

AtliQ Data Analysis & Visualization Project

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Introduction

Case study background & project goals

Background

- AtliQ is a B2B hardware & peripheral **manufacturer** that provides computer and network equipments for other businesses.
- AtliQ has a headquarter in Mumbai and many regional branches across India.
- In the previous quarters, the company was reported to have **declining sales**.
- Bhavin Patel, AtliQ's Sales Director is having trouble tracking where the business is falling in the local Indian market.
- His team reported to him by providing him excel data screen captures, which are difficult to find issue and determine important trends.

Project goals

- **Purpose**

Discover insights from the data to figure out sales dropping issue.

- **Expected results**

- Provide useful exploratory analysis insights from the collected data.
- Provide a real-time dashboard to support data driven decision making.

- **Stakeholders**

- Sales director
- Marketing team
- Customer service team
- Data & analytics team
- IT

- **Success criteria**

- The dashboard is able to provide up-to-date sales data automatically.
- Sales team is able to make better decision, cut down cost and gain more sales by a %.
- Data team: data collecting and visualizing change to automatic, thus save more time & resources.

Data

Data source, database & ERD

Data & workflow

- In this project, we will work on AtliQ's sales data from late 2017 to mid 2020.
- Data was manually extracted from the company's Data warehouse, which was originally stored in the company's Sales database management system.
- The data will be stored in a local MySQL database, then extracted and analyzed with SQL.
- In order to analysis the data with SQL, we will use Jupyter Notebook, utilize Python with sqlalchemy and pandas packages for data mining.
- Data will be visualized using PowerBI.

Data overview

There are 5 tables in the database:

- **transactions:** The table includes the details of the transactions such as product code, customer code, market code, order date, sales amount and profit margin.
- **products:** Contain the types of products by product code
- **markets:** The data of the markets with geographic name and zone that they belong to by the markets' codes.
- **customers:** Contains customers' names and their types by each customer code.
- **date:** The list of date from 2017-1-1 to 2020-06-30 and different time data related to the date.

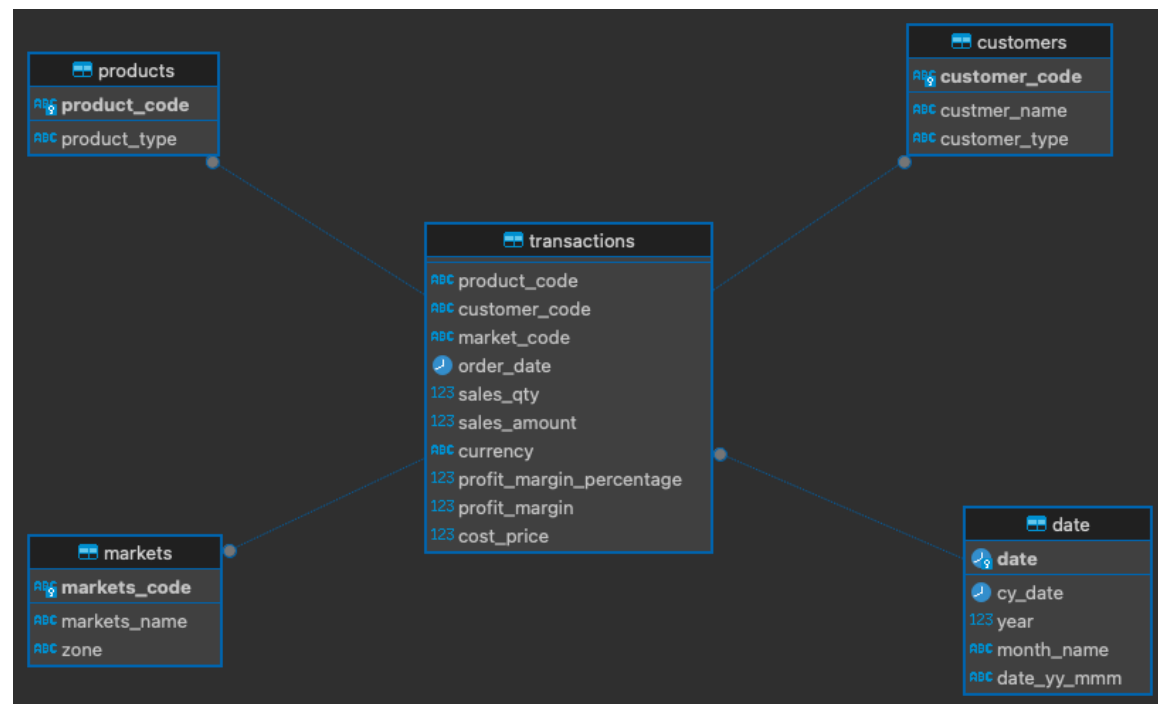


Figure 1. The Entity Relationship Diagram of the database

(Data descriptions can be found in the Jupyter notebook)

Data analysis & dashboard

General information about the analysis work and dashboard building

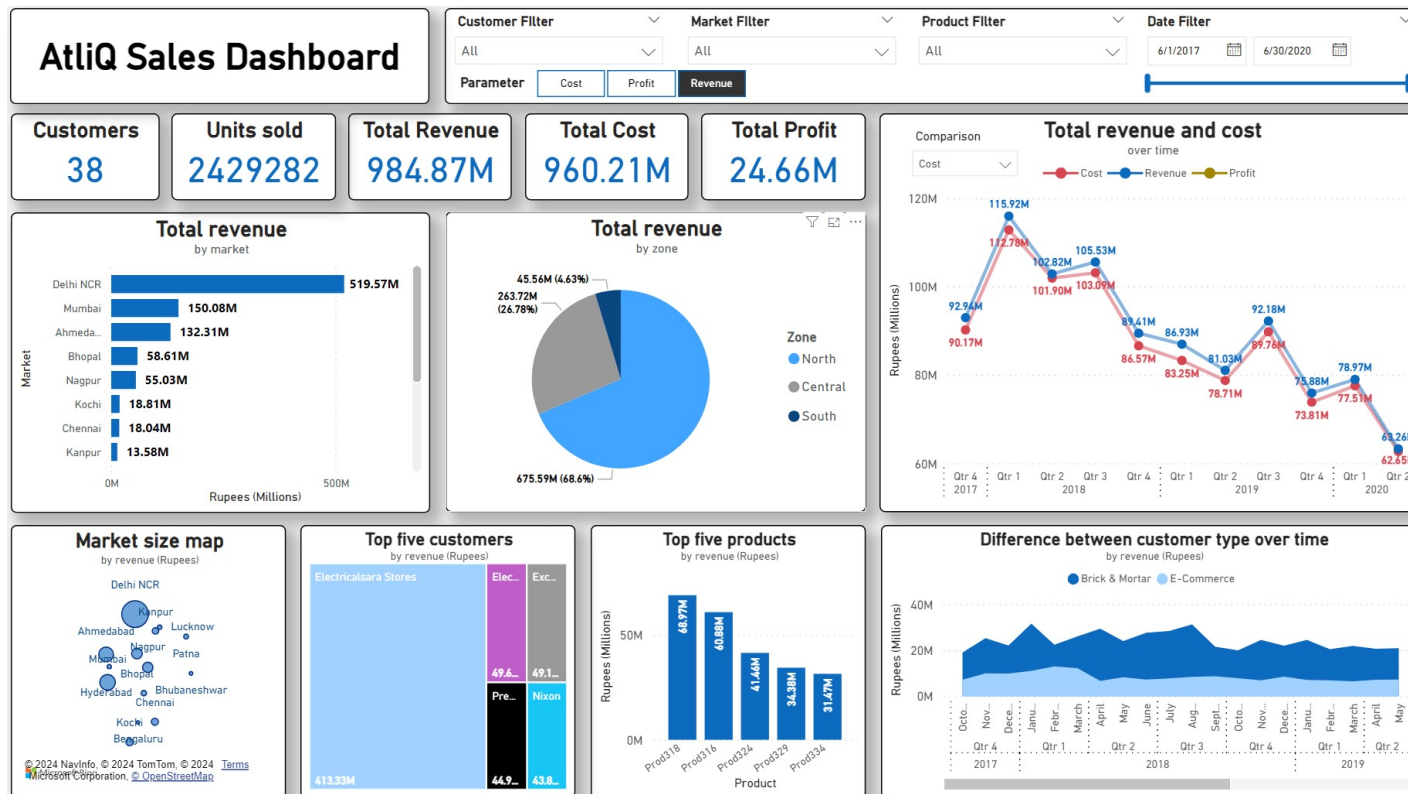
Data analysis with SQL

- The exploratory analysis focuses on the `transactions` table to explore how different customers, markets and product performs in general.
- The analysis also consider the sales performance of different attributes over time.
- The analysis helps to find answers for [expected result #1](#) and assist to work towards [success criteria #2](#).
- Detailed information, queries, comments & conclusion can be found in the Jupyter notebook at `"atliq_sql_data_analysis.ipynb"`.

```
%%sql
SELECT
    date.month_name,
    ROUND(AVG(sales_qty), 1) as avg_quantity,
    ROUND(AVG(sales_amount), 3) as avg_sales,
    ROUND(AVG(cost_price), 3) as avg_cost,
    ROUND(AVG(profit_margin), 3) as avg_profit_margin,
    ROUND(AVG(profit_margin) / AVG(sales_amount), 3) as avg_profit_margin_perc
FROM
    transactions
INNER JOIN
    date ON order_date = date.date
GROUP BY
    month_name
ORDER BY
    avg_profit_margin DESC
```

Figure 2. A SQL query in the report to determine the average profit margin monthly

PowerBI Dashboard



PowerBI Dashboard

- The dashboard met all the dashboard requirements of the project:
 - Met *expected results #2* and *successful criteria #1, #3*.
 - Help to work out *success criteria #2*.
- The dashboard is able to provide up-to-date sales data in real-time.
- As it is connected to a database, the dashboard will automatically update the plot when there is new data.
- Using PowerBI, we can further integrate the dashboard to other platforms and observe how users/stakeholders interact with the dashboard to further developing it.

Findings

Concluded from exploratory analysis + dashboard observation

High performance period (Q4 to Q1)

- From Q4 to Q1, the company generated more profit compared to the period from Q2 to Q3 (Figure 2 & 3).
- In peak months, the sales profit could be doubled.

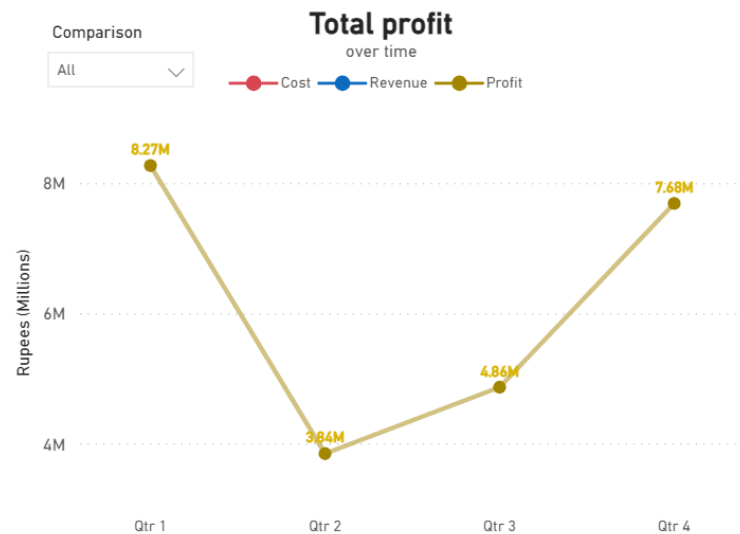


Figure 2. The total profit by quarter
(Plot generated from the dashboard)

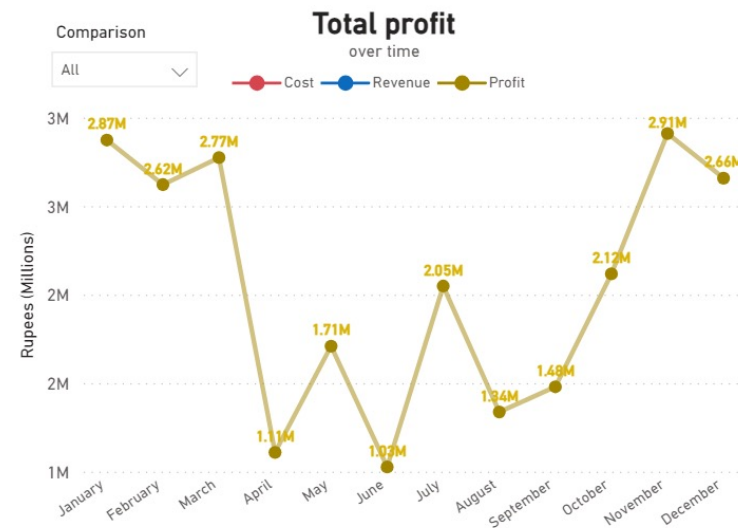
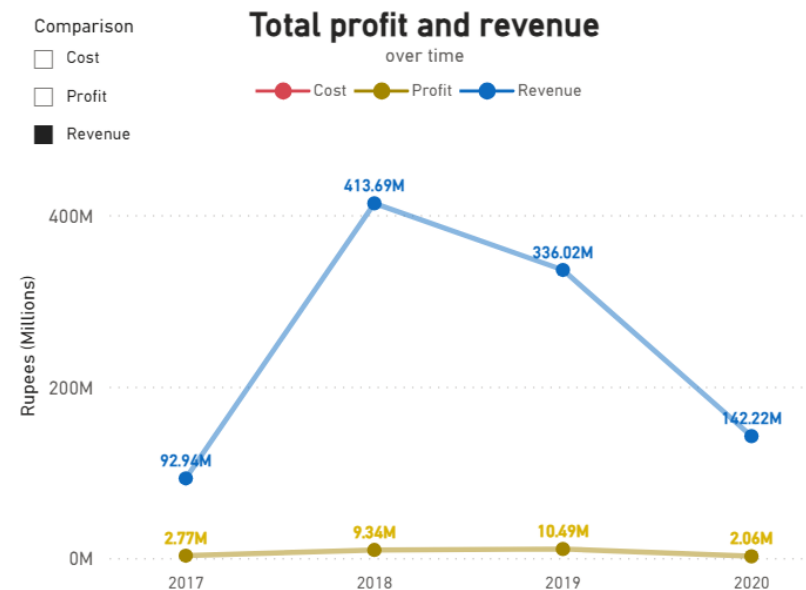


Figure 3. The total profit by month
(Plot generated from the dashboard)

A great example: 2019

- Compared to 2018, the revenue reduced by 20% in 2019. However, the profit margin risen by 12%, from 9.34M to 10.49M (Figure 4).
- This also means that the costs for the sales in 2019 were also smaller.
- The company was more efficient in 2019.



*Figure 4. The total profit and revenue in 4 years
(Plot generated from the dashboard)*

Top products – Most revenue & profit

- There are 5 products: 318, 316, 324, 329 and 334 generated the most revenue and profit (Figure 5,6).
- These products generated 237.16M revenue, 24% of the net revenue and 27.8% of the profit (6.86M).
- Most of the purchases are from Delhi market/North zone (Figure 7,8).
- Over time, Brick & Mortar customers contribute to the higher portion of revenue (Figure 9).

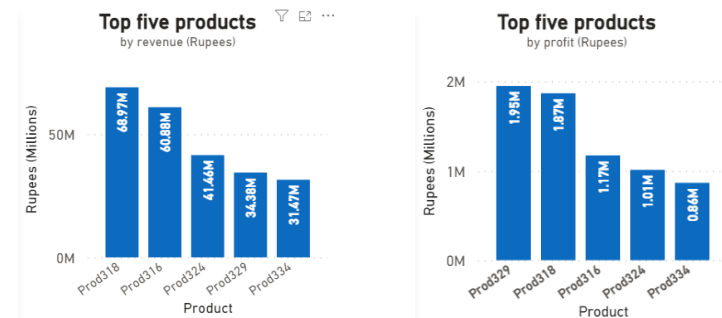


Figure 5&6. Top 5 products by revenue & profit
(Plot generated from the dashboard)

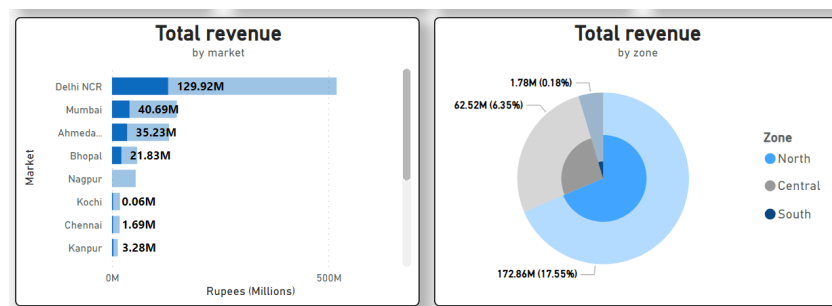


Figure 7&8. Total revenue of the products by market and zone
(Plot generated from the dashboard)

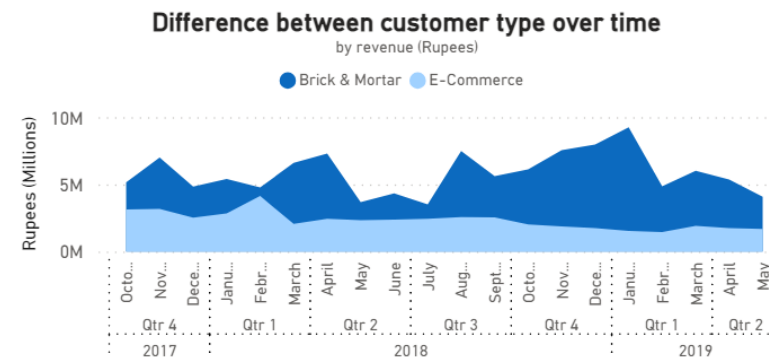


Figure 9. Customer type trend of the top 5 products
(Plot generated from the dashboard)

Top performing market: Delhi NCR

- The market generated 52.8% of the total revenue (519.57M) with 988.30k units sold (41.1% of total units sold).
- Top 5 products in the market: 316, 324, 329, 332, 040 (Figure 12).
- Most of the revenue of the market are from Brick & Mortar customers (Figure 13).
- Electricalsara store contributes to 79% of the market sales (410.54M), this is also the store that generates the most revenue of all India.

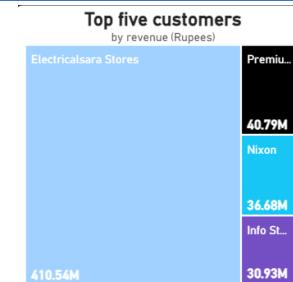


Figure 10. Top 5 customers of Delhi market
(Plot generated from the dashboard)

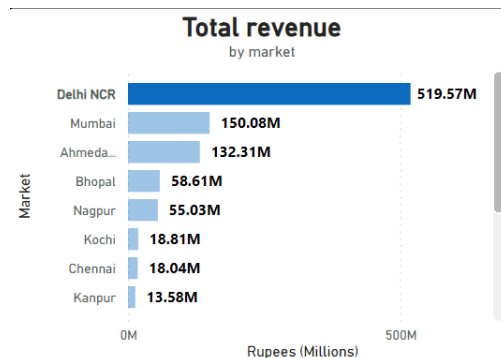


Figure 11. Total revenue of the market compared to others
(Plot generated from the dashboard)

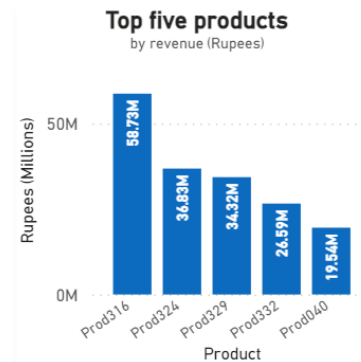


Figure 12. Size and map position of the 5 markets
(Plot generated from the dashboard)

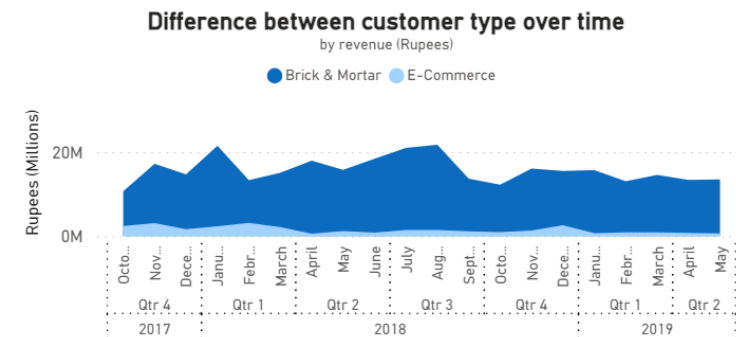


Figure 13. Customer type trend of the market
(Plot generated from the dashboard)

Low performing markets

- There are 3 markets generated very low profit (less than 100k): Hyderabad, Bhubaneshwar, Lucknow
- There are 2 markets had a net loss: Kanpur (-65.88k), Bengaluru (-77.53k).
 - Bengaluru is probably closed (they only have sales data in 2018).
 - Kanpur, from Q2 2018, has a revenue not bigger than 1.17M
- The 5 markets revenue trends seem not to be affected by the whole data's trends

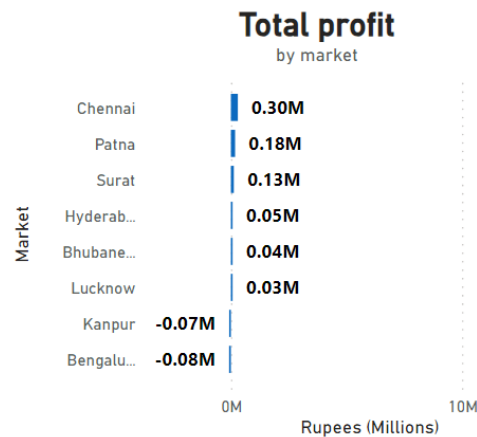


Figure 14. Markets with lowest profit
(Plot generated from the dashboard)

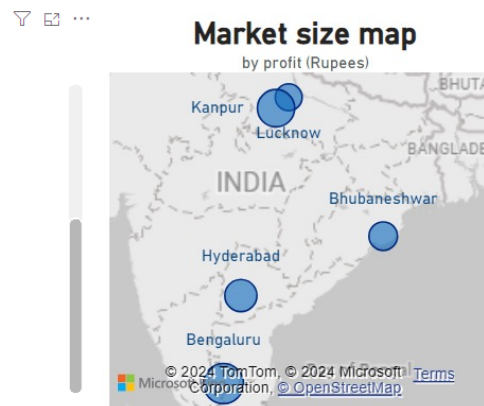


Figure 15. Size and map position of the 5 markets
(Plot generated from the dashboard)

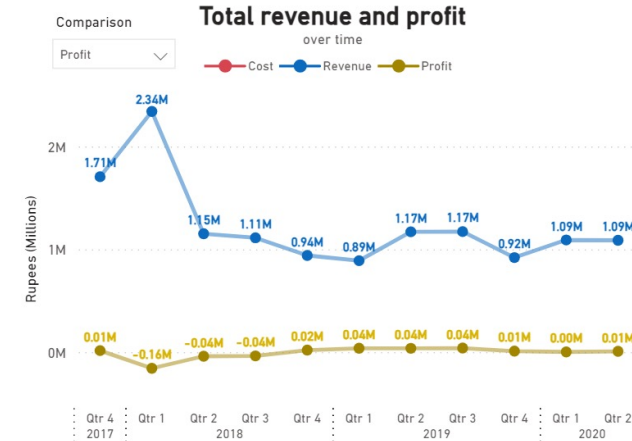
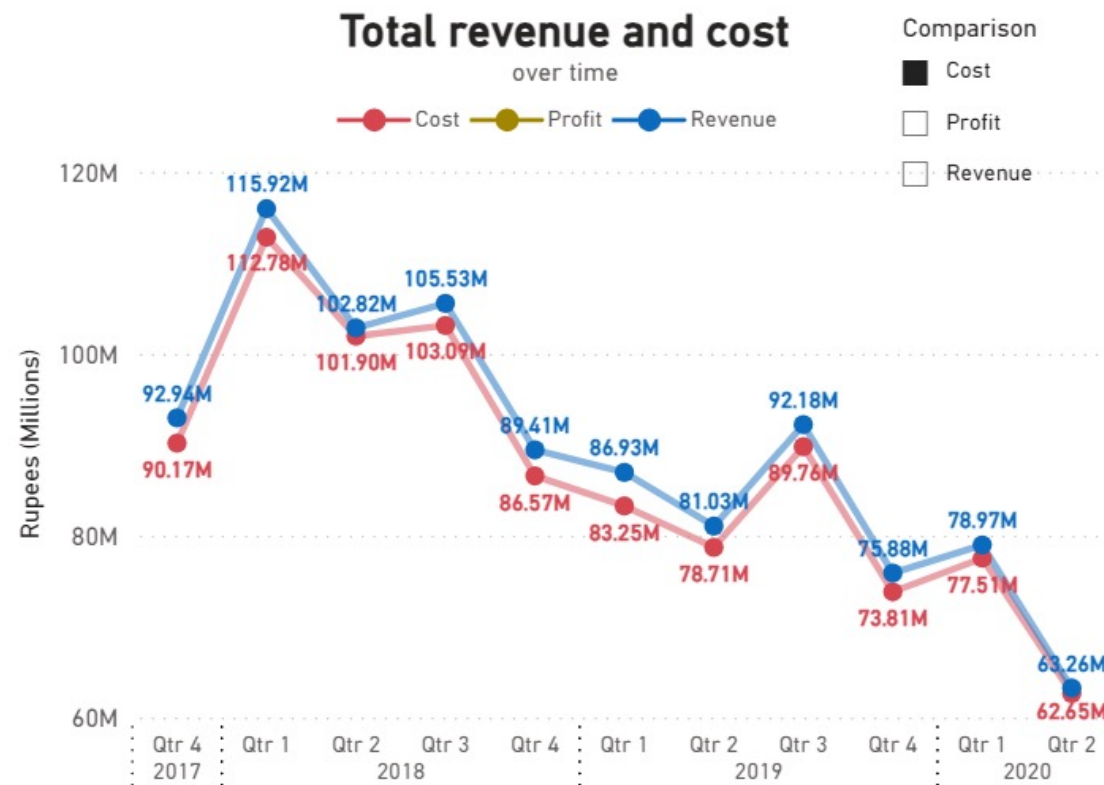


Figure 16. The total revenue and profit of the 5 markets over time
(Plot generated from the dashboard)

Main issue #1: High cost

- In total, the cost takes up 97.5% of the revenue, leaves only 24.6M rupees of profit left in 3 years.
- 45% of the transactions have a negative profit margin (cost is higher than revenue).
- High cost happened to all customers, markets, products and time. There is no difference in any specific demographic, region, product category, or time period.
- Based on Figure 17. (next page), the costs are always close to the revenue of the company over the years. In some periods, these two measures are almost equal.

Main issue #1: High cost



*Figure 17. The total Revenue and cost over time
(Plot generated from the dashboard)*

Main issue #2: Dependency on major customers

- There are many customers that have a significantly larger amount of transactions, thus contributed to a large portion of revenue and profit.
- Consider top 5 customers – with highest revenue (Electricalsara Stores, Electricalslystical, Excel Store, Premium Stores, Nixon):
 - Contribute 1.27M (52.5% of total) units sold, 600.95M (61.0%) in revenue and 14.52M (58.9%) in profit.
 - There are similarity in the patterns of top 5 data with total data (for example, considering total revenue, figure 18 & 19). This shows that because these customers are major buyers, they have a strong influence on the sales performance and thus can make the company to heavily rely on them.
 - When the sales to these 5 customers drop, it cause the whole total sales to drop at the same time.
 - Observing Figure 16 and 20, we can see how other customers have different trends compared to the whole market or top 5 customers.

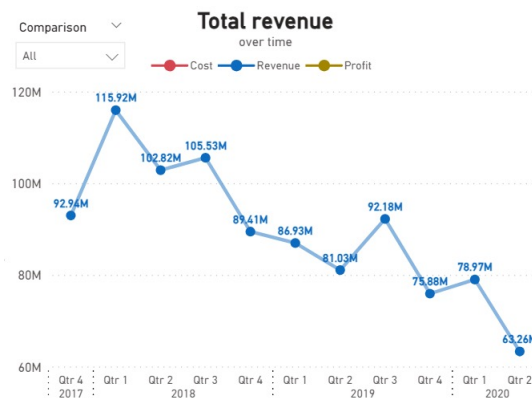


Figure 18. Total revenue of all customers
(Plot generated from the dashboard)

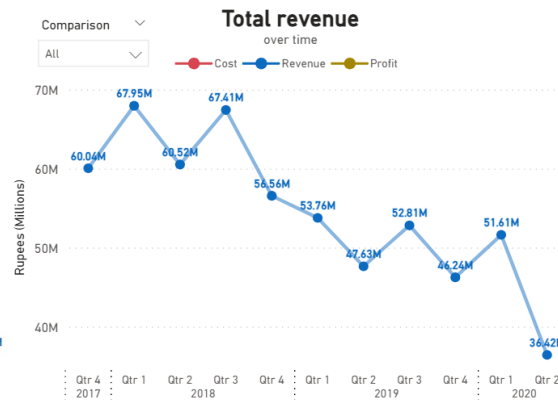


Figure 19. Total revenue of top 5 customers
(Plot generated from the dashboard)

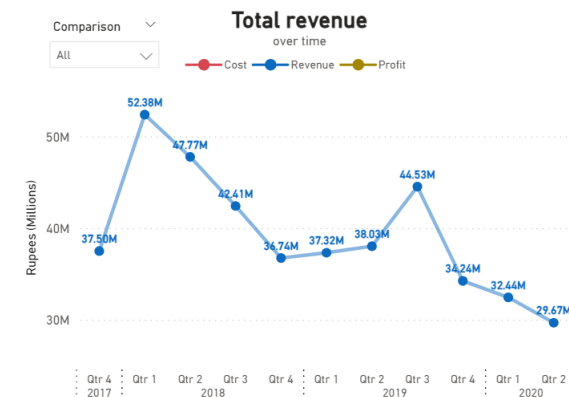
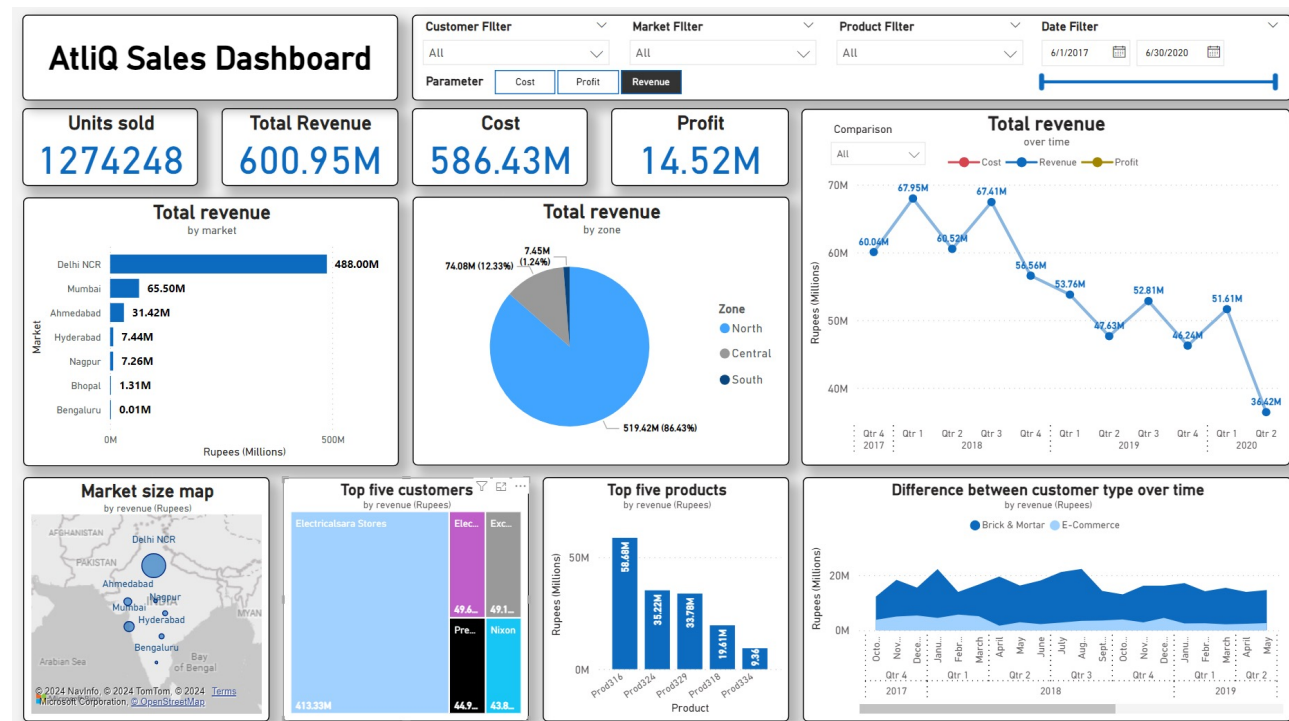


Figure 20. Total revenue of other customers (rather than top 5)
(Plot generated from the dashboard)

Main issue #2: Dependency on major customers

Figure 21. Dashboard shows the data of top 5 biggest customers (Biggest: contributed most to the net revenue)



Conclusion

Case study background & project goals

Conclusion

- Both of the expected results met:
 - (Met) Provide useful exploratory analysis insights from the collected data.
 - (Met) Provide a real-time dashboard to support data driven decision making.
- Success criteria:
 - (Met) The dashboard is able to provide up-to-date sales data automatically.
 - Sales team is able to make better decision, cut down cost and gain more sales by a %.
 - (Met) Data team: data collecting and visualizing change to automatic, thus save more time & resources.
- For the #2 success criteria, we can provide insights from data analysis and dashboard to assist them with this process. Moreover, this process still need more time to evaluate.

Conclusion

- Two major issues found that could help to determine sales bottlenecks:
 - High cost
 - Dependency on major customers
- To do next:
 - Observe how the dashboard operate, gather informations and using data from stakeholders/users to further improve the dashboard.