

## Project Development Phase

### Data Preprocessing & Business Questions with Visualizations

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#### 1. Preprocessing Steps

Data Preprocessing in Tableau Public:

The data preprocessing was performed directly within Tableau Public during the data connection and visualization setup:

Step 1: Connect Data Source — The Apple iPhone India dataset (XLSX format) was connected directly in Tableau Public via the "Microsoft Excel" connector, importing all 7 worksheets: apple\_products, Flipkart\_smartphone, Annual revenue, Market penetration (iPhone), Country wise share, Quarterly-share, Model-wise share.

Step 2: Data Interpreter — Tableau's built-in Data Interpreter was enabled to automatically detect and clean sub-headers, merged cells, and formatting artifacts from the Excel worksheets.

Step 3: Column Renaming & Type Assignment — Column names were reviewed and renamed where necessary using the column header dropdown. Data types (String, Number, Date) were assigned correctly by clicking the data type icon above each field.

Step 4: Data Filtering – Null and empty rows were excluded using Tableau's built-in data source filters (right-click field → Filter → exclude Null values) to ensure only valid records were used in visualizations.

Step 5: Calculated Fields — Custom calculated fields were created for derived metrics:

$\text{AVG}([\text{Sale Price}])$  for average pricing

$\text{AVG}([\text{Star Rating}])$  for average ratings

$([\text{Mrp}] - [\text{Sale Price}]) / [\text{Mrp}] * 100$

for discount percentage

$\text{SUM}([\text{Units}]) / \text{TOTAL}(\text{SUM}([\text{Units}]))$  for market share percentage

Step 6: Data Blending / Relationships — Multiple worksheets were related using Tableau's data model by defining logical relationships (e.g., linking by brand name, year, or country fields) to enable cross-dataset analysis.

Step 7: Aliases & Grouping – Field values were cleaned using aliases (right-click → Aliases) to standardize naming conventions, and similar categories were grouped using the "Group" feature for cleaner visualizations.

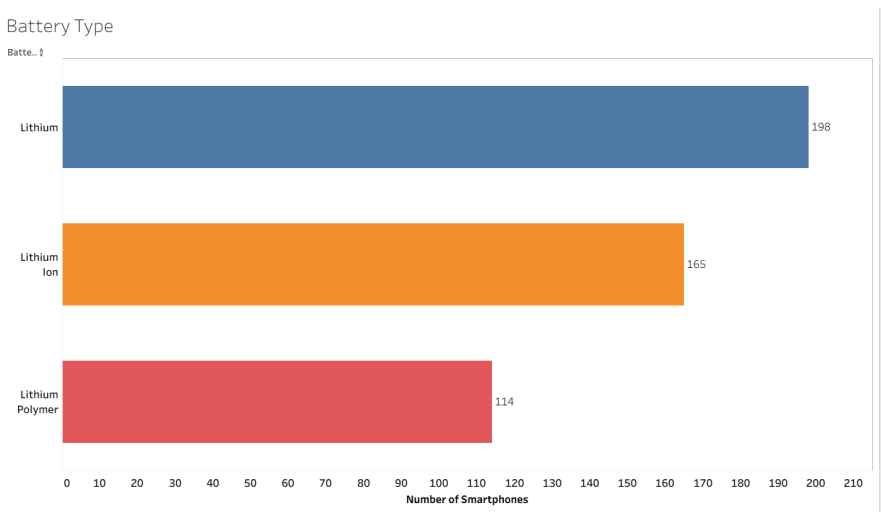
2. Business Questions with Visualizations

1. Q1: What is the distribution of battery types across smartphone models?

Visualization: Bar Chart (Battery Type Distribution)

Dataset: Flipkart\_Smartphone.csv

Insight: Lithium-ion dominates the market; reveals battery technology adoption patterns across 836 smartphone models.

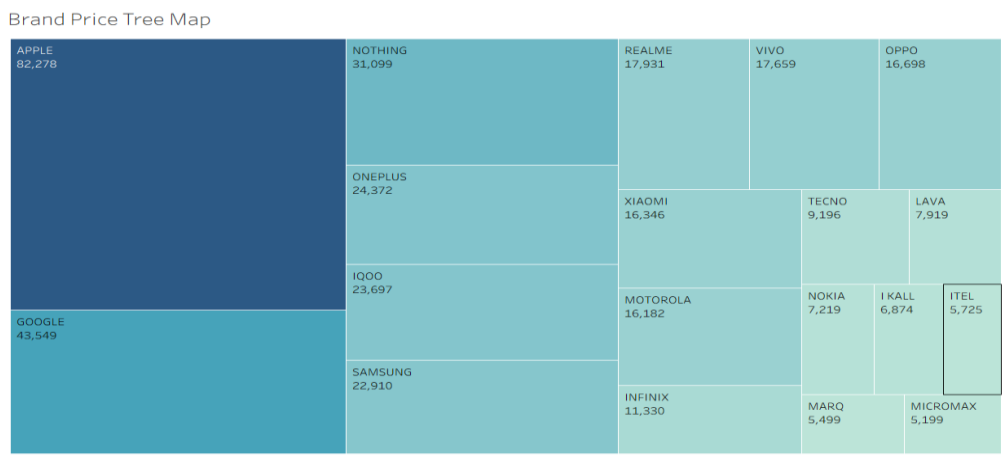


2. Q2: How do smartphone brands compare in terms of pricing?

Visualization: Treemap (Brand-Price Comparison)

Dataset: Flipkart\_Smartphone.csv

Insight: Apple commands the highest average selling price (₹62K avg) compared to Samsung, Xiaomi, and other competitors.



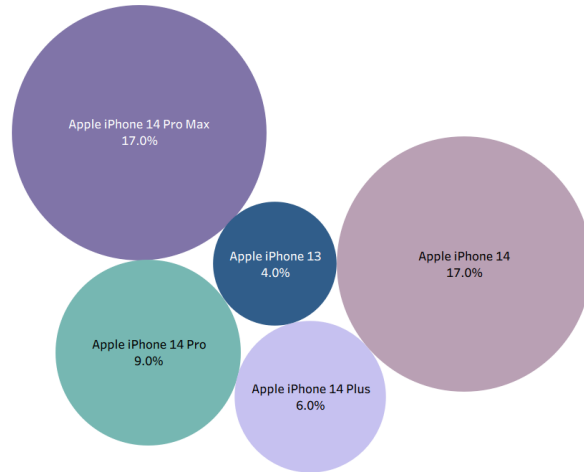
### 3. Q3: What is the model-wise market share of iPhone?

Visualization: Bubble Chart (Model-Wise Share)

Dataset: Model\_share.csv

Insight: iPhone 14 Pro Max and iPhone 14 Pro are tied at 17% US market share — the highest for any single smartphone line.

Model Share



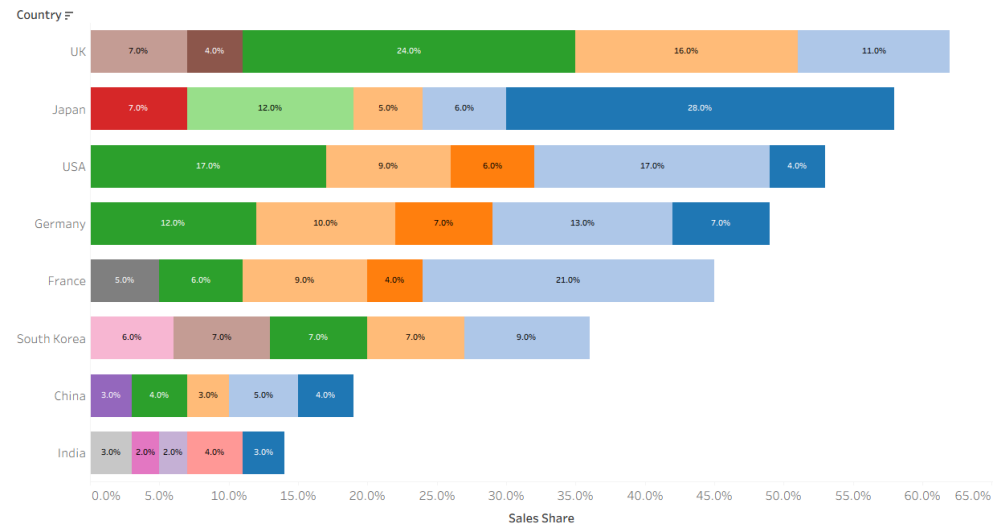
### 4. Q4: Which country's best-selling smartphone brand dominates?

Visualization: Lined Bar Chart (Country-Wise Best Selling)

Dataset: Country-wise\_share.csv

Insight: Apple dominates US and Japan markets; Samsung leads in India with 20% share.

Country Wise Best Selling Smartphones



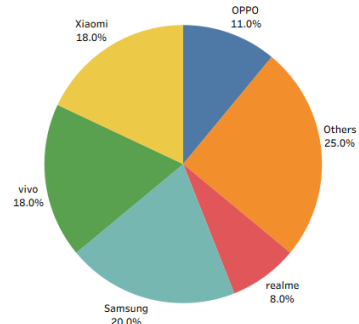
## 5. Q5: How has quarterly market share evolved?

Visualization: Pie Chart (Quarterly Market Share 2022)

Dataset: Quarterly-share.csv

Insight: Samsung (20%), Xiaomi (18%), and vivo (18%) dominate India's volume market.

Quarterly Share-2022

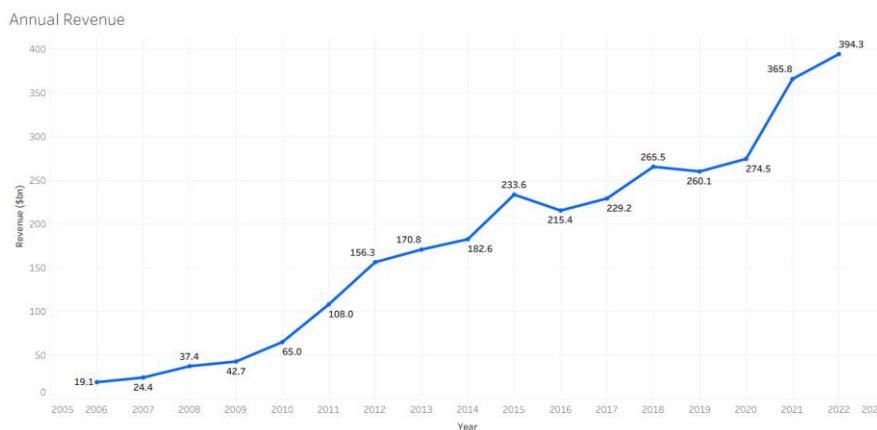


## 6. Q6: What is Apple's annual revenue trend?

Visualization: Line Chart (Annual Revenue Year-Wise)

Dataset: Annual\_Revenue.csv

Insight: Revenue grew from \$19.1B (2006) to \$394.3B (2022) — a 20x increase. Steepest growth post-2020.



## 7. Q7: How does iPhone market penetration vary globally?

Visualization: Choropleth Map (Global Market Share)

Dataset: Market\_Penetrationiphone.csv

Insight: Highest penetration in North America & Europe. Units sold grew from 11.6M (2008) to 232M (2022).

Global Market Map

