Supply Chain And Customer Support Optimization For Pc Tech Solutions

CAPSTONE PROJECT MID -TERM SUBMISSION

Submitted by

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1 Executive Summary and Title

This business data management project aims to rejuvenate "PC Tech Solutions," a B2C firm offering PC/laptop repairing services, spare parts sales, and second-hand laptops and printers, other services with home delivery options. The firm faced significant setbacks post-pandemic, losing customers to online shopping and experiencing reduced margins due to fuel and electronics component price hikes.

To address these challenges, my proposed solutions include enhancing the online presence, optimizing the supply chain, and diversifying revenue streams. By leveraging data-driven strategies and adopting innovative technologies, we aim to revitalize PC Tech Solutions' customer base, improve profitability, and establish a resilient position in the evolving market.

Currently there is no proper record to analyse other than expense, income and profits.The midterm report submitted comprises information about the business's background, problem description and objectives, source of data, metadata and descriptive statistics, analytic process, results and findings, next steps, and schedule.

This study discusses volume and revenue analysis. Everything is explained in great depth. Previous stock analysis is not included in this report because the data is not available but current inventory analysis is being analyzed. This will be completed in the final submission. This report contains my key analysis trends and conclusions.

2 Organization Background

The company that I am working with is PC Tech Services which provides its services from Bangalore.Founded by Mr. Chandra Mouli and two other members, the company has built a reputation for delivering exceptional technical support and personalized services.It is a reputable firm that has been serving customers in the PC/laptop repair industry for over a decade. The firm's commitment to customer satisfaction and personalized service has been the driving force behind its success. Over the years, PC Tech Solutions has nurtured strong relationships with its clients, becoming a trusted partner in resolving their technical issues and sourcing quality products.

Post-2021, the company transitioned from purchasing second-hand products to a commission-based model for resale and continued remaining operations. This strategic shift not only ensured a stable revenue stream but also allowed the company to leverage its industry expertise effectively. And renamed the firm as “PC Tech services”.

3 Problem Statement

This project will use business data management techniques to help PC Tech Solutions identify and address the challenges it is facing. The project will focus on the following key objectives:

3.1. Regaining lost customers: PC Tech Solutions has lost customers to online retailers due to the convenience and lower prices offered by these retailers.The project will analyze customer data to identify why customers have been switching to online retailers. The project will then develop strategies to win back these customers.

3.2. Reducing costs: PC Tech Solutions' margins have been squeezed by the increasing cost of fuel, electronics components, and other supplies.The project will identify areas where PC Tech Solutions

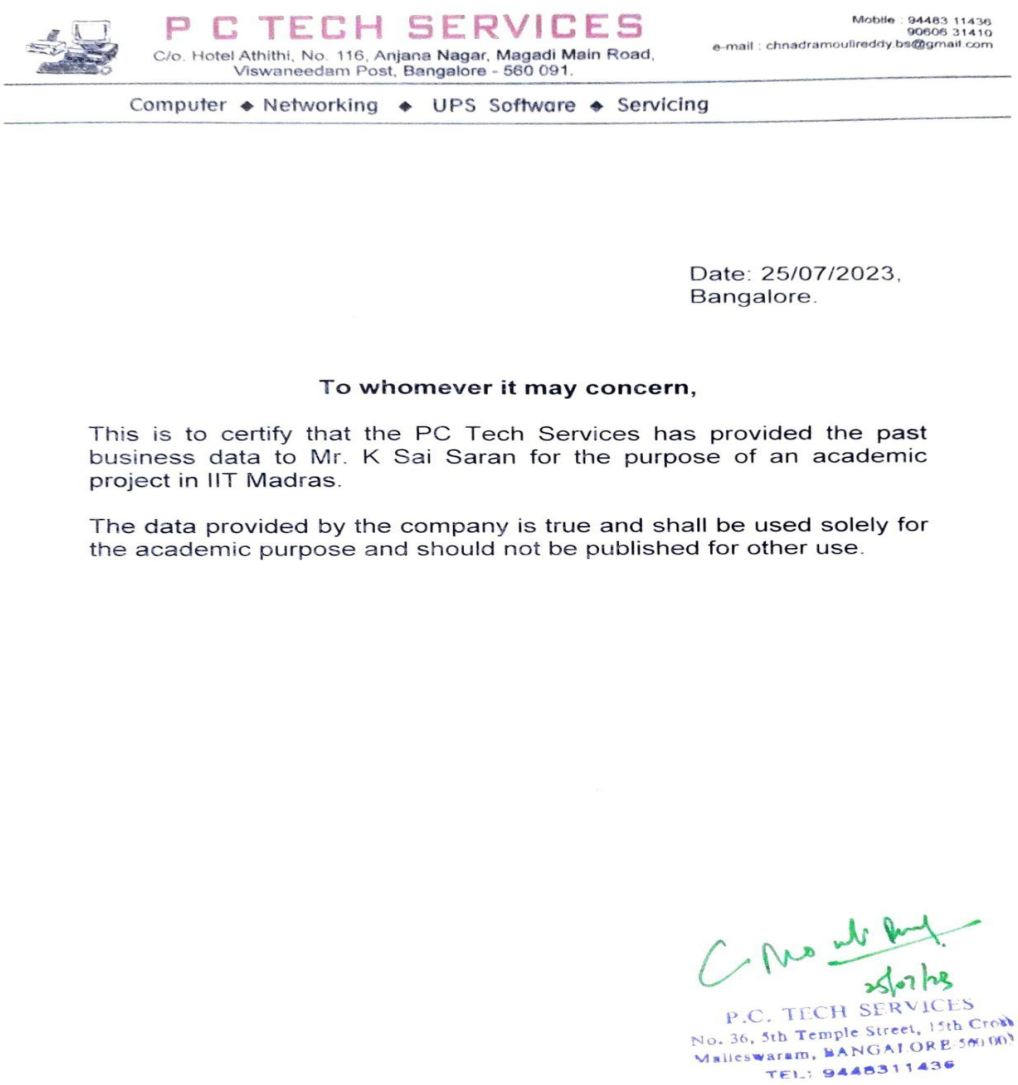
can reduce its costs. This includes finding more efficient ways to operate the business and negotiating better deals with suppliers.

3.3 Optimizing Current Inventory Sales: PC Tech has a stock worth 5 lakhs 16 thousand that have been lying with them from the past 2-3 years.This project tries to optimize the sales of the current inventory, addressing pricing, inventory management, and customer engagement to boost profitability.

4 Source of Data

Mr. BS Chandra Mouli, the company's founder, provided all the information. I had regular discussions and meetings with Mr. Chandra Mouli and Srinivas to understand the data specifics and gather additional information.

Please see the letter from him below to verify the legitimacy of the information.



P C TECH SERVICES

C/o. Hotel Athithi, No. 116, Anjana Nagar, Magadi Main Road, Viswaneedam Post, Bangalore - 560 091.

Mobile : 94483 11436
90606 31410
e-mail : chnadramoulireddy.bs@gmail.com

Computer ◆ Networking ◆ UPS Software ◆ Servicing

Date: 25/07/2023,
Bangalore.

To whomever it may concern,

This is to certify that the PC Tech Services has provided the past business data to Mr. K Sai Saran for the purpose of an academic project in IIT Madras.

The data provided by the company is true and shall be used solely for the academic purpose and should not be published for other use.

25/07/23

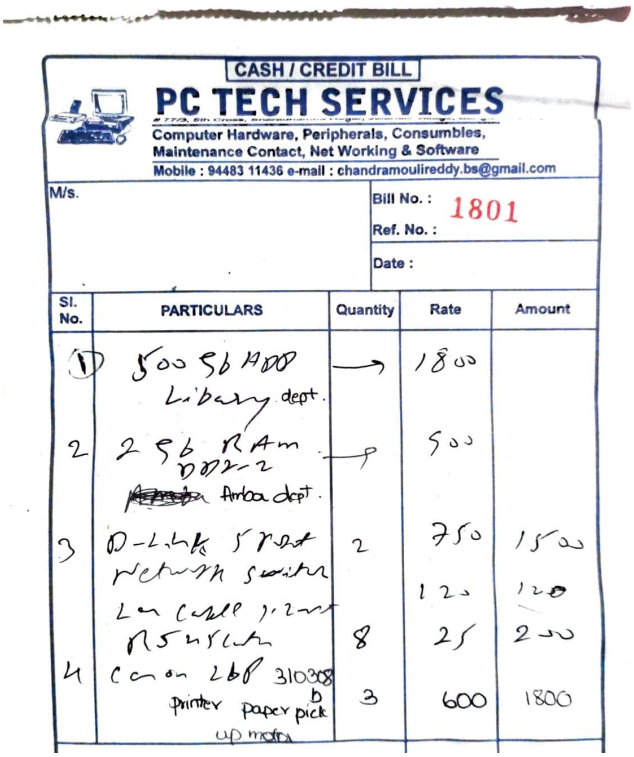
P.C. TECH SERVICES
No. 36, 5th Temple Street, 15th Cross
Malleswaram, BANGALORE-560 003
TEL: 9448311436

Some of the products or inventory storage and service photos are available in the attached link:

https://drive.google.com/drive/folders/1C7qgYa8nCZe6Jm6cWhi6GtaG3tMfyWuu

5 METADATA AND DESCRIPTIVE STATISTICS

Sales data was collected for the time period of January 2019- 2022. Data from January 2023 was not used for analysis since the data collection process in PC Tech solution operates on an annual cycle and they are using the 2023 bill books for their daily business.Hence we were not able to tabulate the data. The used Original Sales and Services data was kept in a book bill wise in each page.:



CASH / CREDIT BILL

PC TECH SERVICES

Computer Hardware, Peripherals, Consumbles,
Maintenance Contact, Net Working & Software
Mobile : 94483 11436 e-mail : chandramoulireddy.bs@gmail.com

M/s.

Bill No. : 1801
Ref. No. :
Date :

Sl. No.	PARTICULARS	Quantity	Rate	Amount
1	500 GB HDD Library dept.	→	1800	
2	2 GB RAM DDR-2 Amba dept.	→	500	
3	D-Link 5 Port Network switch	2	750	1500
	Lan cable 1.2mt		120	120
	RJ45 Jack	8	25	200
4	Canon LBP 3108B printer paper pick up motor	3	600	1800

Original data contains :

1.Bill No
2.Date
3.Serial number
4.Particulars
5.Quantity
6.Rate and
7.Amount

Data Collection Process

Mr. Chandra Mouli and Myself sat together a couple of times at home and arranged it in a desirable format. This data is considered as the original received data.For simplification various components of PC and Laptop are named as Spare parts. I converted the raw data into spreadsheet and shared the data for his future purposes too.Please use the below link to see the original received data:

BDM PC Tech Services Data

Expenses have been termed as zero if the customer took the laptop/pc to repair in the office rather than the home service option and if it has been serviced from the non-working / dump computer parts they have.

The structured data contains:
1.Year, Month
2.Bill/ Ref numbers
3.Service Type
4.Category
5.Income
6.Expenses
7.Profit

The firm provides the following services which are categorized as follows:
Installations: Operating System, Antivirus, Microsoft Tally, Microsoft Office.
Sale: Desktop Sale, Laptop Sale, Printer Sale.
Second Hand Sale: Laptop (refurbished), Desktop (refurbished), Printer (refurbished).
Services: System Security Testing, PC Repair Services and Troubleshooting, PC Troubleshooting, Cloud/Backup Services, Networking/Wired/Wireless Networking, System Security Testing.

The inventory data contains the following:

Item	Quantity	Cost per Unit	Total Value

In the inventory data Other Spare parts of laptop and desktop includes parts like cpu fans, cpu batteries, motherboards ,cables, graphics cards etc…

If the product is sold with no profit for stock clearance or to friends and family, its profit was considered as 50 for the analysis purpose

Profit descriptive data analysis

Category	Min 2019	Max 2019	Avg 2019	Min 2020	Max 2020	Avg 2020	Min 2021	Max 2021	Range 2021	Min 2022	Max 2022	Avg 2022
Sales	100	13450	5218.5	150	12800	4774	50	14000	4688.6	150	9000	3983.33
Second Hand Sales	50	6050	2163	50	5100	2367.8	100	5600	2410.5	50	4450	1837.74
Services	50	2900	951.21	50	2500	1025	50	2850	1139.8	50	2800	986.5
Installation	100	1000	416.27	50	1100	449.18	100	1100	525.3	50	1200	613.59

6. ANALYSIS PROCESS:

Analysis

Key Findings and Analysis:

1. Profitability trends for different service types and categories
2. Identification of high-performing and low-performing services

Analytical Tasks and Process:

Data Preparation and Structuring: Created structured data from bill books and cleaned the dataset for analysis.

Metadata and Descriptive Statistics: Generated metadata for structured data and calculated descriptive statistics for the financial records.

Volume and Revenue Analysis: Analysed service counts and revenue generated per month and year for the 2019-2022 period.

Margin Analysis: Mean margin per service category for the years 2019-2022 was computed to understand the profit margins for each service type.

Categorical Revenue and Margin Analysis: Calculated the revenue generated by each service category in terms of percentages and mean margins per category.

Return on Investment and Trend Analysis: Assessed the return on investment for different service categories and identified trends in revenue and services.

Predictive Modeling (Scheduled for Final Report): Missing data analysis and predictive modeling for stock analysis to optimize profits and future inventory management.

Next Steps:

Address stock optimization and forecast future inventory trends.

Analyze data from 2023 (if available) to further understand current business operations.

Conclude the report with actionable recommendations to address the challenges identified.

This analysis process effectively enables PC Tech Services to make informed decisions, ensuring sustainable growth and profitability.

Tools used for the project:

Google sheets: Initial organization and structuring of raw data from bill books.Preprocessing, formatting, and structuring the data into spreadsheet format for further analysis.Aided in sharing and organizing raw data for future reference and transparency.

Python (Pandas, NumPy, Matplotlib, Seaborn): Used for advanced data analysis, and visualization.Utilized Matplotlib and Seaborn for creating insightful visual representations such as bar charts, pie charts, and line plots.

Google Drive: Storage of supplementary content including images and reference data.Shared a link for visual materials, supporting the structured data.

Predictive Modeling Tools (Scheduled for Final Report): Machine learning libraries like Scikit-Learn for predictive analytics.Employed for forecasting missing data and making predictions for future inventory trends.

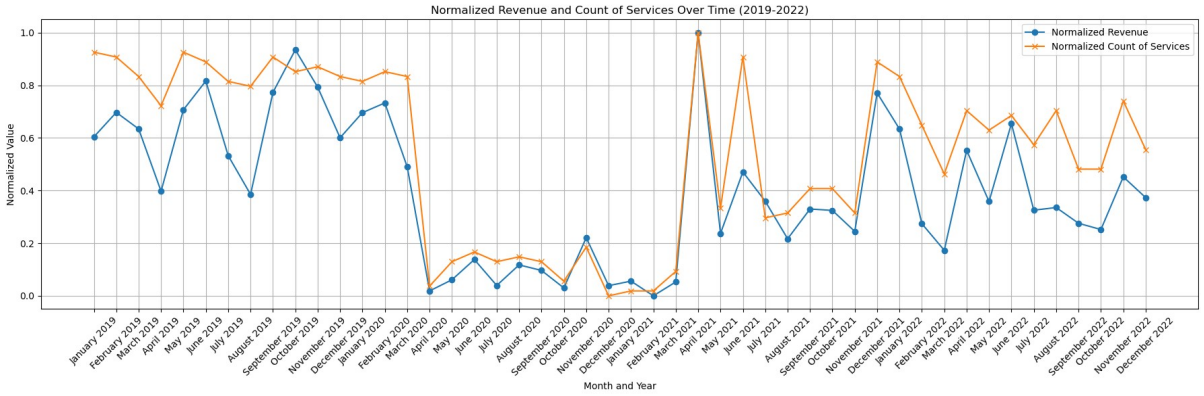
7. Results and Findings

Month and Year wise Service Count

	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
2019	54	53	49	43	54	52	48	47	53	50	51	49
2020	48	50	49	6	11	13	11	12	11	7	14	4
2021	5	5	9	58	28	53	20	21	26	26	21	52
2022	49	39	29	42	38	41	35	42	30	30	44	34

Month and Year wise Revenue Generated

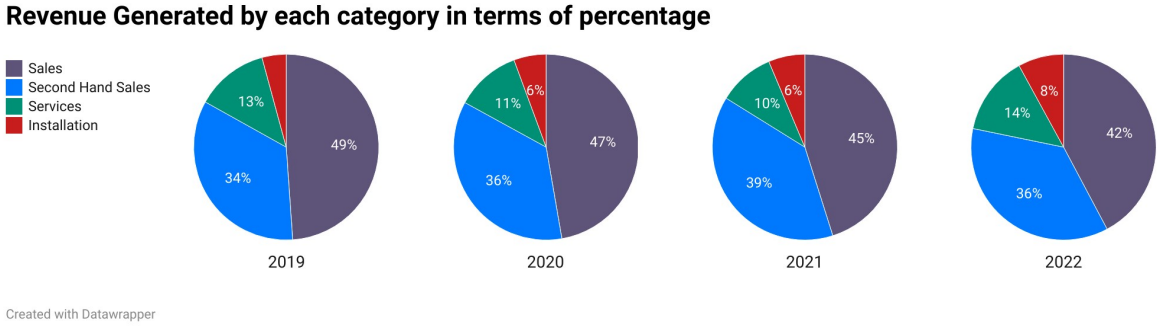
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2019	95620	109150	100000	65650	110600	126450	85300	63900	120150	143650	123050	95150
2020	109000	114350	79100	10700	16850	28000	13700	25050	22000	12350	40050	13600
2021	16100	8000	15650	153100	42400	76300	60150	39450	55850	55100	43500	119850
2022	99950	47750	53100	88200	60000	102950	55200	56700	48000	44550	73600	62150



We observe that the revenue and number of services are proportional here. Also, we can notice a dramatic decrease in both variables during the covid epidemic due to the lockdown, and they had seasonal oscillations even after the pandemic. During peak seasons such as college/university opening days, the start of fiscal years, and New Years, there will be a considerable demand for new/used computer appliances. Also we can observe the decline in the count of services and revenue in the post covid era.

Revenue Generated by each category in terms of percentage

	2019	2020	2021	2022
Sales	48.9	47.3	45.1	42.2
Second Hand Sales	34.2	35.7	38.7	36
Services	12.7	11.4	9.81	13.8
Installation	4.23	5.65	6.36	7.98



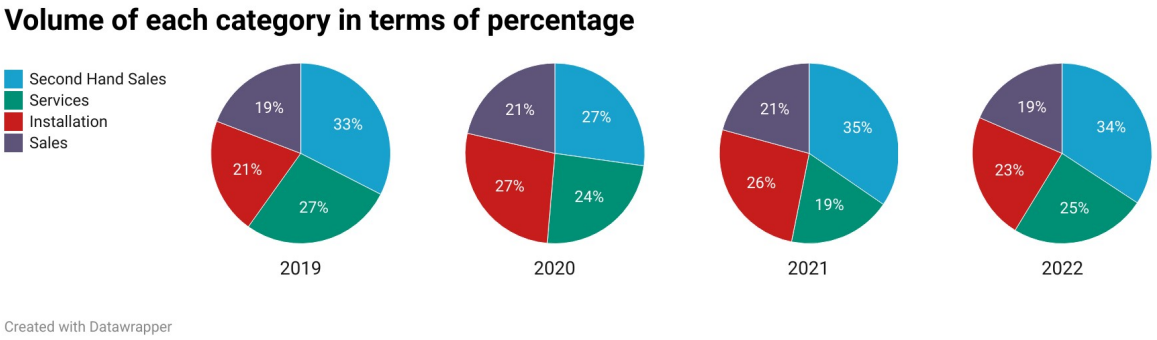
Major contribution of the revenue generated is of sales, followed by Second hand sales, Services and Installation respectively

We observe a drop in the percentage of revenue generated by sales because many individuals choose online/e-commerce purchases over offline purchases due to greater selections and prices. Because of current demand and work from home, installations and services have increased.

In 2021 there was an increased demand for second hand laptops/desktops and printers since there was increase in prices of new laptops/desktops due to shortage of chips.

Volume of each category in terms of percentage

	2019	2020	2021	2022
Sales	19.2	20.3	20.8	18.5
Second Hand Sales	32.5	25.8	34.6	34.2
Services	27.4	22.9	18.6	24.5
Installation	20.9	25.8	26.1	22.7



We can see from the data presented above that the majority of the firm's customers are for the purchase of used laptops/desktops and printers due to their reputation and trust in the company. It is followed by Services like repairs, networking, Cloud/Backup service. Installation is placed on 3rd which is closely followed by Sales.

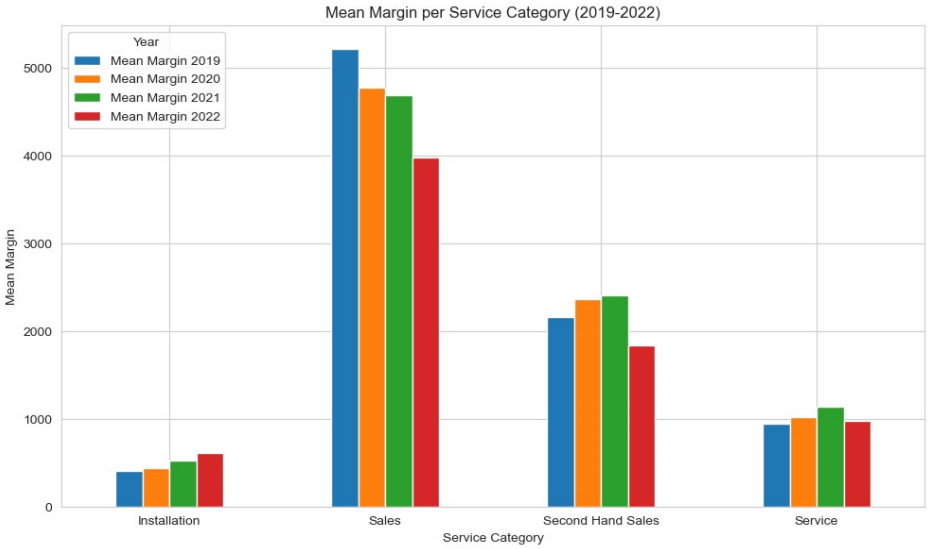
Here also we can observe the increase in the second hand sales and decline in sales due to the above mentioned reasons.

Mean Margin per Service Category (2019-2022)

	2019	2020	2021	2022
Sales	5218.5	4774	4688.64	3983.33
Second Hand Sales	2163	2367.8	2410.45	1837.74
Services	951.21	1025	1139.83	986.5
Installation	416.27	449.18	525.3	613.59

Here we also see a steep decline of margins or profits because of online/e-commerce purchases over offline purchases due to greater selections and prices. Moreover, the fierce competition among various online retailers compels them to provide competitive pricing, enticing customers through discounts, promotions, and cost-effective logistical operations. Moreover, due to rising traffic and fuel prices in Bangalore, they are less able to perform their services around the city at the appropriate time.

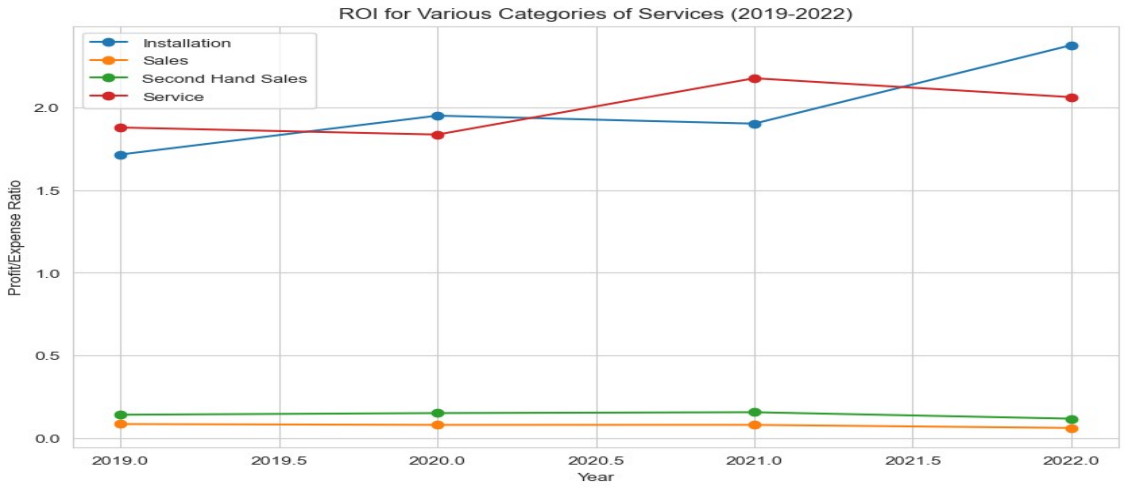
The only category with a consistent growth in margin is Installation, which contributes the least to revenue. However, Installations are usually bought in conjunction with Sales, Second Hand Sales, and Services, and because they do not want to lose their consumers, they continue to provide Installation services.



We can observe that the firm gets high margins from sales, followed by Second Hand Sales, Services and Installation

Return on Investment per Service Category (2019-2022)

	2019	2020	2021	2022
Sales	0.085841	0.080746	0.080889	0.062212
Second Hand Sales	0.142208	0.152023	0.157322	0.118389
Services	1.878516	1.835821	2.176375	2.062147
Installation	1.715454	1.950178	1.901854	2.375940



Despite being the primary revenue sources with significant sales and high volume, both Sales and Second Hand Sales exhibit notably low return on investment (ROI). Sales reflect the lowest ROI, measuring less than 10%, while Second Hand Sales portray an ROI below 15%. This suggests that without adequate selling strategies and investment planning, the capital remains relatively idle, potentially affecting overall profitability.

Services and Installations exhibit an ROI of nearly 200%. Scaling up their volume and expanding the range of services could significantly enhance their overall profitability.

EXPECTED TIMELINE FOR FINAL REPORT:

The deadline for the final report is set for August 15th, 2023. An extensive examination of sales volume, revenue, inventory control, and profit will be included in the final submission report. Using the conclusions drawn from this analysis, we were able to address the project's problem objectives for the PC Tech Services case study.