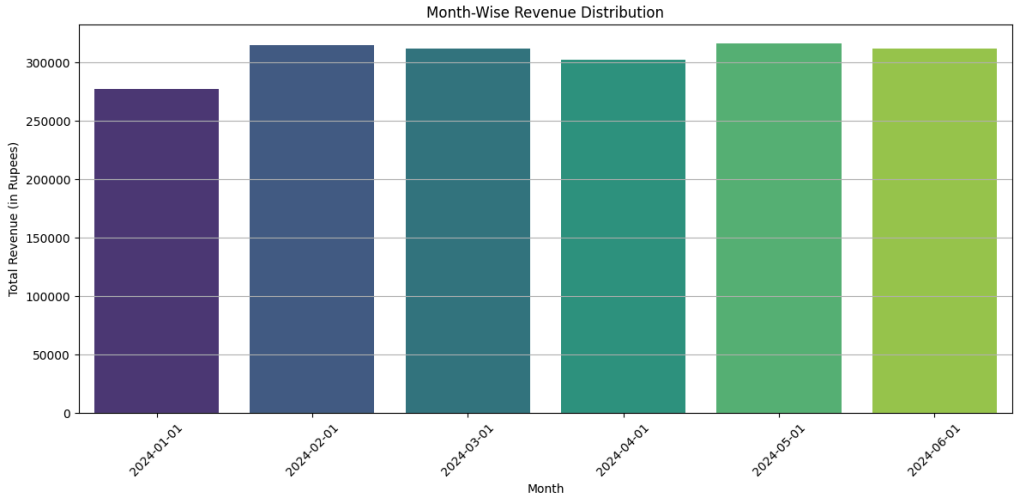

Fig 9: Monthly Revenue Distribution

The graph presents monthly revenue trends, showcasing both the peaks and troughs in revenue generation. It highlights seasonal variations that impacted overall profitability.

Key Findings

- The busiest months showed higher revenues, likely due to maintenance requests and regular servicing contracts.
- There were slight dips in the chart, which could be attributed to factors like employee availability or lower customer demand during those periods.

5. Impact of Employee Turnover on Profit

One key challenge identified during the project was the significant impact of employee turnover on the company's profitability. High turnover rates not only caused delays in servicing clients, but also negatively affected customer satisfaction, leading to a reduction in overall business performance.

To gain further insights, I asked the business owner to elaborate on how the employee turnover rate had

impacted the business both financially and operationally. He explained that poor employee management had led to a range of operational issues. With a growing customer base, the lack of sufficient staff made it increasingly difficult to meet service demands, forcing him to step in as an employee rather than focusing on his role as an owner. This shift in responsibility resulted in lost opportunities for business expansion, as there was insufficient manpower to support growth initiatives.

When asked specifically about the financial impact, the owner noted that the business operates on slim profit margins, partly due to the costs associated with maintaining equipment. Although he did not provide an exact figure, he estimated that the profit margin was around 5-10%. He concluded by asking for suggestions on how to improve other aspects of the business, signalling a need for better operational strategies to counter the challenges caused by employee turnover.

Key Findings:

- Employee turnover significantly hindered the business's ability to provide timely service, resulting in delayed project completions and a decrease in revenue.
- The owner's time was diverted from strategic business tasks to operational work due to staffing shortages.
- Net Profit Margin of 5-10% suggests that in 6 months the overall profit was ₹91,708- ₹1,83,417 which is very less and this employee issue might be bottlenecking the growth of this business.

6. Problem Type Distribution and Resolution Efficiency

Analyzing the types of problems reported (software vs hardware) provided insight into how efficiently each type was resolved and which types of issues were most common.

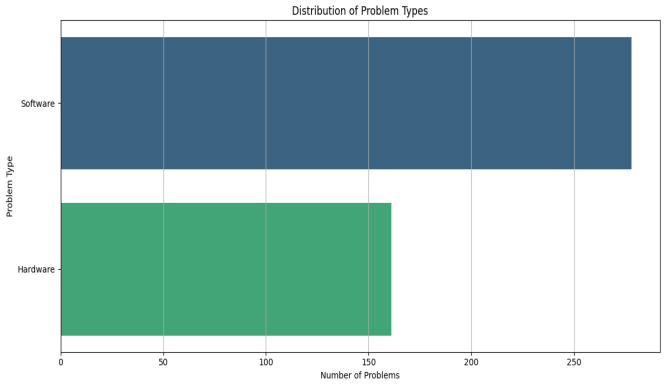

Fig 10: Problem Type Distribution Count

This bar chart compares the number of software and hardware issues resolved. Software issues were

more frequent but quicker to resolve, while hardware issues, although less frequent, required more time and generated higher bills.

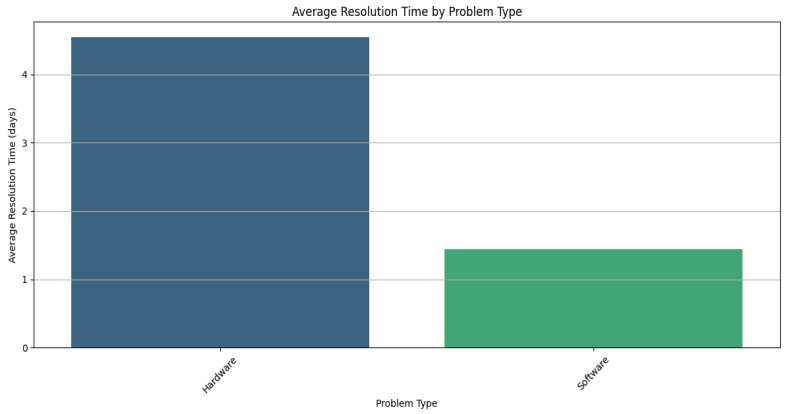

Fig 11: Average Resolution Time (Days) by Problem Time

The graph shows the average time taken to resolve software versus hardware issues, with hardware issues taking significantly longer to address.

Key Findings

- Software issues were resolved faster but resulted in lower revenue compared to hardware issues, which required more time but generated higher billing amounts.
- The business could consider optimizing processes for resolving hardware issues to reduce the time taken and increase profitability.

7. Revenue Per Service Mode (Remote vs Phone)

Analyzing the modes of service provided revealed differences in revenue. Each service mode has its costs and profit margins, and understanding these helped the business identify the most efficient service methods.

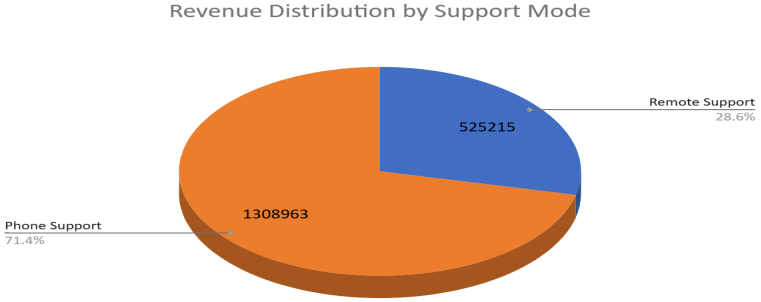

Fig 12: Revenue Distribution by Support Type

This pie chart illustrates the distribution of revenue generated by each support mode. Remote visits, while more expensive, resulted in less revenue, while phone support generated higher revenue but at reduced cost and time.

Key Findings

- Phone Support accounted for the majority of the revenue (₹13 lakh +). It was a more cost-effective solution.
- Remote support which accounted for ₹5.25 lakh was more time-consuming for resolving the issues.

8. Revenue per Machine Model

The ABC classification of machine models based on revenue shows three distinct categories, which help prioritize resources and focus on the most profitable models.

Category A: High-Revenue Models (~70% of Revenue)

- **Top models**: Ricoh SP C262SFNw, Dell B2360dn, Xerox, Canon 2870, HP 438 NDA, Brother HL-L2370DW, Lexmark MB2236adw, Kyocera 1800.
- These models are the most critical, contributing the majority of the company's revenue.
- **Recommendation**: Prioritize these models with the best service and maintenance to ensure uptime and client satisfaction.

Category B: Mid-Revenue Models (~20% of Revenue)

- **Key models**: Konica, HP 3015, Epson EcoTank L3150, Toshiba.
- Important but less critical than Category A.
- **Recommendation**: Allocate resources efficiently, and maintain consistent but less intensive support.

Category C: Low-Revenue Models (~10% of Revenue)

- **Models**: Canon, Sharp 6020, Canon 3025, HP.
- These models contribute the least and may be outdated or serve smaller clients.
- **Recommendation**: Minimize maintenance costs and consider upgrading or phasing out these models.

Machine model	Bill	Cumulative Revenue %	ABC Category
Ricoh SP C262SFNw	205805	11.22055766	A
Dell B2360dn	199487	22.09665583	A
Xerox	189000	32.40099925	A
Canon 2870	160591	41.15647445	A
HP 438 NDA	156504	49.68912505	A
Brother HL-L2370DW	127149	56.62133119	A
Lexmark MB2236adw	121463	63.24353471	A
Kyocera 1800	112930	69.4005162	A
Konica	89006	74.25315318	B
HP 3015	83826	78.82337483	B
Epson EcoTank L3150	82472	83.31977594	B
Toshiba	80762	87.72294728	B
Canon	78764	92.01718699	C
Sharp 6020	62267	95.41200472	C
Canon 3025	42243	97.71510726	C
HP	41909	100	C

Fig 13: ABC Classification of machine models w.r.t revenue

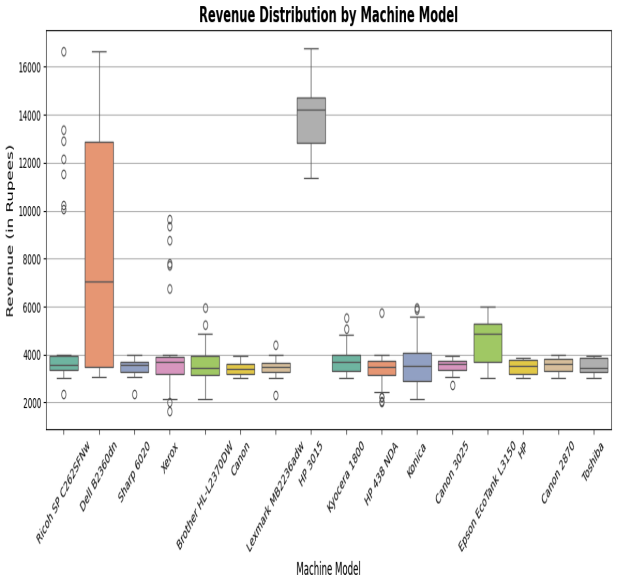

Fig 14: Revenue Distribution by Machine Model Candle Chart

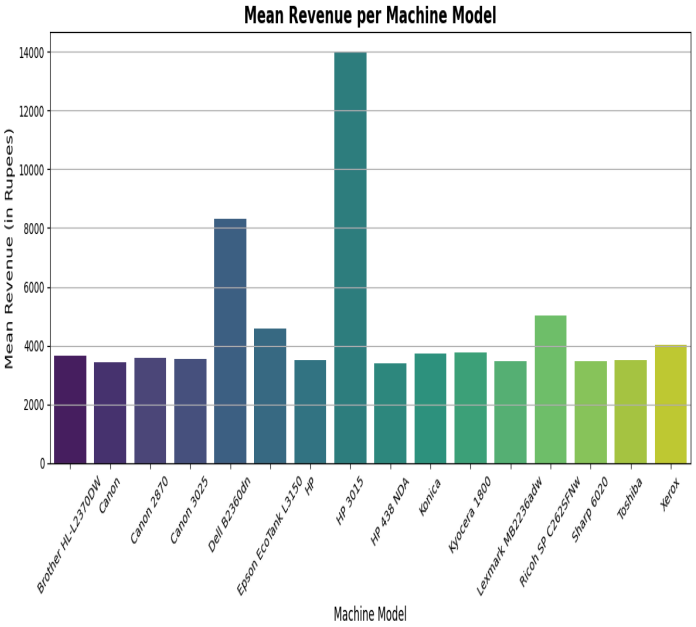

Fig 15: Average Revenue per Machine model

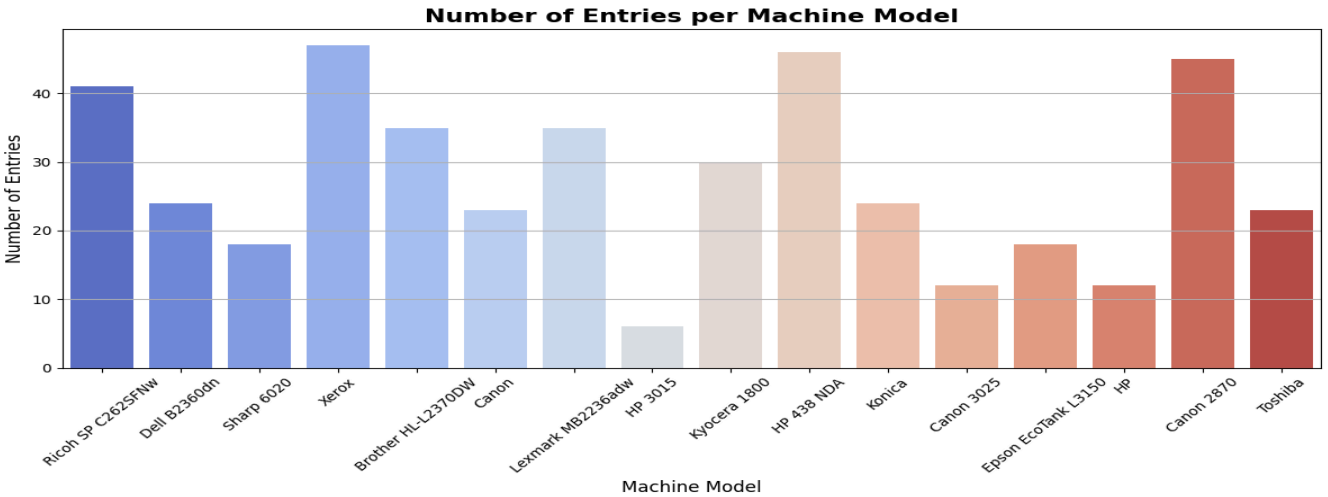

Fig 16: Entries count per Machine Model

Conclusion of Results

The analysis of customer logs provided detailed insights into the business's operations, highlighting key trends in week-wise and location-wise profitability, the impact of employee turnover, and the efficiency of resolving different types of issues. These insights have enabled the business owner to make data-driven decisions to improve service delivery and profitability.

The implementation of automated billing and the owner's transition to a more online-oriented approach will definitely show positive results, streamlining operations and allowing the business to focus more on customer satisfaction. By continuing to monitor these trends and optimizing processes, the business can further enhance its service efficiency and profitability in the future.

Interpretation of Results & Recommendation

1. Understanding Service and Profit Trends

The analysis of customer logs revealed significant variations in revenue generation across different time periods and locations. Week-wise profit distribution indicated that certain periods saw higher service demand, likely due to seasonality or recurring contracts, while lower revenue weeks were affected by external factors like employee availability or holidays. Location-wise, North Delhi and East Delhi emerged as key profit centers, with a high volume of service requests. This underscores the importance of maintaining strong customer relationships and efficient service delivery in these regions.

Recommendation:

The business should consider developing tailored strategies for high-demand locations. For example, dedicating more staff to regions like East Delhi or Gurugram may help meet the high service demand, ensuring faster response times and better customer satisfaction. For low-revenue weeks, a more proactive approach could be taken, such as offering promotional discounts or sending service reminders to clients to smooth out revenue fluctuations.

2. Impact of Employee Turnover on Profitability

One of the most important findings is the significant impact of employee turnover on profitability. Not having proper work distribution management to the employees caused a lot of problems regarding this issue. This reflects the need for a stable workforce to ensure timely service delivery and maintain customer satisfaction.

Recommendation:

Employee retention should be a top priority. Changing Hiring policies such as having some minimum required qualification, servicing proficiency and for the rest, the business could explore ways to improve employee satisfaction and reduce turnover, such as offering competitive salaries, professional development opportunities, or flexible work arrangements. This will help maintain consistent service levels and ensure that revenue remains steady, even during peak service periods.

3. Efficiency in Resolving Software vs. Hardware Issues

The analysis revealed that software issues were more common and faster to resolve, while hardware issues took more time. This indicates that the business is able to handle routine software problems efficiently, but hardware problems, which often involve onsite visits, require more time and resources to resolve.

Recommendation:

To improve efficiency in resolving hardware issues, the business should consider implementing more structured troubleshooting protocols and ensuring that the necessary spare parts and tools are readily available. This would help reduce downtime and increase the speed at which hardware issues are resolved, thus improving both customer satisfaction and profitability.

4. Location-Based Customer Analysis

The geographic distribution of customers served by HSK Enterprises is concentrated mainly around New Delhi, Gurgaon, and parts of Faridabad. High-density areas like New Delhi (including regions such as Karol Bagh, Janakpuri, and Pitampura) and Gurgaon show significant customer clusters, indicating strong demand. In contrast, Faridabad, Noida, and Ghaziabad have fewer customers, potentially highlighting areas for growth or untapped demand.

Recommendation:

HSK Enterprises should focus its resources on the high-demand regions of New Delhi and Gurgaon to improve operational efficiency and response times. Additionally, marketing efforts in lower-density areas like Faridabad and Noida could help attract new customers and expand the business. Strategic placement of technicians in Gurgaon could also boost customer satisfaction by reducing service times.

5. Transition to Automation and Online Systems

One of the most impactful changes introduced during the project was the automation of billing processes and the business owner's gradual transition to a more online-oriented system. This has already begun streamlining operations, reducing manual effort, and ensuring quicker turnaround times for client

invoicing.

Recommendation:

The business should continue to invest in automation and online systems, expanding these capabilities to other areas, such as customer support and service scheduling. A fully automated invoicing system will not only save time but also reduce the risk of human error in billing calculations. Additionally, integrating a customer portal where clients can view their service history and invoices online would further enhance customer experience and operational efficiency.

6. Long-Term Strategy and Growth

Finally, the results of this analysis show that while the business is performing well, there are opportunities for growth and expansion. By focusing on key areas such as employee retention, optimizing service delivery, and increasing the use of technology, the business can improve profitability and customer satisfaction in the long term.

Recommendation:

The business should develop a long-term strategy focusing on scaling operations. This could include expanding the service portfolio, offering premium service plans, or even branching out into new regions. By leveraging data analytics from customer logs and service history, the business can make informed decisions about future growth opportunities, ensuring sustained success in an increasingly competitive market.

Final Conclusion

Throughout this project, I focused on tackling the main challenges faced by HSK Enterprises, specifically their manual logging processes and high employee turnover. My goal was to find practical solutions to improve their operations.

Manual Logging: One significant issue was the reliance on manual logging for service requests and employee data, which was both time-consuming and error-prone. To resolve this, I implemented an automated digital system that streamlined data collection, improved accuracy, and allowed for real-time tracking of service requests. This change reduced administrative overhead and helped with better decision-making.

Employee Turnover: High employee turnover was another major challenge. I reviewed the current hiring policies and salary structures, recommending changes to attract more skilled candidates and offering more competitive salaries. I also suggested enhancing employee satisfaction through better

benefits and recognition programs, which would help create a more stable and motivated workforce.

***Project Research Completion*:** While addressing these specific issues, I also conducted a broader analysis of operational inefficiencies. This research provided insights into the underlying problems and guided us toward targeted solutions, leading to improvements in both operational efficiency and employee morale.

Personal Growth: This project was not just a professional task for me; it was a significant learning experience. Developing the automated billing script was particularly rewarding, as it allowed me to apply my skills in a real-world setting and make a tangible impact on the business. I gained valuable insights into problem-solving, data analysis, and automation, which have greatly contributed to my personal and professional growth.

In conclusion, I put my heart into addressing the challenges faced by HSK Enterprises. The solutions implemented should help automate processes and improve employee management. I hope these recommendations helps the business's growth and sustainability, and I wish them all the best in their future endeavours.

Complete Project Links

- ➔ **Root Folder for my Project:** BDM Capstone Project - Google Drive
- ➔ **Final Report drive link:** Final - Google Drive
- ➔ **Midterm Report drive link:** MidTerm - Google Drive
- ➔ **Proposal Report drive link:** Proposal - Google Drive
- ➔ **Customer data analysis colab link:** HSK_data_analysis_23f1001879 - Colab (google.com)
- ➔ **Employee data analysis colab link:** employee_data_analysis_23f1001879 - Colab (google.com)
- ➔ **Script Proof:** Script_demo