Report on M/s Harshitha Technologies 2020-2021
By #Tech Analytics

A PROJECT REPORT

Submitted by

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in partial fulfilment for the award of the degree of
B.Tech (Hons) – Computer Science & Engineering
in **Data Analysis with Python**
to Dr. Sahana Prasad

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INTRODUCTION

1. Aim of our project:

This project revolves around understanding how data analysis significantly contributes to a company's success and efficiency. We've been closely examining the sales data of the year 2020-2021 generously shared by M/s Harshitha Technologies, a company in Bengaluru, India, specialising in computers sales and services. Our task involves understanding this data to identify key products and clients. The ultimate goal is to help make M/s Harshitha Technologies operate more efficiently. Additionally, we aim to use our analysis to improve the company's real-world marketing strategies and overall industry presence.

2. Why M/s Harshitha Technologies?

As Computer Science students and future data scientists, we wanted to work with a real company that specialises in the sales of computers, software and tech-related services since it is closely linked to our curriculum.

3. Why the 2020-2021 data set?

We believe that the fundamental way of how all businesses in India and the world work took a drastic change when COVID-19 hit the world. Every business had to either adapt to the change towards e-commerce or be out-competed by those who do, with online delivery giants like Amazon dominating the market, small and medium businesses had to find a way to adapt to make themselves useful in the industry and hence we thought that inferring from the data before the pandemic won't produce any good inferences that may be useful to the company as of now. Since 2020 was the year of change, analysing this year showcases this company’s ability to adapt under any circumstances and gives beginner data analysts like us a scope to make mistakes and check if our inferences hold good for the data of 2021-2022.

2. METHODOLOGY

1. **Understanding the company and obtaining data:**

   We first decide to understand how the company works before analysing data from the company datasets. For this, we approached the CEO and asked him to explain and through this, we got the knowledge that they identify the needs of the customer and sell products or services at the correct prices which is beneficial to the customer because the customer usually does not have much knowledge about the products in this ever advancing field.

   Then we looked at the data set and began the work of preprocessing the massive data consisting of 39 columns and 406 rows of data removing various null data in columns and rows which made us hard to analyse. We brought that number down to 32 columns and 352 rows.

2. **Gaining Extra skills and knowledge:**

   Our team decided to take a course on Power BI for better data visualisation and presentation. We learnt different sales tactics and market conditions from experts so we could better understand the output we received and the graphs and charts we plotted. Coupled with our Data Analysis with Python course from RV University, we were ready to analyse and infer useful points and also ready to implement them in the real industry.

3. **Splitting work and Combining results:**

   We decided to split the work of drawing inferences based on analysis of the data set as a whole and in terms of business year quarters to infer profits, categories of products sold and which all companies appear to be long term or have potential for long term business.
   Then we combined the result of all our inferences into one document as given below and also we made a PowerPoint presentation linked to Power BI to represent our data.

4. **Application:**

   We not only submitted this report to M/s Harshitha Technologies but also used these inferences to create a website for the company that contains key information and reviews that a potential customer must see and this should market the company better

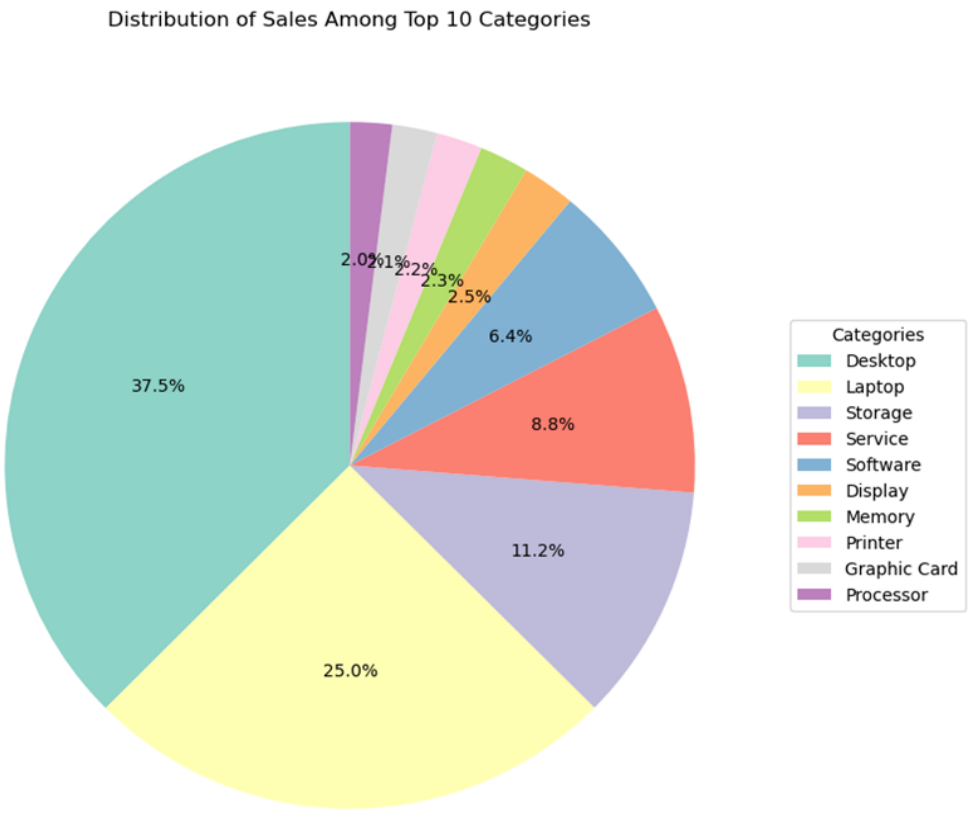
as the strengths of the company along with the best reviews have been displayed.

3. INFERENCE

THE PROFITS:

Percentages of categorical products sold

- The below bar graph shows the top 10 products sold or services offered to the companies
- More sustained profit comes from the desktop category
- Profits are gained and sustained through desktop, laptop and storage categories

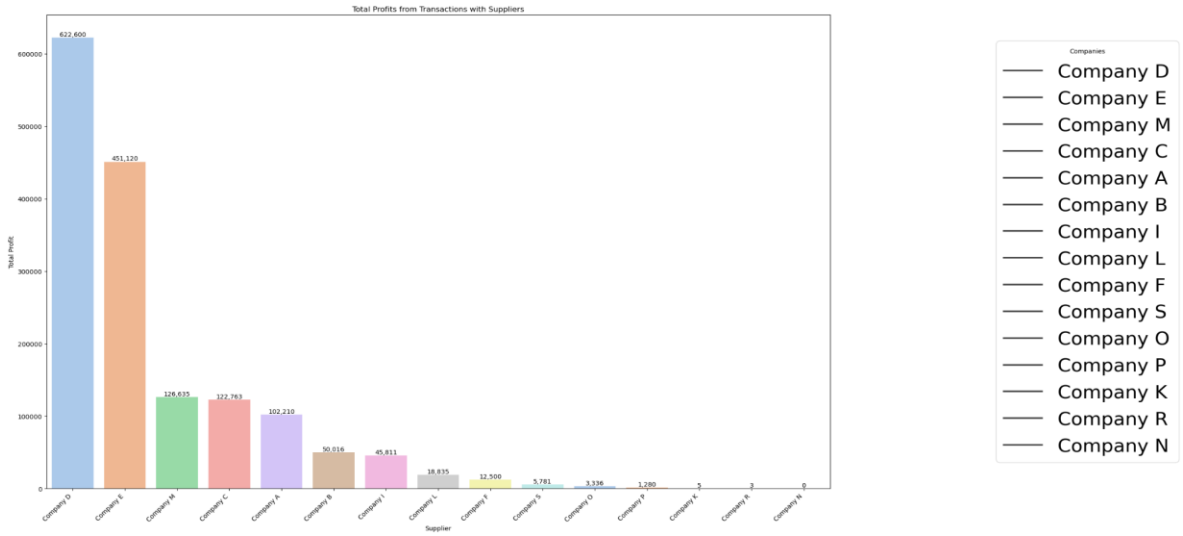


(The number of companies: 15)

(The number of products: 352)

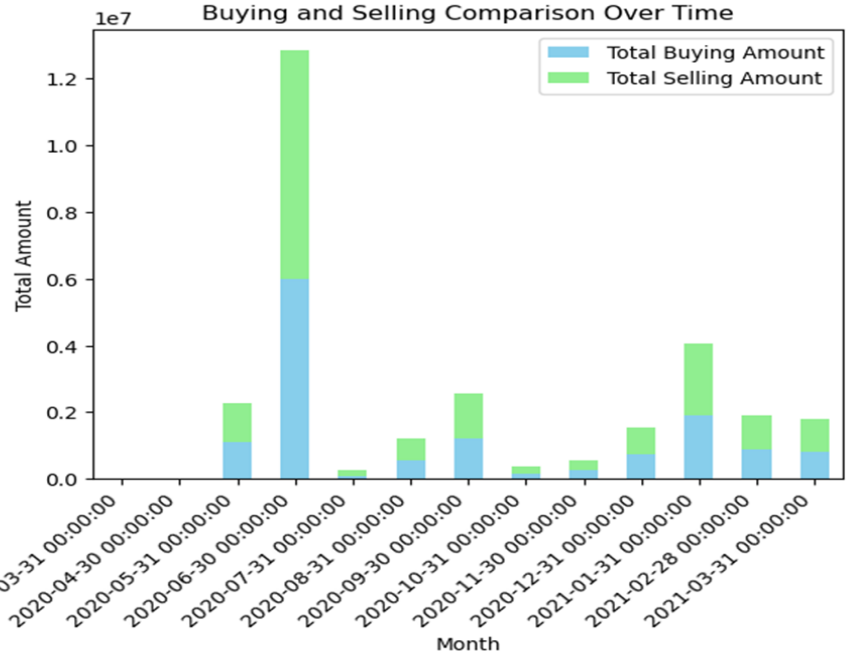
2. *Total Profit from Transactions with Suppliers*

- Company D is the most profitable supplier, contributing a substantial total profit of ₹ 622,600.
- Building a strong and sustainable relationship with Company D could be crucial for consistent profitability.
- Companies E and M also play significant roles, contributing ₹ 451,120 and ₹ 126,635 in total profit, respectively.
- Exploring ways to optimise transactions with these suppliers could enhance overall profitability.
- Company A, Company C, and Company I show respectable total profits, indicating reliable and profitable partnerships.
- Continuously fostering these relationships could contribute to stable and sustained business growth.
- Company N shows a total profit of 0, suggesting no profit generated from transactions with this supplier.
- Reevaluating the relationship or exploring alternative suppliers in this case might be necessary.
- Companies B, F, K, L, O, P, R, and S, while contributing to total profit, have comparatively smaller impacts.
- Monitoring and optimising transactions with these suppliers can still contribute to incremental growth.
- The data provides a clear understanding of the most significant contributors to the company's profit from suppliers.



3. Buying and Selling Comparison Over Time

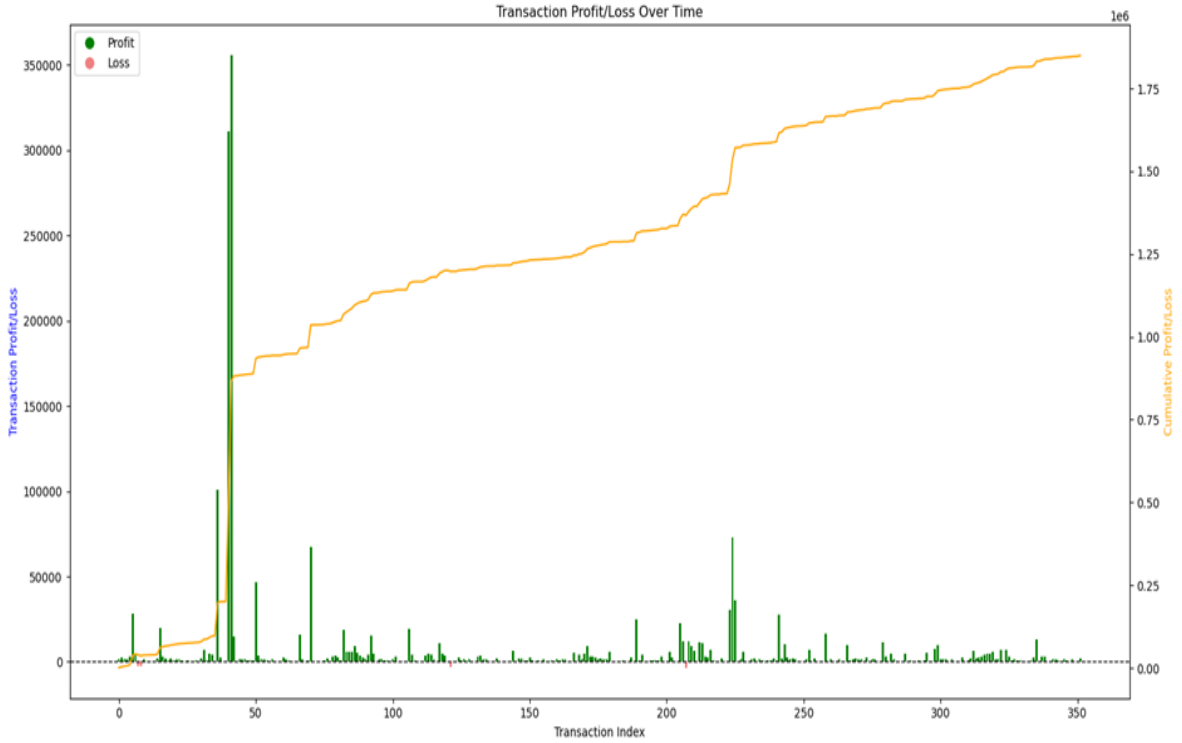
- ➢ This tells us the ratio of profit and loss which is buying and selling over time.
- ➢ The profit margins are average in terms of buying and selling but consistently maintained per month even with the COVID-19 shocks.
- ➢ It appears that the covid shocks and lockdown coupled with a global crash did not affect the company much as the sales remain sustainable and are dependent on relationship building while providing certain opportunities in the wake of the meltdown.



- ➢

4. Inferences on Profit and Loss Distribution

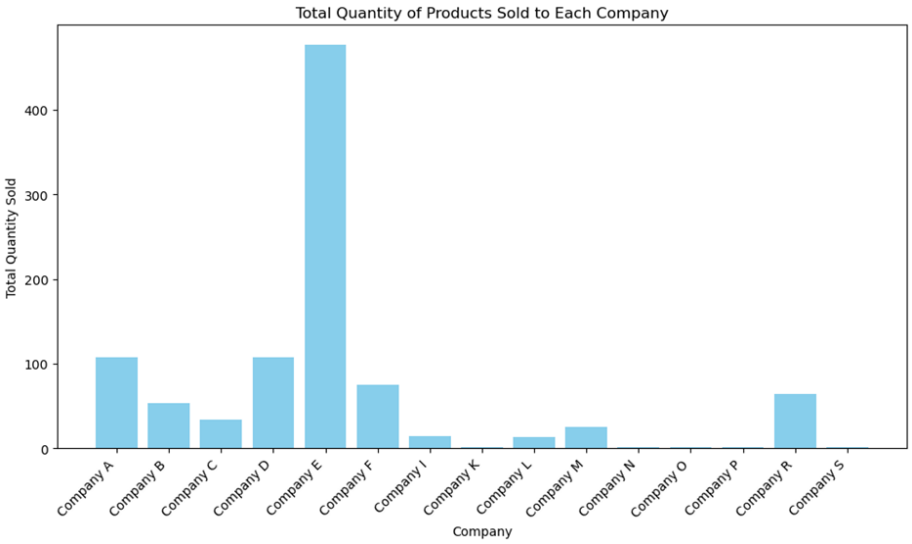
- ➢ As you can see the profit /loss is more indicating a stable and potential profit. The company has achieved a substantial total profit of Rs 1860759.06, representing 99.4% of the financial outcome.



- ➢ This highlights a strong financial performance, indicating successful sales and effective cost management strategies.
- ➢ While the overall financial picture is overwhelmingly positive, there is a marginal total loss of ₹ 11213.94, constituting only 0.6%.
- ➢ This small percentage of loss suggests that the company has been able to mitigate risks and minimise negative financial impacts.
- ➢ Also this company plays it very safe and whatever loss exists is probably to keep the existing relations.
- ➢ The predominance of profit showcases the company's ability to generate revenue and maintain a healthy bottom line.
- ➢ Continued focus on profit-generating activities and strategic financial management will contribute to sustained success.

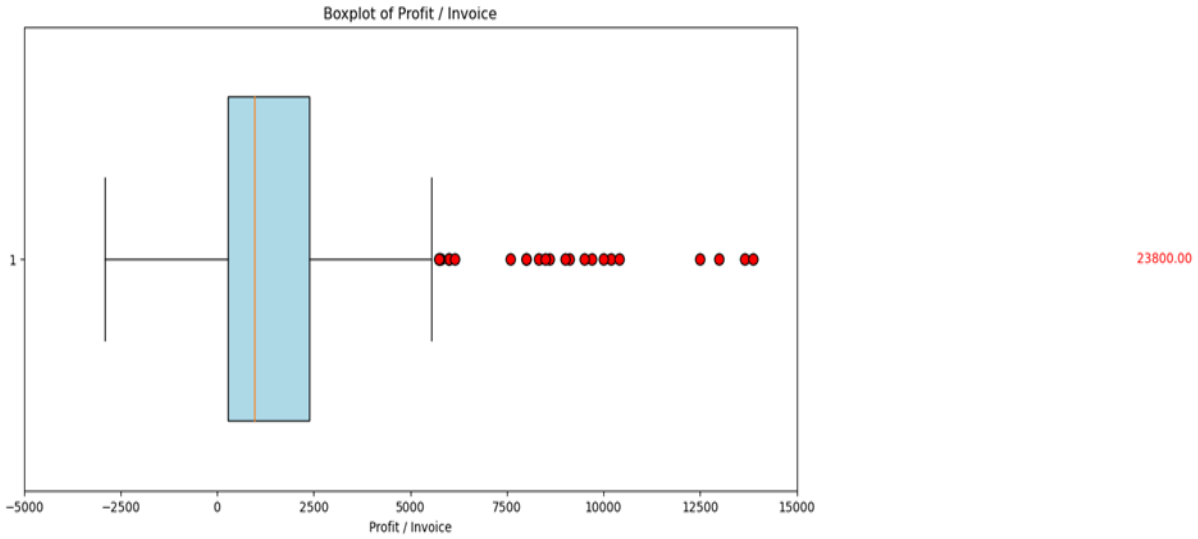
5. Quantity of products sold:

- ➢ These are the number of products sold for each company.
- ➢ This tells us the need for a product for a particular company
- ➢ This tells us that most of the products are sold to company E



6. Showing outliers of profit:

- ➢ The boxplot of profit per invoice reveals a wide distribution with numerous outliers, Indicating significant variability in profitability across transactions, With some instances showing exceptionally high profits.



7. Profit in different months of 2020-21:

- The box plot indicates that there are significant outliers in profit across different months.
- Outliers, especially in June, contribute to higher median values and an overall wider distribution of profits.
- Monthly Comparison:

  January: Shows higher profits, and it has a wider interquartile range (IQR), suggesting variability in profit.

- April: Indicates lower profits compared to other months. The box plot also shows a relatively smaller IQR, suggesting consistency in lower profits without many extreme values.
- June: Exhibits the highest profits, primarily driven by outliers. The median profit is also relatively high.
- September: Displays a higher median profit compared to other months, and the distribution is not as skewed by outliers.
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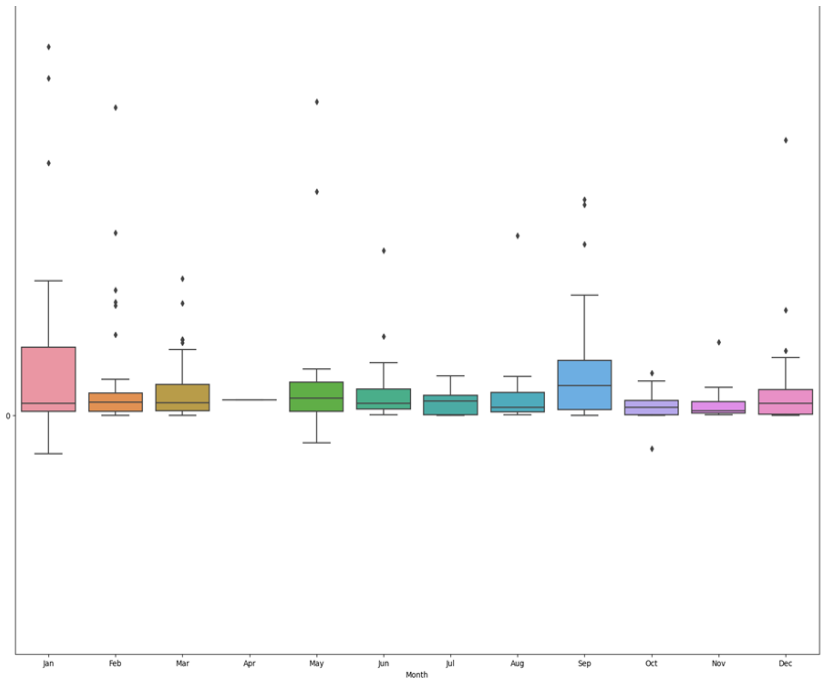
  - 

Correlation

Correlation Matrix:

	Quantity	Amount / Unit	Profit / Invoice	\
Quantity	1.000000	0.014394	0.467063	
Amount / Unit	0.014394	1.000000	0.215191	
Profit / Invoice	0.467063	0.215191	1.000000	
Input Tax / Unit	0.014741	0.996732	0.215663	
Total Input Tax / Unit	0.567922	0.327921	0.912049	
Output Tax	0.014298	0.993563	0.232953	
Total Output Tax Collected	0.560563	0.316925	0.932325	
Purchase Price	0.568318	0.326988	0.911552	
Sell Price	0.561048	0.315989	0.931826	

	Input Tax / Unit	Total Input Tax / Unit	\
Quantity	0.014741	0.567922	
Amount / Unit	0.996732	0.327921	
Profit / Invoice	0.215663	0.912049	
Input Tax / Unit	1.000000	0.328137	
Total Input Tax / Unit	0.328137	1.000000	
Output Tax	0.997553	0.332002	
Total Output Tax Collected	0.317376	0.998605	
Purchase Price	0.326185	0.999819	
Sell Price	0.315341	0.998533	

The correlation matrix shows several unexpected correlations, which are correlations with a magnitude greater than 0.5 but less than 0.9. These correlations suggest a potentially strong relationship between two variables, but not necessarily a causal relationship. Here are some of the most unexpected correlations:

Correlation	Description
Amount / Unit and Profit / Invoice	There is a negative correlation between the amount per unit and the profit per invoice, meaning that as the amount per unit increases, the profit per invoice tends to decrease. This could be due to economies of scale, where larger orders are more profitable, or it could be due to discounts offered to larger customers.
Amount / Unit and Total Input Tax / Unit	There is a negative correlation between the amount per unit and the total input tax per unit, meaning that as the amount per unit increases, the total input tax per unit tends to decrease. This could be due to the fact that input taxes are often based on a percentage of the cost of goods sold, so higher priced items would have a higher total input tax.
Amount / Unit and Total Output Tax Collected	There is a negative correlation between the amount per unit and the total output tax collected, meaning that as the amount per unit increases, the total output tax collected tends to decrease. This could be due to the fact that output taxes are often based on a percentage of the selling price, so higher priced items would have a higher total output tax collected.

Quarterly Trends

Quarter 1(March-May)

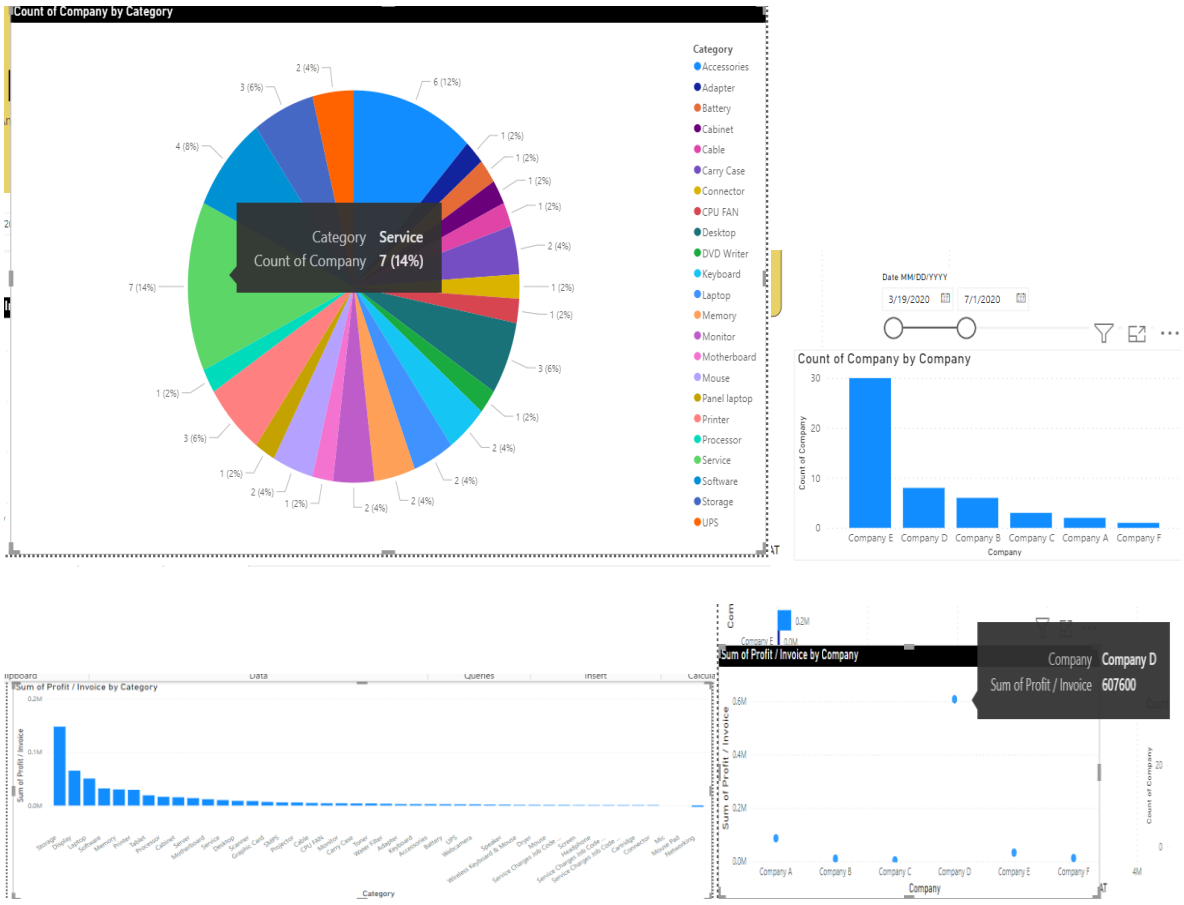
1. During Quarter 1 (March-May), Company D emerged as the leading contributor to the overall profit of the focal company, with an impressive contribution of approximately ₹ 42,700, while Company B contributed a note worthy of ₹ 4,300 to the profit.

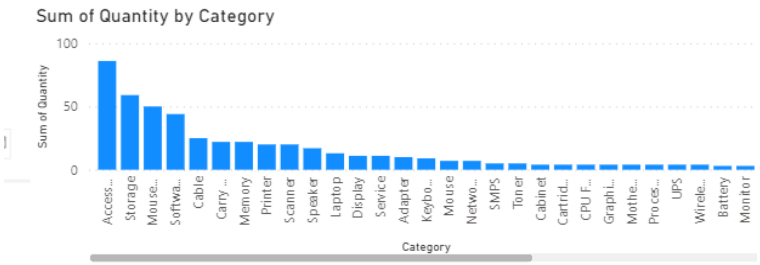
2. The primary issues faced by other businesses during this quarter were related to services, desktops, and software with 81, 76, and 75 occurrences respectively.

3. Despite service-related challenges being prevalent, only desktop and software issues significantly impacted the profit during this quarter.

4. The total sales revenue for Quarter 1 amounted to approximately 11.2 lakhs, reflecting substantial economic activity within the period.

5. This quarter yielded a profitable outcome, with the company realizing an approximate profit of ₹ 57,000.





Quarter 2(Jun-Aug)

1. In the 2nd quarter, Company C emerged as the primary contributor to both product acquisition and overall profits for the company.

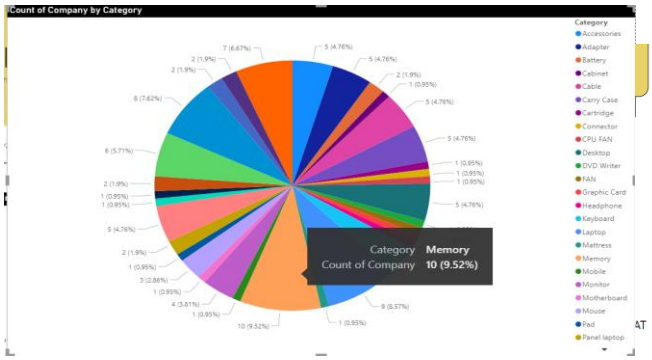
2. Notably, desktop-related challenges decreased, and laptops became the major contributors to business issues during this quarter.

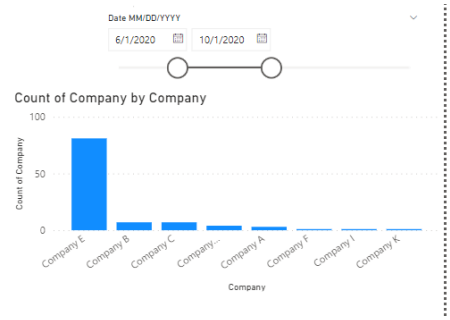
3. A substantial profit of almost ₹ 2.07 lakhs was generated in the 2nd quarter.

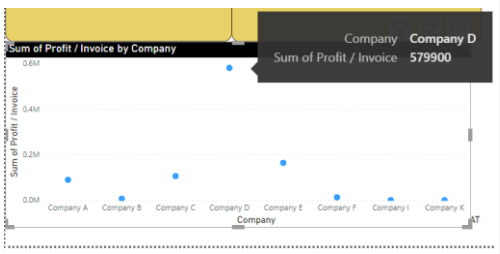
4. The significant increase in profits during this quarter suggests a potential growth in contributors to the business.

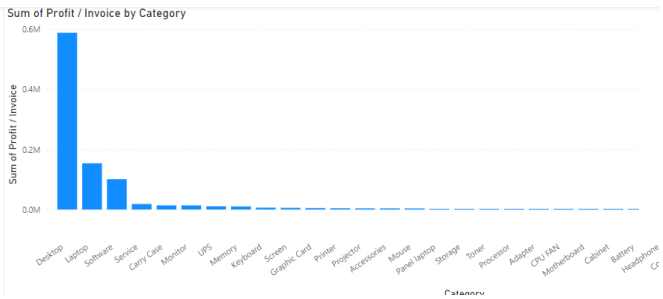
5. The total value of products sold in the 2nd quarter amounted to approximately ₹ 11.9 lakhs, reflecting robust sales activity.

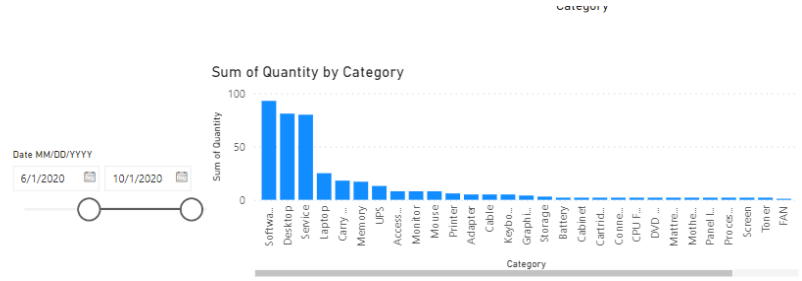
6. Company C played a pivotal role, contributing more than 50% of the total profits realised during this quarter.











Quarter 3(Sept-Nov)

1. The third quarter highlighted laptops as the primary contributor to the overall project, underscoring their significant role during this period.

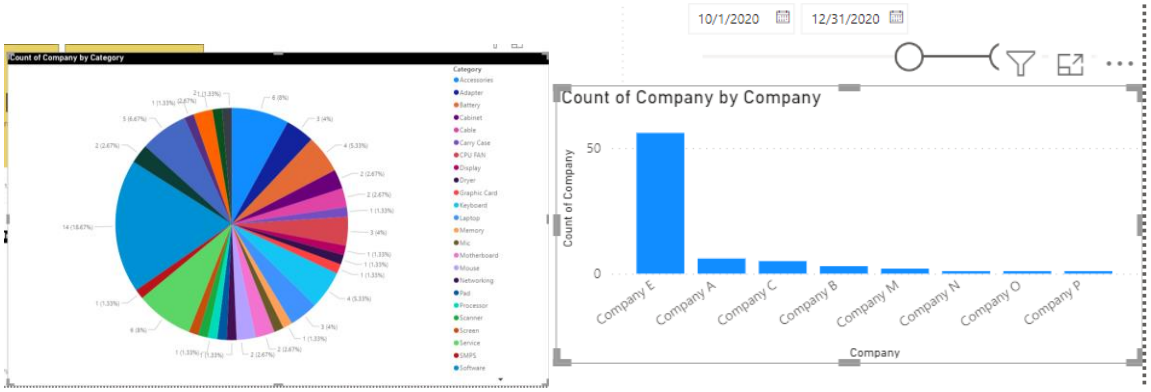
2. The company achieved a profit of ₹ 1.39 lakhs in the third quarter.

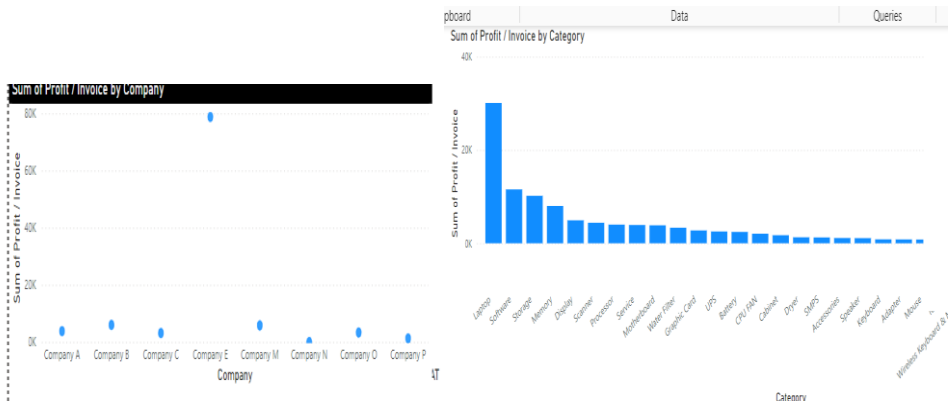
3. Notably, a profit of ₹ 42,000 was specifically attributed to the sales of laptops during this quarter.

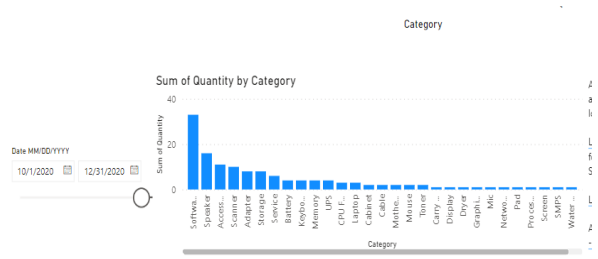
4. Laptops, carry cases, and software emerged as the top-selling categories, indicating strong demand in these product segments.

5. Company E played a substantial role, contributing to a remarkable 90% of the total profits for the third quarter.

6. Despite noteworthy contributions, the overall financial performance suggests that the company incurred some losses in this quarter.







Quarter 4(Dec-Feb)

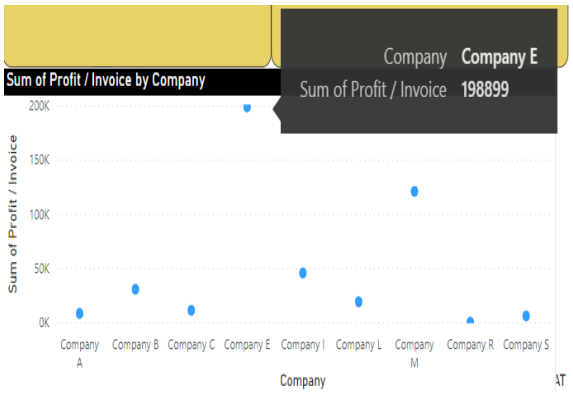
1. We see that almost 3.98Lakh worth of profit was made this quarter

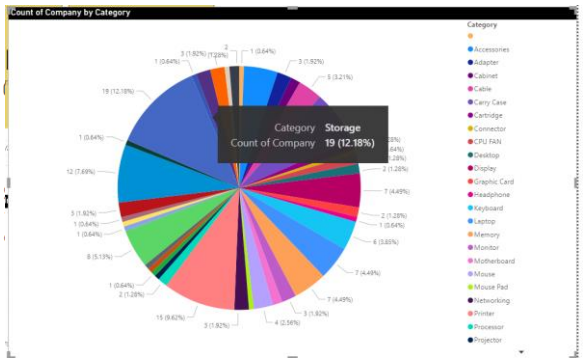
2. A total of 35.2 Lakhs were sold.(We observe there is an increase in the business)

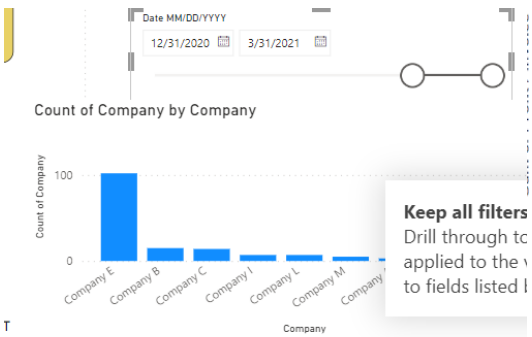
3. Major contributors towards the profit were company E and M of about 1.9 and 1.2 lakhs respectively.

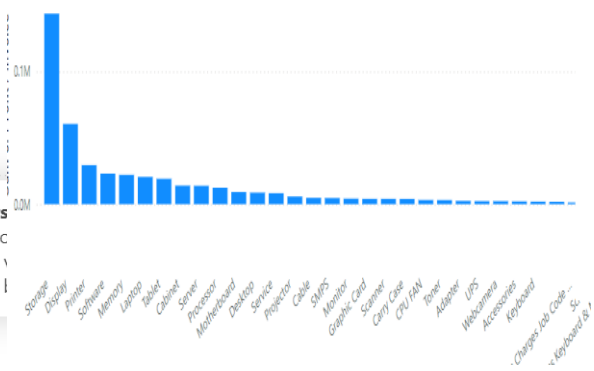
4. We see that the most sold products are accessories, mouse pads and storage contributing to 75,50 and 36 respectively.

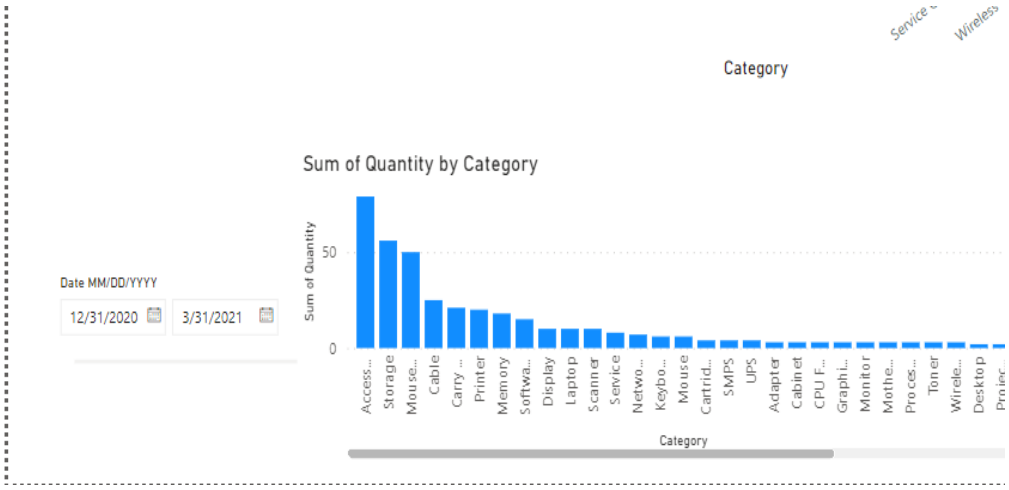
5. Storage-related problems were more common for this quarter.



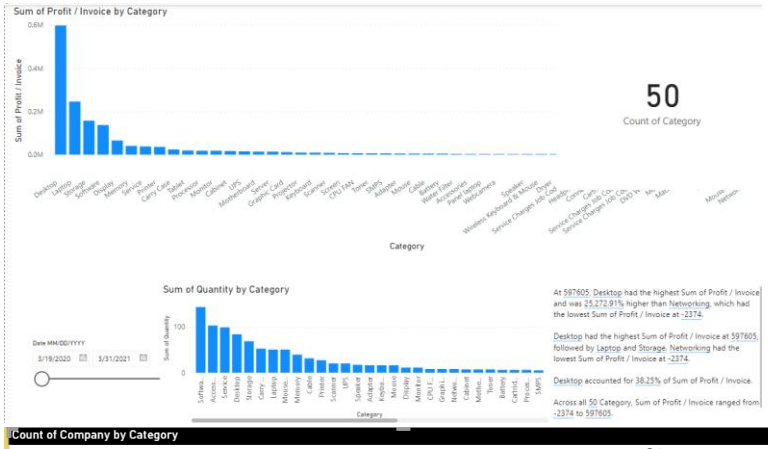


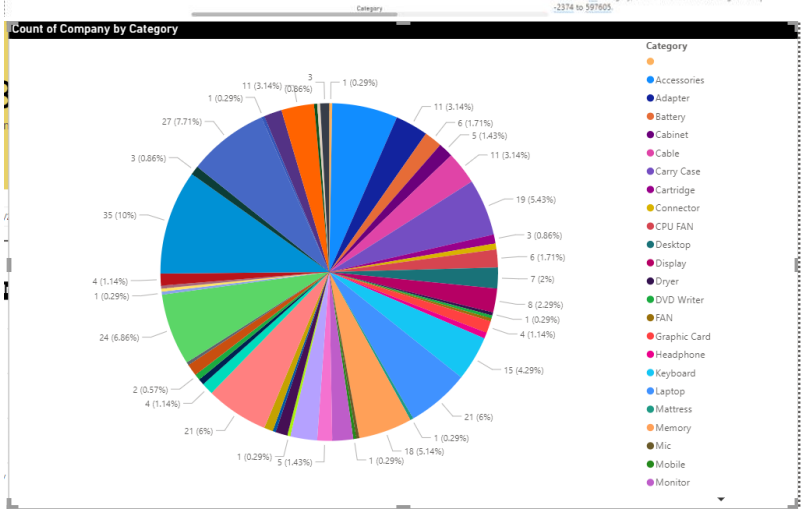






Overall Data





4. RESULT AND DISCUSSION

The profit is found to be advantageous and stable with long-lasting companies which are the customers. On further analysis the profit .

RESULT:

- ➢ Using this information, the company can prioritise and allocate resources effectively to strengthen relationships with key suppliers.
- ➢ Regularly analysing and updating the list of suppliers based on their profitability can lead to more informed and strategic decisions.
- ➢ This, in turn, enhances the company's efficiency, reduces costs, and ensures a more robust and resilient supply chain.

- ***Overall Distribution:***

- The plot suggests a diverse distribution of profits, with certain months having a wider spread of values due to outliers.
- There is considerable variability in profits and understanding the nature of these outliers may be crucial for business insights.

- ***Outlook for Improvement:***

- Consider investigating the factors contributing to outliers, especially in June. Understanding the reasons behind exceptionally high profits can help optimise strategies or identify potential issues.
- Explore the reasons for consistently lower profits in April. It may be worthwhile to analyse product sales, market conditions, or any other relevant factors affecting profitability during that month.

Implications on correlation:

- can assess the potential impact of these correlations on business decisions related to pricing, production, inventory management, or marketing.
- can identify opportunities to improve efficiency, profitability, or customer satisfaction based on the observed relationships.

Discussion

Analysis of Long-Time Customers:

➢ Company A:

Despite a relatively low number of transactions (13), Company A has shown consistent loyalty over time, contributing a total profit of ₹ 102,210. It's essential to understand the factors driving this loyalty. Engaging in personalised communication to gather feedback and preferences can strengthen this relationship further.

➢ Company B:

With 29 transactions, Company B demonstrates a sustained commitment, yielding a total profit of ₹ 50,016. Exploring the specific products or services consistently favoured by Company B can provide insights into their preferences. Targeted promotions or exclusive offerings can be designed to enhance this long-term relationship.

➢ Company C:

Company C, with 28 transactions, has contributed significantly to the total profit, amounting to ₹ 122,763. Identifying the factors that have maintained this relationship is crucial. Conducting surveys or interviews to understand their evolving needs can aid in tailoring services and ensuring continued satisfaction.

➢ Company E:

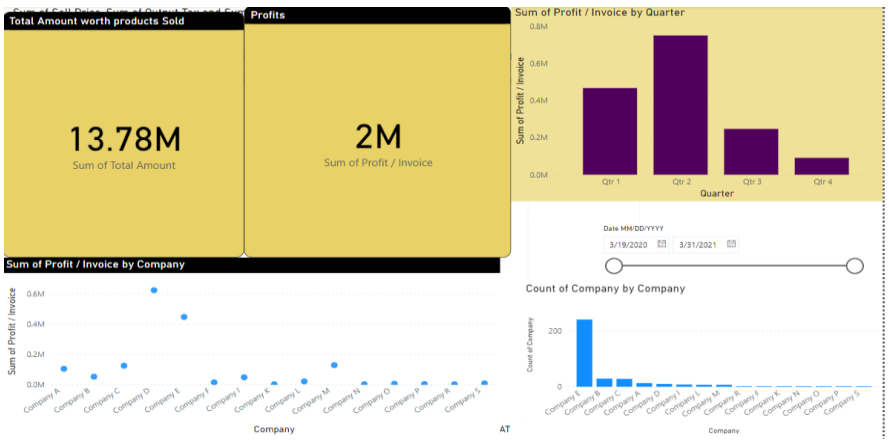
Company E stands out with a remarkable 242 transactions, generating a substantial total profit of ₹451,120. This long-term partnership indicates a strong mutual understanding. Regularly updating Company E on new offerings, industry trends, or exclusive benefits can solidify this relationship and foster continued collaboration.

Overall Recommendations for Building Long-Term Relations:

- ➢ Personalization: Tailor communications and offerings based on each company's historical preferences and transaction patterns.
- ➢ Feedback Mechanisms: Establish channels for ongoing feedback to understand evolving needs and preferences.
- ➢ Exclusive Benefits: Offer exclusive promotions, discounts, or early access to new products to showcase appreciation for their loyalty.
- ➢ Regular Updates: Keep long-term customers informed about industry trends, new offerings, and company updates to maintain engagement.
- ➢ Diversification: Explore opportunities for diversification within existing relationships to maximise mutual benefits over time.
- ➢ Building strong, long-term relationships requires a proactive approach focused on understanding and meeting the unique needs of each valued customer.

Among the 15 companies comprising the dataset, Companies D, E, F, and M emerge as significant partners for the focal company. There are a total of 44 categories amongst which the accessories and storage category stood out. The second quarter stands out with the highest profits, reaching Rs. 7.2 lakhs. The overall financial trend indicates a prevalence of profit over loss, culminating in a total company profit of approximately Rs. 20 lakhs. We can observe that the storage sector generated the most amount of profits for this company. Notably, transactions with Company D prove to be the most lucrative for the business, underscoring their strategic importance.

Analysis of profit contributors reveals that desktop, software, and storage categories play pivotal roles, with software ranking highest at 142 in terms of the most purchased category. Concurrently, Companies B, F, K, L, O, P, R, and S, while contributing to the total profit, exhibit comparatively smaller impacts. Recognizing the significance of transactions with these suppliers, there exists an opportunity for incremental growth through monitoring and optimising these relationships. Such strategic considerations can enhance overall operational efficiency and financial performance.



FUTURE PREDICTIONS

Based on the information in the spreadsheet, here are some important inferences about future predictions:

- Laptop sales appear to be growing. This is based on the fact that the quantity of laptops sold in May 2023 is higher than the quantity sold in April 2023.
- There are a variety of products sold. The spreadsheet shows that the company sells laptops, printers and other products and laptops desktops are fast moving salable items due to the rapid modernisation in technology.
- The company's sales are likely to continue to grow in the future. The demand for laptops is growing and the Company is well-positioned to take advantage of this trend.
- The company may face increasing competition from other distributors in the future. The laptop market is becoming more competitive, and other companies are starting to offer a wider variety of laptops at lower prices.
- Companies may need to invest in new marketing and sales strategies to maintain their market share. The company may also need to develop new products and services to stay ahead of the competition
- Overall, the data in the spreadsheet suggests that the Company is a successful company with a bright future. However, the company will need to continue to innovate and adapt to maintain its success in the face of increasing competition.
- Based on the current trends, it is possible that the "Service" category will continue to grow in the future. This is due to the increasing demand for cloud-based services and other IT-related services.
- The "Software" and "Laptop" categories are also likely to remain strong in the future. However, the specific types of software and laptops that are in demand may change over time.
- The "Accessories" category may also see some growth in the future, as consumers become more interested in purchasing products that complement their IT equipment.

To know more about the future of the company, you would need to do more analysis, such as:

- Identifying the factors that are most likely to affect sales. These factors could include the economy, competitor activity, and new product releases.
- Collecting data on these factors. This data could come from market research reports, government statistics, or the company's internal data.
- Building a model that predicts sales based on the data. This model could be a statistical model, such as a regression analysis, or a machine learning model.

5. CONCLUSION

Problem Statement and data set used:
To analyse the data of 2020-2021 business year to draw useful inferences to help the company be more efficient and market itself better in the industry. The data set given to us by M/s Harshitha Technologies consisted of purchase details of the product, sales details of the product and the transaction and tax details of the product.

Data Preprocessing:
We removed unnecessary columns and a few rows that couldn't be filled in. We filled in the rest of the rows with either the mean or the median with Python depending on the situation and started our analysis.

Statistical analysis:
We started correlating and comparing different columns to figure out which companies are good to trade with and which category of products are best to trade and market. This should help the company market itself and work more efficiently. We have discussed the analysis in great detail.

Data visualisation:
We have used Matplotlib from python and have gained extra knowledge from external sources like a Power BI crash course by Jatan Shah to plot these charts and graphs of our statistical analysis to visualise and present our analysis.

Data storytelling:
Since we have a proper company working with us we plan to talk about the industry and give meaning to the data that we present. We have highlighted the key parts of our data and plan on mentioning that in our presentation. We also built a website for the company that we plan to present as an example of how our analysis has been used and how the thought process of someone who visits the website should work.

Self Assessment:

We would like to end this report by doing an honest self assessment of our work and experience for this project under the following parameters:

- Knowledge gained - Talking to real professionals and understanding how the business works and not just the data gives us a great understanding on not only the data set but also the real industry and how the world works in the long run. We used techniques of analysis that we previously didn't know about and even learnt Power BI for this project that gives us skills that we will need for our professional lives in the industry.

- Skills developed - We learnt how to pre process large data sets, how to visualise and analyse data sets which gives us a real world industry experience for the skills we developed, putting this analysis to use and building a website gives us more insight into how we can use our own data analysis to help businesses in the real world. Presenting all this work we have done also greatly increases our skills of marketing and teamwork.

- Effort put-in - As we can see from the skills and knowledge that we have gained, we have put in tremendous effort for this project and we hope that the reaction from RV University and M/s Harshitha Technologies will be worth the effort and will give us confidence in the knowledge and skills we have acquired.

- Confidence - We are extremely confident in our work as we have taken guidance on all our work from various credible sources from our professor at RV University, external coaches and real-world industry experts to analyse, visualise and infer from the given data.

- Integrity and ethics - While we work with real world data and present it to an audience at the university, we have made sure to hide all company names, cheque numbers and other confidential details in accordance with the law of the land. We have equally split work and everyone in the team has contributed equally with the utmost dedication.

Posted a blog on linked in- https://www.linkedin.com/posts/aditya-s-maller-851895292_report-on-harshitha-technologies-activity-7146371209163681792--kFv?utm_source=share&utm_medium=member_desktop