

Sales Data Analysis

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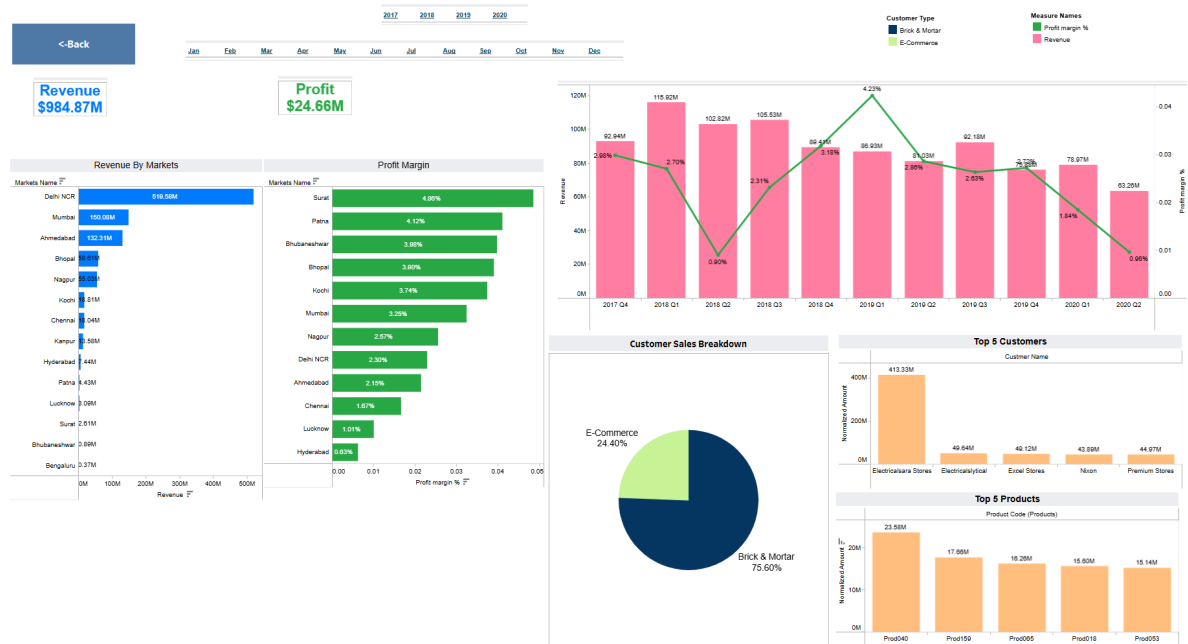


Fig. 1: A look at the sales data analysis [1]

Abstract— This project focuses on the creation of an interactive data visualization dashboard tailored to AtliQ Hardware's key performance indicators (KPIs). The dashboard enables users to dynamically filter and analyze data based on specific years and months, offering a comprehensive view of performance metrics. It employs advanced visualizations for profit margin analysis and incorporates intuitive navigation buttons and filters for enhanced interactivity. By iteratively refining the design from initial sketches to a fully functional interface, the project demonstrates how thoughtful visualization strategies can transform raw data into actionable insights. The result is a user-centric tool that aids decision-making by presenting complex information in an accessible and visually engaging format.

Index Terms—Sales Data Analysis, Data Visualization, Tableau Dashboard

1 INTRODUCTION

In the current era of data-driven decision-making, businesses generate vast amounts of data, which can be challenging to analyze and interpret effectively. Data visualization has emerged as a powerful tool to address this challenge, transforming complex datasets into visually accessible formats that facilitate faster and more informed decision-making.

This report focuses on the development of an interactive data visualization dashboard for AtliQ Hardware, a project aimed at enabling stakeholders to monitor key performance indicators (KPIs) and derive actionable insights. The dashboard is designed to provide users with the ability to filter data by year and month, visualize profit margins, and navigate easily through the data using responsive and interactive elements.

The motivation for this project stems from the need for intuitive tools that not only simplify the analysis of raw data but also enhance the decision-making process by focusing on clarity and usability. By addressing these needs, the project highlights the critical role of ef-

fective data visualization in enabling organizations to harness the full potential of their data resources.

The remainder of this report details the design methodology, implementation process, and the outcomes of the project, emphasizing its contribution to improving data accessibility and operational efficiency for AtliQ Hardware.

2 LITERATURE REVIEW

To develop an effective sales dashboard for AtliQ Hardware, the project began by reviewing similar sales data visualizations and identifying areas for improvement. Several key critiques emerged from the literature on sales dashboards:

- **Ineffective Color Usage:** Luminance alone was found to be ineffective in distinguishing categories like manager names and regions, which are crucial for understanding the data. Instead, color hue is recommended to provide better differentiation and clarity [2].
- **Overuse of Colors:** Excessive use of colors, especially more than six, was found to overwhelm users, making the dashboard harder to interpret. This is particularly problematic when trying to convey multiple data points in a single visualization [2], [3].

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- **Pattern and Line Styles:** Incorporating patterns or line styles along with colors is suggested to improve accessibility for those with color vision deficiencies, ensuring that all users can interpret the data effectively [3].
- **Graph Clutter:** Many dashboards suffer from cluttered visualizations, especially with overlapping lines in line graphs. Simplifying these graphs and reducing the amount of information presented in one view can improve the dashboard's clarity [3].
- **Inconsistent Data Representation:** A lack of consistency in data formats, such as showing sales MoM (month-over-month) and profit QoQ (quarter-over-quarter) in different ways, can confuse users. Standardizing the representation of these metrics across the dashboard ensures clarity and enhances decision-making [4].

By critically reviewing these existing visualizations, the goal of this project is to create a cleaner, more intuitive sales dashboard that enhances usability and decision-making for the AtliQ Hardware sales team.

3 DATA & TASKS

3.1 Dataset Description

The dataset used in this project comes from **AtliQ Hardware**, a company that sells computer hardware and peripheral products to various stores across India. The dataset is sourced from the following GitHub [5]

The dataset contains several key tables, including:

- **Customers:** Information about customers, including demographics and purchase history.
- **Date:** Time-stamped data associated with each transaction.
- **Markets:** Data on the different markets or regions where the products are sold.
- **Products:** Information on the hardware products sold, including product categories and pricing.
- **Transactions:** Transaction details, including date, product purchased, quantity, and customer details.

With over 150,000 rows of data, this dataset provides a comprehensive view of the company's sales across different regions and product categories.

3.2 Key Stakeholders

The primary users of this data visualization are:

- **Sales Director:** Responsible for driving revenue growth and ensuring that the sales team meets its targets. The sales director will use the visualizations to gain insights into overall sales performance, identify areas of improvement, and make strategic decisions.
- **Data Analyst:** Responsible for analyzing and interpreting the data to provide actionable insights. The data analyst will use the dashboard to break down complex data into understandable visualizations and identify trends that inform business strategies.

3.3 Visualization Tasks

The users will be able to perform the following tasks with the data visualization:

- **Sales Performance Analysis:** Users can view overall sales performance (KPI) over time, comparing different time periods (monthly, quarterly) to identify trends and seasonality.
- **Product and Market Comparison:** Users can compare the performance of different regions, helping to identify which products and markets are performing well and which need attention.
- **Customer Segmentation:** The dashboard allows segmentation of sales data by customer demographics, helping users target specific customer groups for more focused marketing strategies.

- **Data Filtering and Customization:** Users can filter the data by various criteria (such as time, product type, market) to explore specific segments and gain detailed insights tailored to their needs.

These tasks enable the sales director and data analyst to use the data efficiently, uncovering insights that guide decisions for optimizing sales strategies, targeting markets, and improving overall business performance.

4 DESIGN ITERATIONS & RATIONALE

4.1 Design Idiom

The visualization employs a combination of visual encoding and interaction techniques to effectively present the sales data. The key design elements include:

- **Bar Charts:** Used to compare sales across product categories, regions, and time periods. Bar lengths encode quantitative values, providing a clear comparison.
- **Line Charts:** Visualize sales trends over time, enabling users to identify patterns such as seasonality or spikes in sales.
- **Treemaps:** Show the hierarchical structure of sales by category, subcategory, and profit margins, helping users identify which areas are contributing the most to the overall performance.
- **Interactive Filters:** Allow users to filter data dynamically by time range, region, product type, or customer demographics.

These idioms were chosen for their ability to balance simplicity and information density, ensuring that users can interpret the data intuitively.

4.2 Rationale for Design Choices

The following design choices were made based on usability principles and alternative evaluations:

- **Bar Charts vs. Pie Charts:** Bar charts were preferred over pie charts for category comparisons, as they make it easier to perceive differences in magnitude.
- **Line Charts for Trends:** Line charts were chosen instead of stacked area charts to reduce visual clutter and emphasize individual trends over time.
- **Treemaps for Hierarchical Data:** Treemaps were used instead of nested bar charts to compactly represent hierarchical data while providing a proportional view of each category's contribution.
- **Interactive Filters vs. Static Views:** Interactive filters were incorporated to enhance exploration and allow users to tailor the visualization to their needs, as opposed to providing static, pre-defined views.
- **Color Choices:** A consistent and limited color palette was used to ensure clarity, avoiding overuse of colors that could overwhelm users.

These choices ensure clarity, reduce cognitive load, and maximize the utility of the visualization for the stakeholders.

4.3 Design Iterations

The visualization underwent multiple iterations to refine its effectiveness and usability. Each iteration incorporated feedback from test users and usability principles:

1. **Initial Design:** The first version used simple stacked bar charts and multiple pie charts. Feedback highlighted difficulties in comparing magnitudes and identifying trends.
2. **Next Iterations:** simple charts were converted to dashboard with navigation and Interactive filters were added to allow for dynamic data exploration.
3. **Final Design:** Final design consists of multiple story points making the whole visualization simpler and more effective to understand. The color palette was simplified based on accessibility guidelines to improve readability.

4.4 Evolution of the Design

The design evolved through a structured process following a typical software development cycle: Design, Development, Feedback, and Testing. Each phase contributed to improving the visualization and aligning it with user needs:

- **Design Phase:** The initial visualization was conceptualized using stacked bar charts and pie charts to represent sales and trends. These designs were informed by initial discussions with stakeholders about their goals, such as tracking sales performance and comparing regions.
- **Development Phase:** The first prototype was developed using Tableau. Features like basic filters and time-based visualizations were implemented, focusing on usability and clear data representation.
- **Feedback Phase:** Feedback was gathered from key stakeholders, particularly a data analyst, using a questionnaire hosted on Google Forms. The questionnaire evaluated various aspects such as ease of use, clarity, and functionality of the visualizations. Feedback highlighted the need for more dynamic exploration features, better clarity in quantitative comparisons, and additional insights through hierarchical and correlation-based views. Also peer review feedback were also taken into consideration while making final changes
- **Testing Phase:** Usability testing was conducted with the data analyst to identify gaps in the initial design. Results showed that tree map made it difficult to compare values, and static views limited the ability to explore the data effectively.

Based on the iterative feedback and testing results, the visualization evolved significantly:

- **Enhanced Usability:** Static views were replaced with interactive filters and drill-down capabilities, allowing users to explore data tailored to their specific needs.
- **Improved Clarity:** Dark Color changes and simple bar charts and line charts, making it easier to interpret and compare quantitative data.
- **Added Insights:** Advanced features like such as stories and navigations were introduced to visualize hierarchical data and correlations between metrics, providing new perspectives for decision-making.

This iterative process ensured that the final design was not only visually appealing but also highly functional and user-friendly, meeting the needs of the stakeholders effectively.

By iterating on user feedback and evaluating alternative designs, the final visualization effectively balances functionality, clarity, and usability.

5 IMPLEMENTATION & EVALUATION STUDY & RESULTS

5.1 Study Description

The evaluation study was conducted to assess the usability and effectiveness of the developed sales dashboard for AtliQ Hardware. The study involved a data analyst performing tasks such as analyzing sales trends, comparing regional performance, and identifying product category contributions. Feedback was collected via a structured questionnaire on Google Forms [6], focusing on navigation, clarity, and overall user experience.

5.2 Key Learnings from the Study

The study provided several insights that shaped the final implementation:

- **Clear Visuals Are Essential:** Simplifying visualizations, particularly treemaps, greatly enhanced data interpretation.
- **Streamlined Interactions:** Reducing the number of filters and focusing on key ones improved usability and prevented overwhelming users.

- **Guidance and Storytelling:** Adding textual descriptions and guidance helped users navigate the dashboard effectively, making their experience more intuitive.

- **Usability Improvements:** Minimizing clicks and simplifying interactions allowed users to complete tasks more efficiently.

- **Impactful Design:** Clean and simple visual design significantly improved user satisfaction and understanding.

These learnings emphasized the importance of balancing functionality with simplicity to ensure a positive user experience.

5.3 Final Implementation

The final dashboard was implemented in Tableau, incorporating the feedback and lessons learned. Key features of the implementation include:

- **Simplified Treemaps:** Hierarchical data visualizations were refined to focus on the most relevant categories and subcategories, reducing complexity.

- **Interactive Filters:** Limited the number of filters to key dimensions such as time range, region, and product category, allowing users to focus on critical insights without being overwhelmed.

- **Textual Guidance:** Brief descriptions were added to each section of the dashboard to guide users and provide context for the visualizations.

- **Improved Navigation:** Streamlined interactions reduced the number of clicks needed to explore data, ensuring a seamless user experience.

- **Clean Design:** A consistent and minimalistic color scheme was applied to enhance readability and focus on the data.

5.4 Screenshots of the Dashboard

Below are screenshots of the final implementation:

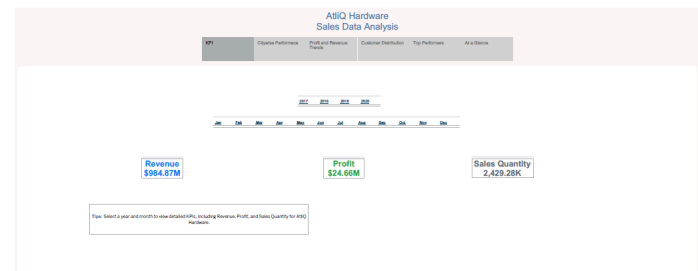


Fig. 2: Overview of the sales dashboard showcasing KPI [1]



Fig. 3: City wise comparison of revenue, profit and sales quantity [1]

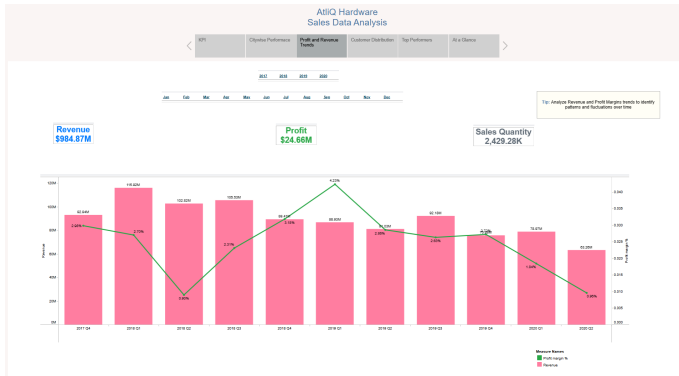


Fig. 4: Revenue and profit trends explaining point [1]

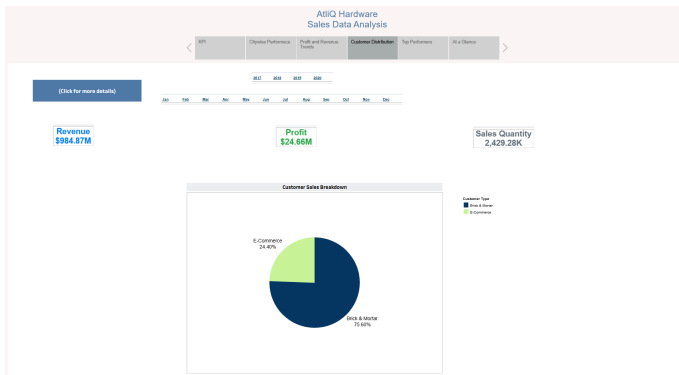


Fig. 5: Pie chart showing how the products are sold [1]

5.5 Results and Impact

The final dashboard received positive feedback for its usability and clarity. The data analyst reported that:

- The simplified design improved task efficiency and reduced cognitive load.
- Interactive features and guided navigation enhanced exploration and understanding of the data.
- Visual storytelling through charts, treemaps, and textual annotations provided actionable insights.

By focusing on user-centric design and iterative feedback, the final implementation successfully addressed the needs of the stakeholders, enabling informed decision-making and improved user satisfaction.

6 DISCUSSION & FUTURE WORK

6.1 Reflection on the Approach

The development of the sales dashboard followed a systematic process of design, feedback, and iteration. This approach had several strengths:

- **Strengths:**
 - **User-Centered Design:** Iterative feedback from stakeholders ensured the dashboard met their specific needs.
 - **Simplified Visualizations:** The final implementation focused on clarity and usability, making it accessible even for non-technical users.
 - **Interactive Features:** Filters and dynamic visualizations enhanced the ability to explore data and uncover insights.
- **Weaknesses and Limitations:**
 - **Static Data:** The dashboard relied on a static dataset, which limits its ability to provide real-time insights.



Fig. 6: Top performers city and products [1]

- **Scalability Challenges:** As the dataset grows, performance optimization may be required to handle larger volumes of data efficiently.
- **Limited Features:** Some advanced features, such as predictive analytics or AI-based recommendations, were not included due to time constraints.

6.2 Lessons Learned

The project provided valuable insights and learning opportunities:

- **Importance of Clarity:** Clear and simple visualizations are crucial for effective data interpretation.
- **User Feedback is Key:** Iterative feedback helped identify pain points and refine the design to better meet user needs.
- **Balance Between Features and Usability:** Overloading the dashboard with filters or complex visualizations can overwhelm users. Simplicity enhances user experience.
- **Value of Guidance:** Providing textual instructions within the dashboard significantly improved navigation and usability.
- **Iterative Design Process:** Regular iteration and testing ensured that the final product aligned closely with user requirements.

6.3 Future Work

With more time and resources, the following enhancements could further improve the dashboard:

- **Integration of Live Data:** Incorporating live data feeds would enable real-time insights, making the dashboard more dynamic and actionable.
- **Latest Data Updates:** Automating data refreshes would ensure that users always work with the most recent data, reducing manual updates.
- **Advanced Features:** Adding predictive analytics and machine learning capabilities could provide forward-looking insights, such as sales forecasts or anomaly detection.
- **Performance Optimization:** Optimizing the dashboard for larger datasets would improve scalability and responsiveness as data grows.
- **Enhanced User Interface:** Continuing to refine the user interface with additional usability testing could make the dashboard even more intuitive and visually appealing.

These improvements would make the dashboard a more comprehensive and powerful tool for decision-making, ensuring it evolves alongside the needs of the stakeholders.

7 CONCLUSION

This project successfully developed an interactive sales dashboard for AtliQ Hardware, addressing the company's need for actionable insights to improve sales performance and strategic decision-making. The dashboard was designed through a user-centered, iterative process, incorporating feedback from stakeholders to ensure it aligned with their needs.

The final implementation included clear and simplified visualizations, such as bar charts, line charts, treemaps, and pie charts, combined with interactive filters to enable dynamic exploration of the data. The dashboard allows users to analyze sales trends, compare regional performance, and evaluate product contributions with ease. Textual guidance and a minimalistic design further enhanced usability, making the dashboard accessible even to non-technical users.

Throughout this project, valuable lessons were learned about the importance of clarity, user feedback, and iterative design. While the dashboard is effective in its current state, future work could include integrating live data, implementing advanced analytics, and optimizing performance for scalability.

Overall, this project demonstrates how data visualization can transform raw data into meaningful insights, empowering stakeholders to make informed decisions and drive business growth.

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