

BACHELOR OF SCIENCE IN MATHEMATICS



DEPARTMENT OF MATHEMATICS

Government Thirumagal Mills College

Gudiyattam-632 602

Thiruvalluvar University- 632115

Serkadu

SEPTEMBER.2023

IRevolution: A Data-Driven Exploration Of Apple's IPhone Impact In India

SUMMITTED BY

V. JANARTHANAN

31021U25049

J.VIGNESH

31021U25144

Y.SAKTHIVEL

31021U25108

J.KAMESH

31021U25054

GUIDED BY

DR. P.PUVIARASU

PROJECT

IRevolution: A Data-Driven Exploration Of Apple's iPhone Impact In India

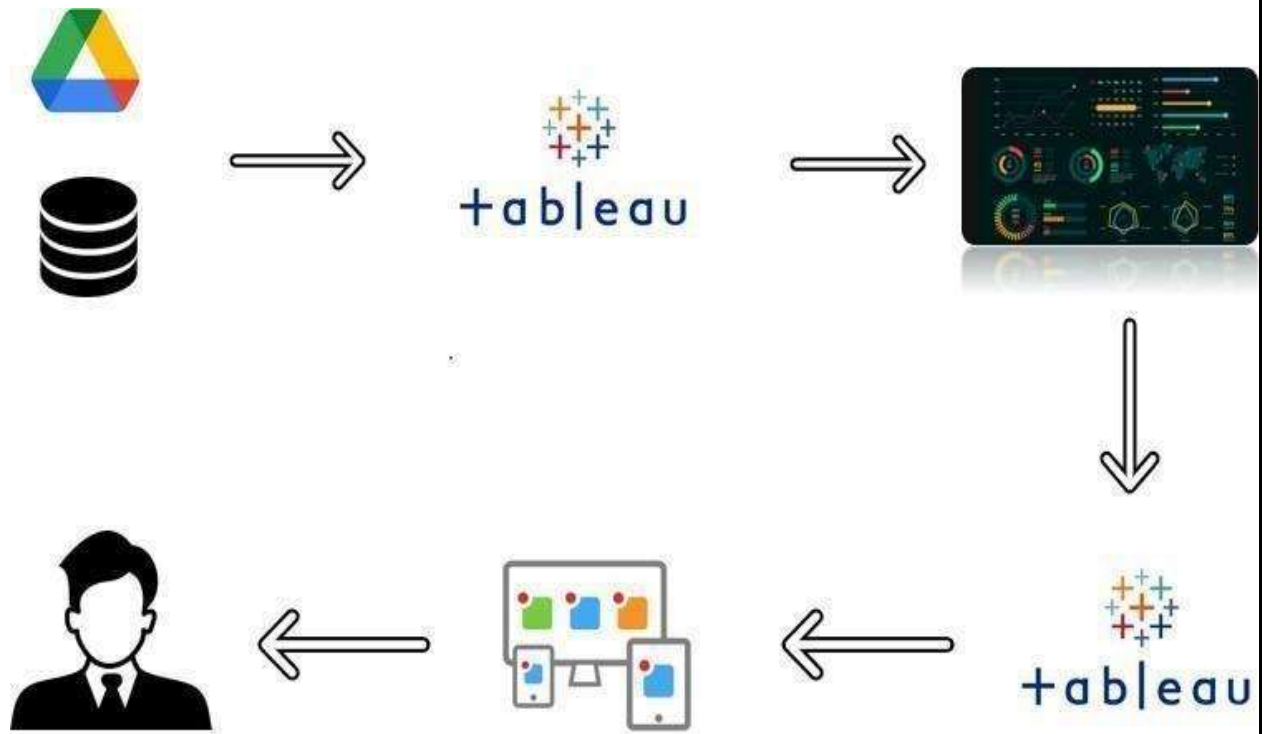
DISCRIPTION:

The world has changed as a consequence of the increasing use of smartphones, which have improved communication, connected people, and revolutionized many different businesses. With its main product, the iPhone, capturing markets around the world, Apple Inc. has emerged as a prominent player among the top smartphone makers. India, one of the economies with the greatest economic growth, has seen a tremendous increase in smartphone usage, making it an interesting market to study the effects of Apple's iPhone.

In order to shed light on important factors like market penetration, customer preferences, economic ramifications, and societal changes, this research report will perform a data-driven investigation of the impact of the iPhone in India. This study will offer invaluable insights into the transformative impact of the iPhone on India's technological landscape and the lives of its consumers by using advanced data analytics techniques and analyzing large datasets.

Apple has a special chance to increase its market share and develop a significant presence in India thanks to the country's large population and rising smartphone adoption. Each new iPhone model unveiling generates excitement and anticipation among Indian buyers. By utilizing the plethora of information Already accessible, this research aims to go beyond conjecture and anecdotal evidence in order to develop a thorough knowledge of the effects of the iPhone.

Technical Architecture:



Contents

- 1) Project Flow**
- 2) Define Problem / Problem Understanding**
- 3) Data Collection & Extraction**
- 4) Data Preparation**
- 5) Data Visualization**
- 6) Dashboard**
- 7) Story**
- 8) Performance Testing**
- 9) Publishing**
- 10) Project Demonstration & Documentation**

Project Flow:

- ❖ To accomplish this, we have to complete all the activities listed below,
 - Define Problem / Problem Understanding
 - Specify the business problem
 - Business requirements
 - Literature Survey
 - Data Collection & Extraction
 - Collect the dataset
 - Connect Dataset with Tableau
 - Data Preparation
 - Prepare the Data for Visualization
 - Data Visualizations
 - No of Unique Visualizations
 - Dashboard
 - Responsive and Design of Dashboard
 - Story
 - No of Scenes of Story
 - Performance Testing
 - Utilization of Data Filters
 - No of Visualizations/ Graphs
 - Publishing
 - Publishing Dashboard & Story to Tableau Public
 - Project Demonstration & Documentation
 - Record explanation Video for project end to end solution
 - Project Documentation-Step by step project development procedure

Define Problem / Problem Understanding:

- Problem Understanding, also known as Problem Definition or Problem Identification, is the initial and critical phase of any data analysis or problem-solving process. It involves gaining a clear and comprehensive understanding of the problem at hand, its context, scope, and objectives.

✓ Specify The Business Problem:

The objective of this study is to obtain a thorough understanding of how Apple's iPhone would affect the Indian market. In particular, we want to investigate the market penetration of iPhones in India, comprehend consumer preferences and decision-making processes, and assess the social and economic effects of iPhone adoption. We aim to offer insights that can direct strategic decisions for Apple and other stakeholders active in the Indian smartphone industry by leveraging data analytics and visualizations using Tableau.

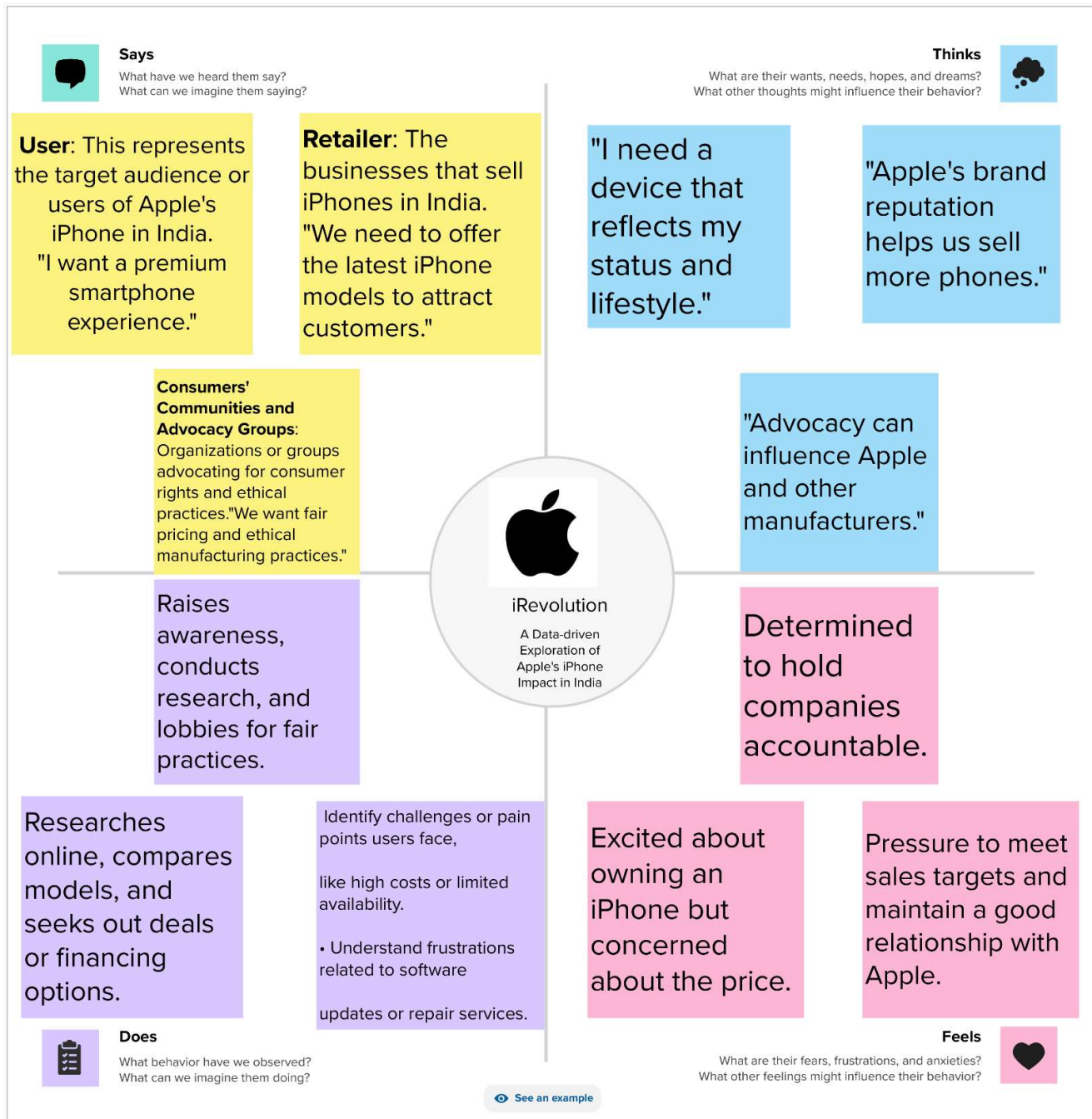
✓ Business Requirements:

The project's business needs call for data analysis and visualization in order to understand how Apple's iPhone has affected India. This entails looking at customer choices, market penetration, sociological developments, and economic effects. Tableau visualizations should be interactive, understandable, and educational so that stakeholders can make data-driven decisions and comprehend the impact of the iPhone on the Indian market.

✓ Literature Survey (Student Will Write):

This would involve a search for relevant publications, articles, and academic papers on the topic, as well as an analysis of the various techniques, models, and algorithms used in previous research. The literature survey would also involve identifying gaps in existing research and potential areas for further exploration and improvement.

Example: Emphy map



Social Or Business Impact:

Social Impact:

An important component of this study is the societal impact of Apple's iPhone in India. We intend to investigate how the iPhone has altered communication, information access, and social

relationships in Indian society through data analytics and Tableau visualizations. Studying the impact of iPhones on social media use, online content consumption, and the broader digital divide are all included in this. Policymakers and organizations can better manage the benefits and difficulties brought on by the expanding smartphone adoption by understanding the social impact.

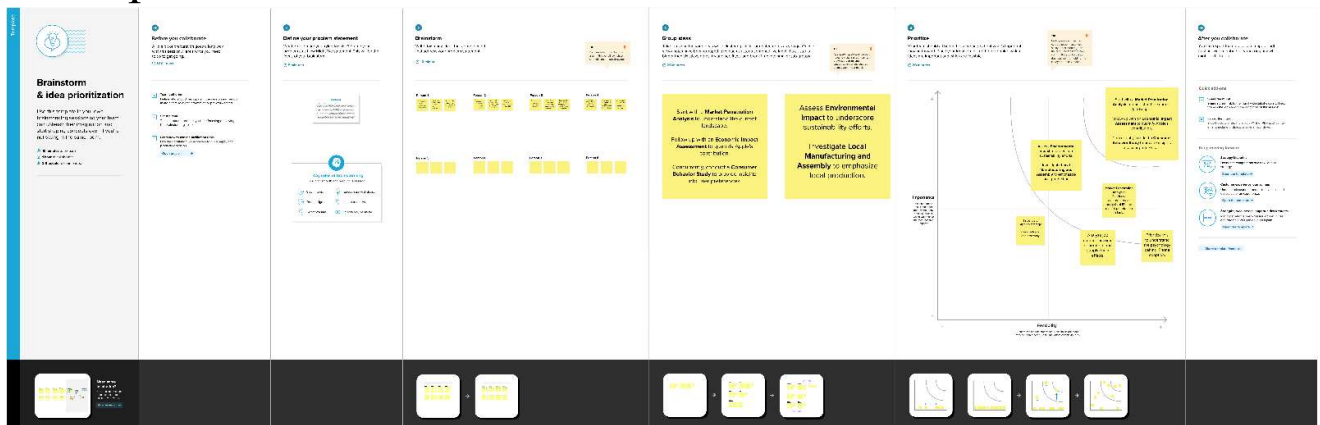
Business Impact:

Research must focus on how Apple's iPhone has affected business in India. We seek to examine the economic effects of iPhone uptake in the Indian market using data analytics and Tableau visualizations.

Examining iPhone sales data, market share, revenue creation, and its effects on different industries like

e-commerce, app development, and digital payments are all part of this. Organizations can find possibilities for growth and innovation by understanding the business impact and using it to help them position themselves in their markets and make strategic decisions.

Example:brinstrome



Data Collection & Extraction:

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes and generate insights from the data.

Please use the link to download the dataset:

<https://docs.google.com/spreadsheets/d/1p1ZWaYcEuFI5UNFcmNvpkXi3JnoHamut/edit#gid=1877446487>

Understand the data:

Data contains all the meta information regarding the columns described in the CSV files. We have provided the XLSX file:

Column Description for BigML_Dataset.csv:

The file apple_products.xlsx contains a total of 7 sheets. Each sheet corresponds to a different parameter related to iPhones/Smartphones.

The sheets are:

- ❖ apple_products.csv
- ❖ Flipkart_smartphone
- ❖ Annual revenue
- ❖ Market penetration (iPhone)
- ❖ Country wise share
- ❖ Quarterly-share
- ❖ Model-wise share

Data set:



apple_products.xlsx

Note:(Only open in digitl only).

Data Preparation:

Data preparation, also known as data preprocessing, is a crucial step in the data analysis process. It involves transforming raw data into a clean, structured, and suitable format for analysis. Proper data preparation ensures that the data is accurate, consistent, and ready to be used effectively to derive meaningful insights .

❖ Prepare The Data For Visualization:

Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring the data is accurate and complete. This process helps to make the data easily understandable and ready for creating visualizations to gain insights into our analysis

❖ Data Visualization:

Data visualization is the process of creating graphical representations of data in order to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

❖ No Of Unique Visualizations:

The number of unique visualizations that can be created with a given dataset. Some common types of visualizations that can be used to analyze the performance and efficiency of a project include bar charts, line charts, heat maps, scatter plots, pie charts, Maps, etc. These visualizations can be used to compare performance, track changes over time, and show distribution, and relationships between variables.

KPI(key performance indicator):

KPI stands for key performance indicator, a quantifiable measure of performance over time for a specific objective. KPIs provide targets for teams to shoot for, milestones to gauge progress, and insights that help people across the organization make better decisions.

KPI

Brand	Discount Perce..	Mrp	Number Of Revi..	Sale Price
Apple	0	77,000	794	77,000

Discount Percentage, Mrp, Number Of Reviews, Sale Price and sales difference broken down by Brand. The data is filtered on Upc, which keeps MOBEXRGVZFZGZEWV.

Brand	sales difference
Apple	0

Model Specification:

Model specification is the process of determining which independent variables to include and exclude from a regression equation.

Model specification

Model	Processor	Front Cam..	Rear Camera	Colour	
APPLE IPHONE 11	A Bionic Chip	12MP	12MP + 12MP	Black	92,800
APPLE IPHONE 12	A Bionic Chip with Next Generation Neural Engine	12MP	12MP + 12MP	Black	1,99,700
				Blue	59,900
APPLE IPHONE 12 MINI	A Bionic Chip with Next Generation Neural Engine	12MP	12MP + 12MP	Blue	74,900
				Black	74,900
APPLE IPHONE 13	A Bionic Chip	12MP	12MP + 12MP	Blue	1,49,800
APPLE IPHONE 14	A Bionic Chip, Core	12MP	12MP + 12MP	Blue	1,89,800
APPLE IPHONE 14 PLUS	A Bionic Chip, Core	12MP	12MP + 12MP	Blue	99,900

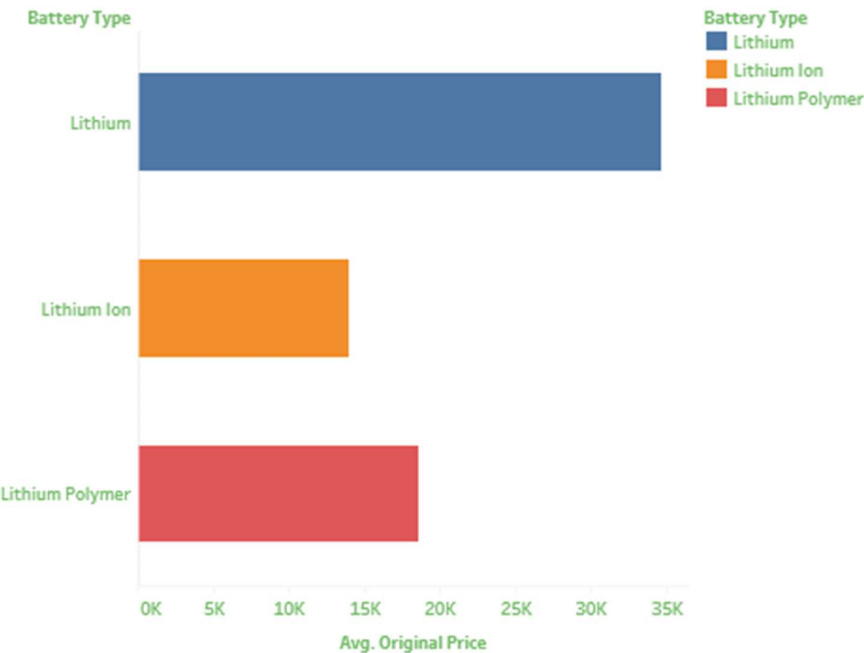
Colour
■ Black
■ Blue

Sum of Original Price broken down by Model, Processor, Front Camera, Rear Camera and Colour. Color shows details about Colour. The data is filtered on Brand, which keeps APPLE. The view is filtered on Colour, which keeps Black and Blue.

Battery-Type distribution:

- There are three different types of batteries that are commonly used - Alkaline, Nickel Metal Hydride (NiMH), and Lithium Ion. The use of different metals and electrolytes in these batteries gives them different properties which means they are suited to different contexts.
- It turns out that different materials have different electrochemical properties, and so they produce different results when you put them together in a battery cell. For example, some combinations will produce a high voltage very quickly but then drop off rapidly, unable to sustain that voltage for very long

Battery Type Distribution



Average of Original Price for each Battery Type. Color shows details about Battery Type. The data is filtered on Brand, which keeps MOTOROLA. The view is filtered on Battery Type, which keeps Lithium, Lithium Ion and Lithium Polymer.

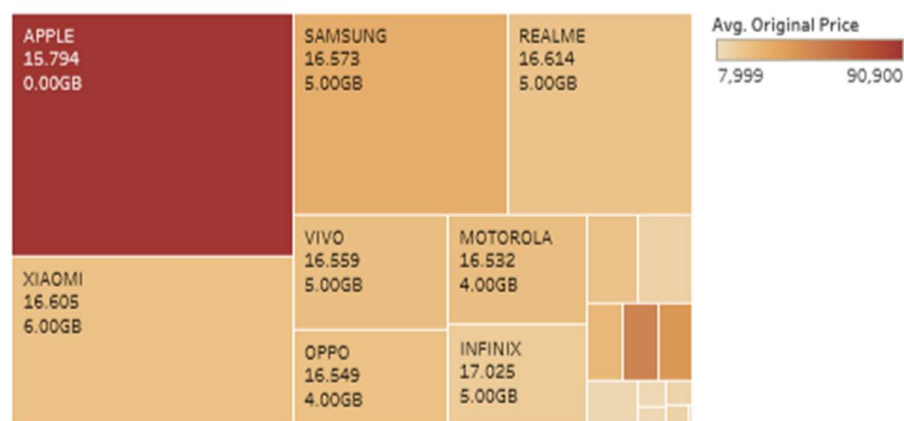
Brand- Price Comparison:

- Apple iPhone | Market Share for Quarter 4 2022: 23% ...
- Samsung | Market Share for Quarter 4 2022: 19% ...
- Xiaomi | Market Share for Quarter 4 2022: 11% ...
- Oppo | Market Share for Quarter 4 2022: 10% ...
- Realme | Market Share for Quarter 4 2022: 9% ...
- OnePlus | Market Share for Quarter 4 2022: 8.7%

Brand- Price Comparison

(Picture)

Brand price comparsion

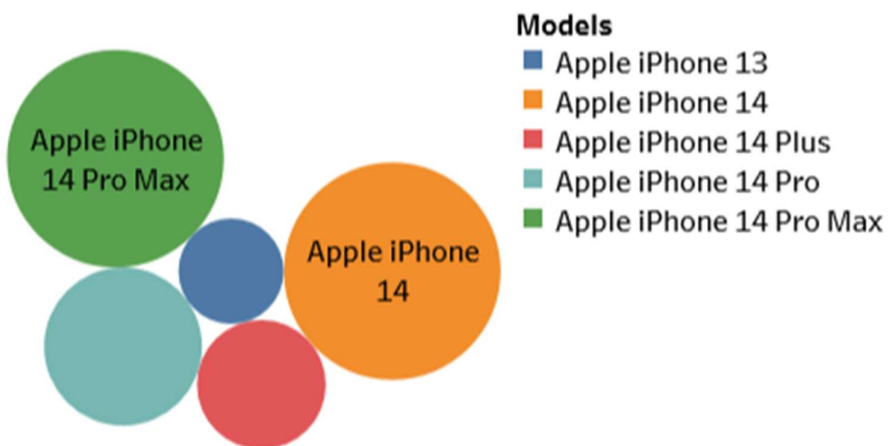


Brand, average of Display Size and distinct count of Memory. Color shows average of Original Price. Size shows sum of Original Price. The marks are labeled by Brand, average of Display Size and distinct count of Memory.

Model- Wise Share of iPhone:

the iPhone 14 Standard Edition claimed a 19% market share among US operators, surpassing the iPhone 14 Pro Max, which slipped to second place with an 18% market share. The market share of iPhone 14 Pro models also declined from 16% to 15%

model share

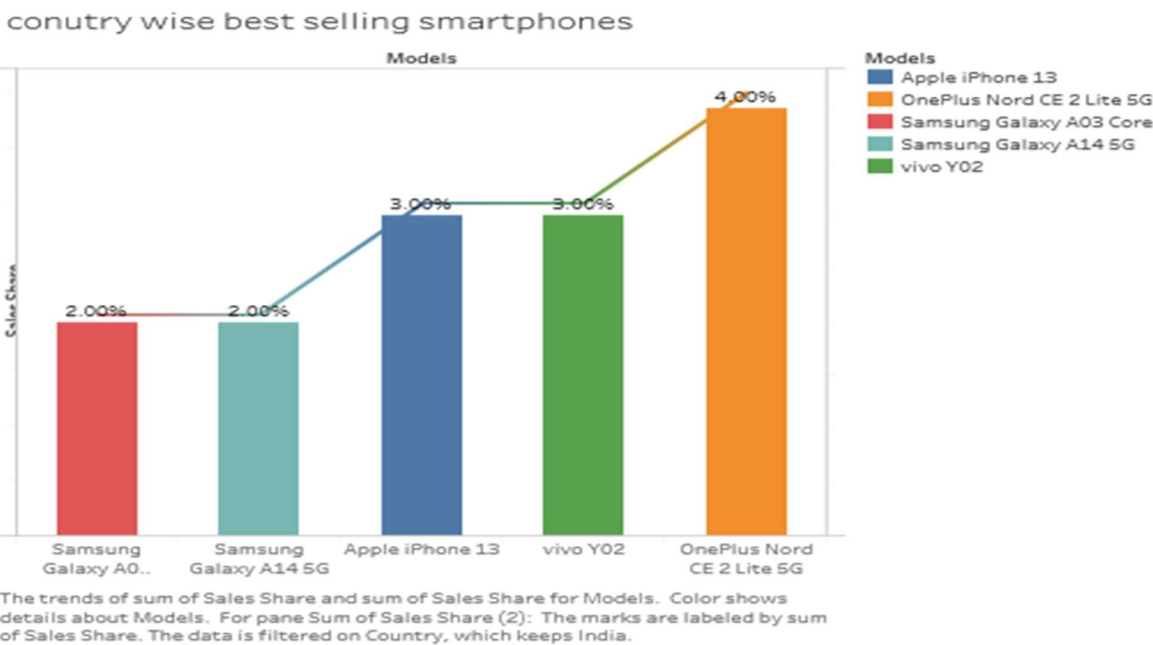


Models and Sales Share. Color shows details about Models. Size shows sum of Sales Share. The marks are labeled by Models and Sales Share.

Country-Wise Best-Selling Smartphone:

Global Smartphone Shipments (Millions)

Brands	Q3 2021	Q3 2022
One plus	69.3	64.3
Apple	48.0	49.2
Samsung	44.4	40.5



Annual Revenue Year-Wise:

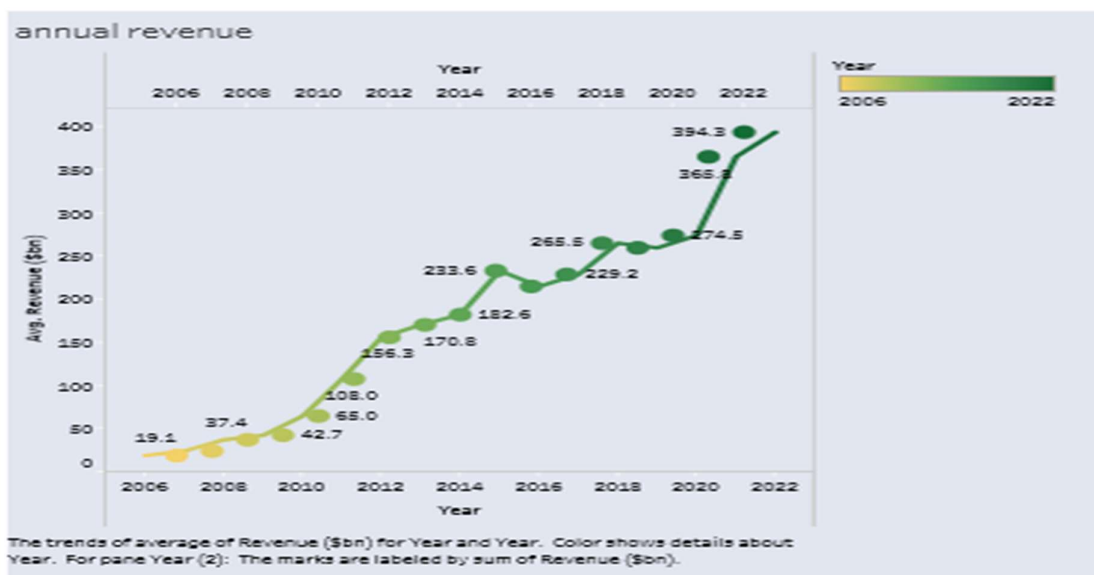
"Annual revenue," also known as "annual sales" or "annual turnover," refers to the total amount of money earned by a business through its primary operations within a given fiscal year. It represents the income generated from selling goods or services to customers, clients, or other businesses.

Year-wise, the term "annual revenue" is used to categorize and analyze a company's financial performance on an annual basis. This allows stakeholders, including investors, analysts, and management, to assess the company's growth, profitability, and overall financial health over specific periods.

For example, if a company has an annual revenue of \$1 million in 2020, it means that during the fiscal year 2020 (which could be from January 1, 2020, to December 31, 2020), the company earned a total of \$1 million from its primary business activities.

Analyzing annual revenue year by year is crucial for businesses to track their progress, make informed decisions, and plan for future growth and investments. It also provides valuable information for stakeholders, including shareholders and potential investors, to evaluate the company's financial performance and stability over time.

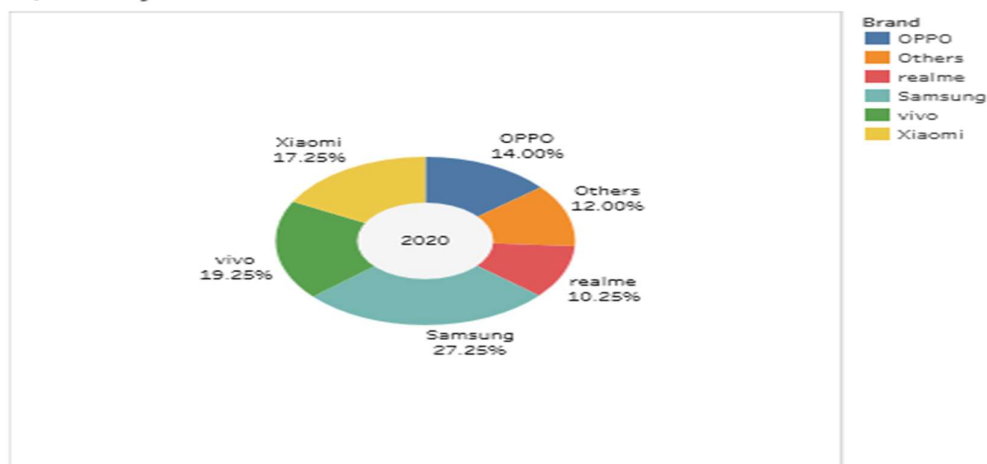
Annual Revenue:



Quarterly share:

- "Quarterly share" is not a standard financial or business term. It appears to be a combination of two terms: "quarterly" and "share."
- **Quarterly:** "Quarterly" refers to something that occurs or is calculated every quarter, which typically means every three months. In a business context, it often refers to financial reporting, where companies release their financial statements (such as income statements, balance sheets, and cash flow statements) on a quarterly basis. These reports provide insights into the company's performance and financial health for a specific three-month period.
- **Share:** In a financial context, "share" most commonly refers to an ownership stake in a company. It can represent ownership in the form of common shares or preferred shares, with each share representing a portion of ownership in the company. Shareholders may have voting rights and are entitled to a portion of the company's profits in the form of dividends.
- If you have a specific question or need clarification on a financial or business term related to quarterly reports, ownership shares, or any other topic, please provide more details, and I'd be happy to assist you further.

Quartely -share



SUM(0) and SUM(0). For pane SUM(0): Color shows details about Brand. The marks are labeled by Brand and % of Total annual share. For pane SUM(0) (2): The marks are labeled by Year as an attribute. Details are shown for Year. The data is filtered on Year, which keeps 2020.

KPI-2:



Another Key Performance Indicator (KPI):



Customer Acquisition Cost (CAC)



Definition: Customer Acquisition Cost (CAC) is a metric that calculates the average cost a company incurs to acquire a new customer. It includes expenses like marketing and sales costs over a specific period divided by the number of customers acquired during that period.



Importance: Understanding CAC is crucial for businesses to assess the effectiveness of their marketing and sales efforts. It helps in determining whether the cost of acquiring a customer is sustainable in relation to the revenue that customer is expected to generate.



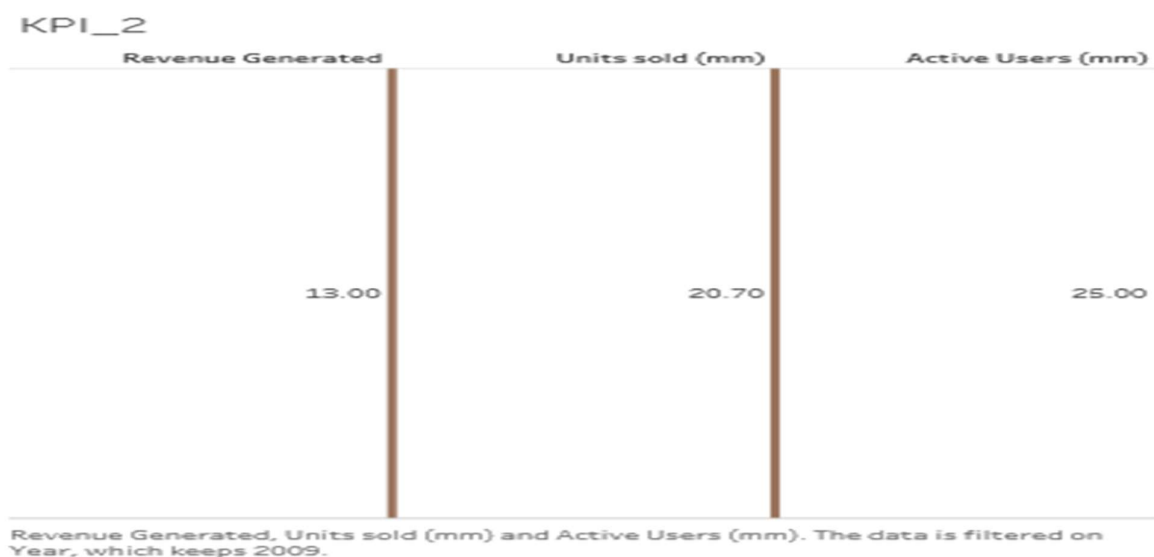
Calculation: $CAC = \text{Total Marketing and Sales Costs} / \text{Number of New Customers Acquired}$



For example, if a company spends \$10,000 on marketing and sales in a month and acquires 100 new customers, the CAC would be \$100 (\$10,000 / 100).



A lower CAC indicates that a company is acquiring customers at a lower cost, which is generally desirable. However, it's important to balance this with the Customer Lifetime Value (CLTV) to ensure profitability over the long term.



Global Market Share:

- ✚ Global Market Share refers to the portion or percentage of a specific market that a company or product holds relative to the total market for that particular product or service worldwide.
- ✚ For example, if there are five major companies producing smartphones, and one of them sells 30% of all smartphones globally, then that company has a 30% global market share in the smartphone industry.
- ✚ Global market share is an important metric for businesses because it indicates their competitive position on a worldwide scale. It is often used as a benchmark for measuring a company's performance and influence in a particular industry or sector.
- ✚ Companies with a high global market share are typically considered industry leaders and have significant market power. They often have the resources and influence to shape market trends, set prices, and outcompete smaller players.
- ✚ It's important to note that market share can vary by region, and what might be a dominant player globally might have a smaller market share in specific countries or continents.
- ✚ Analyzing global market share is also crucial for investors and analysts as it provides insights into the competitive dynamics of an industry and can be indicative of future trends and profitability.

Global Market Share:

(Image)



Map based on Longitude (generated) and Latitude (generated). The marks are labeled by Country, Models and Sales Share. Details are shown for Country. The view is filtered on Country, which keeps France and India.

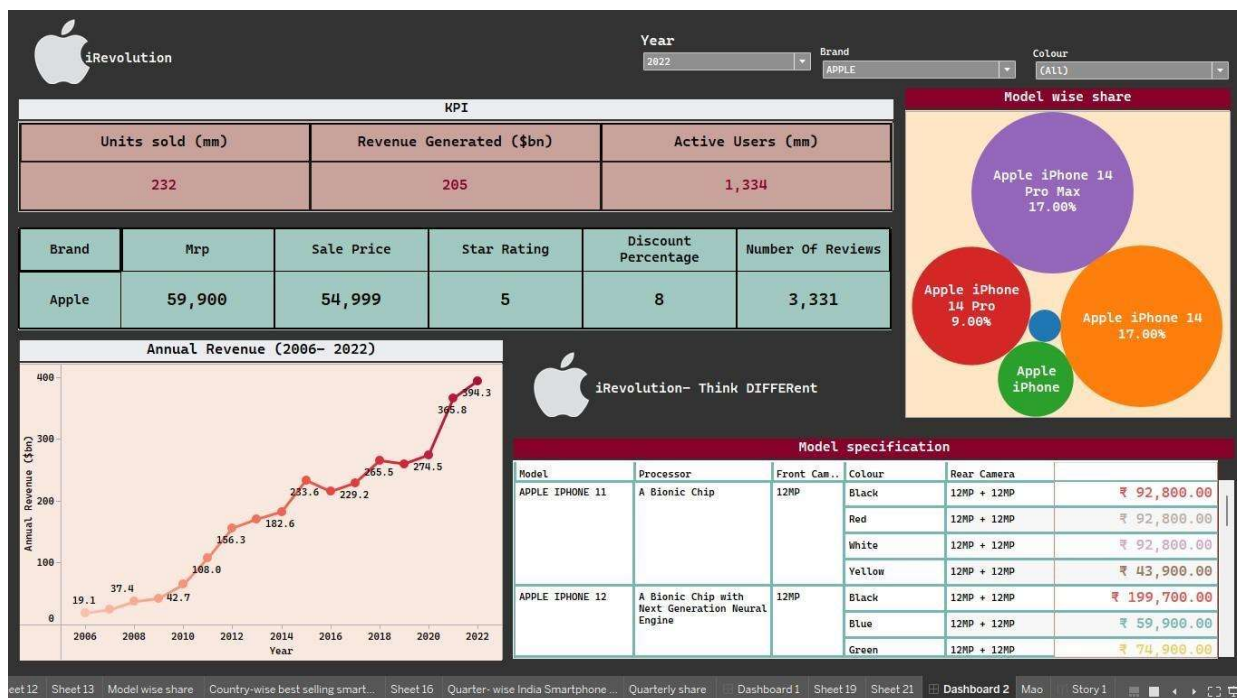
Dashboard:

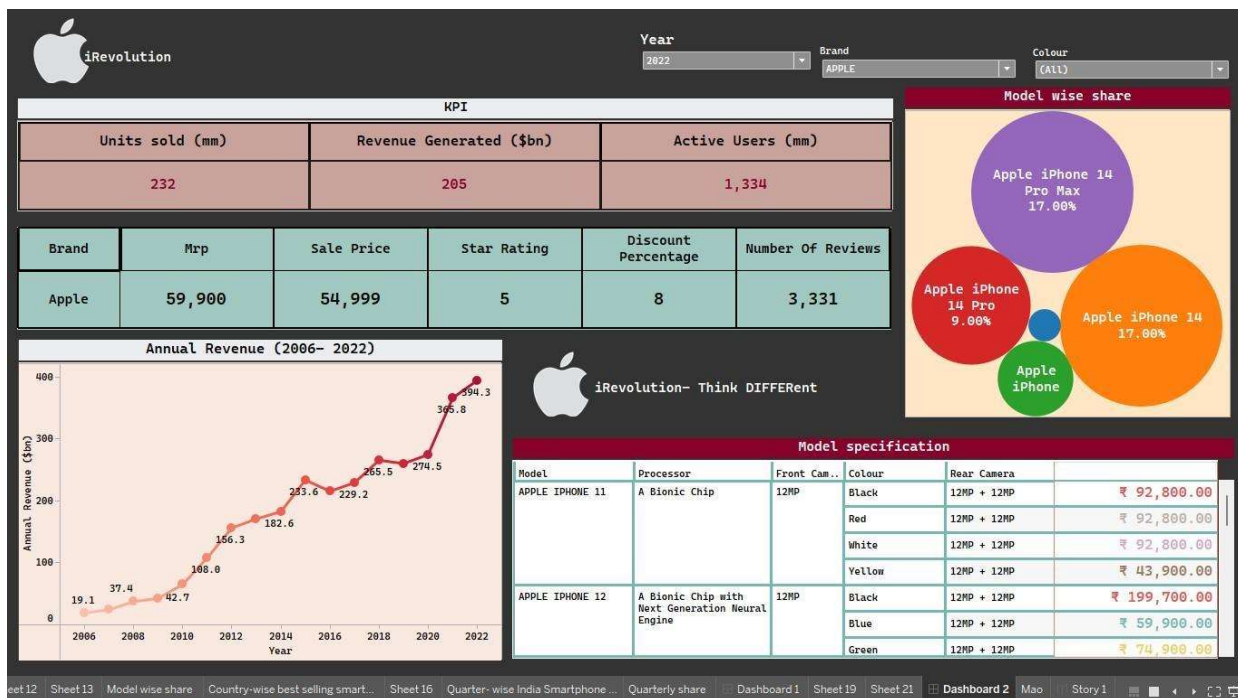
- A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data, and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of settings, such as business, finance, manufacturing, healthcare, and many other industries. They can be used to track key performance indicators (KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.

Responsive And Design Of Dashboard:

- The responsiveness and design of a dashboard for Data-Driven insights on iRevolution: A Data-driven Exploration of Apple's iPhone Impact in India is crucial to ensure that the information is easily understandable and actionable. Key considerations for designing a responsive and effective dashboard include user-centered design, clear and concise information, interactivity, a data-driven approach, accessibility, customization, and security. The goal is to create a dashboard that is user-friendly, interactive, and data-driven, providing actionable insights.

Example: Dashboards



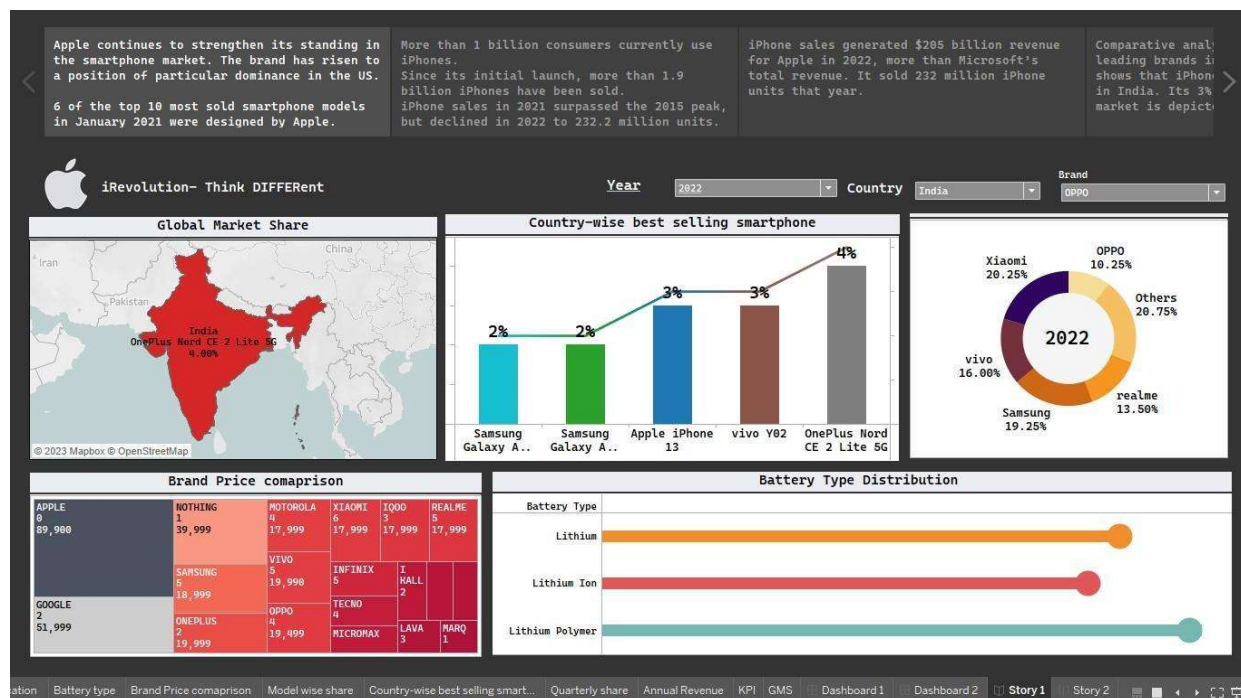


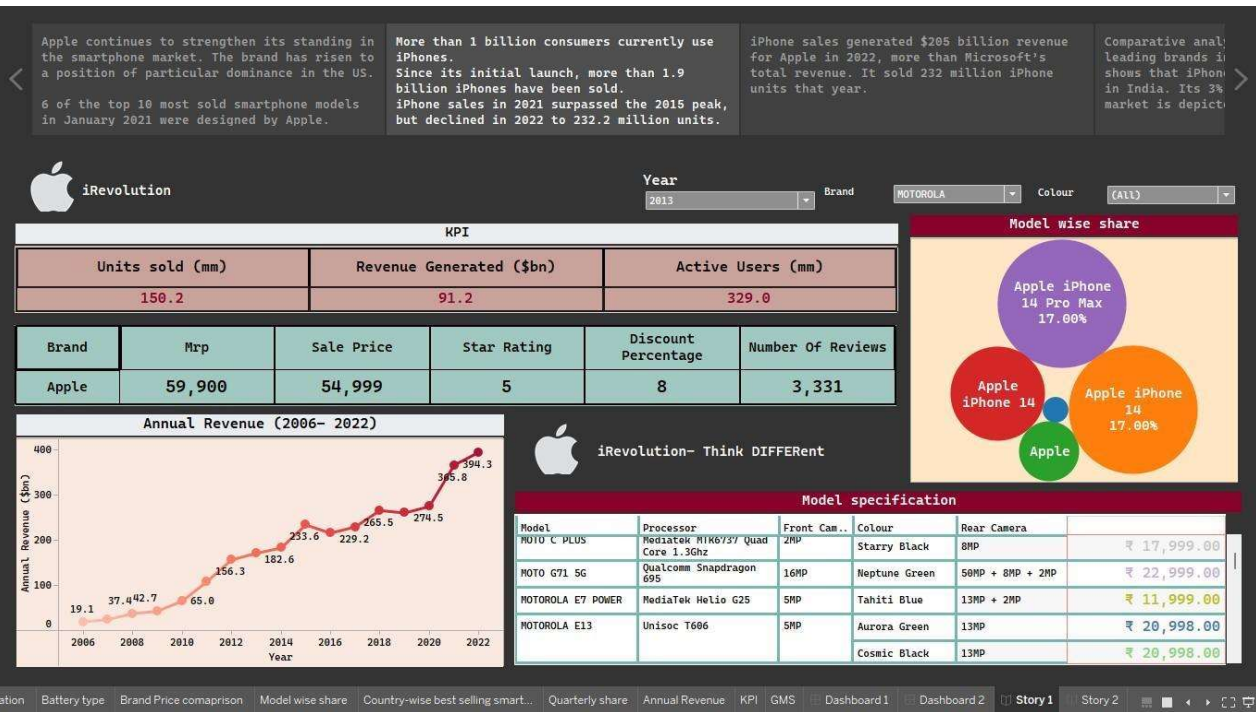
Story:

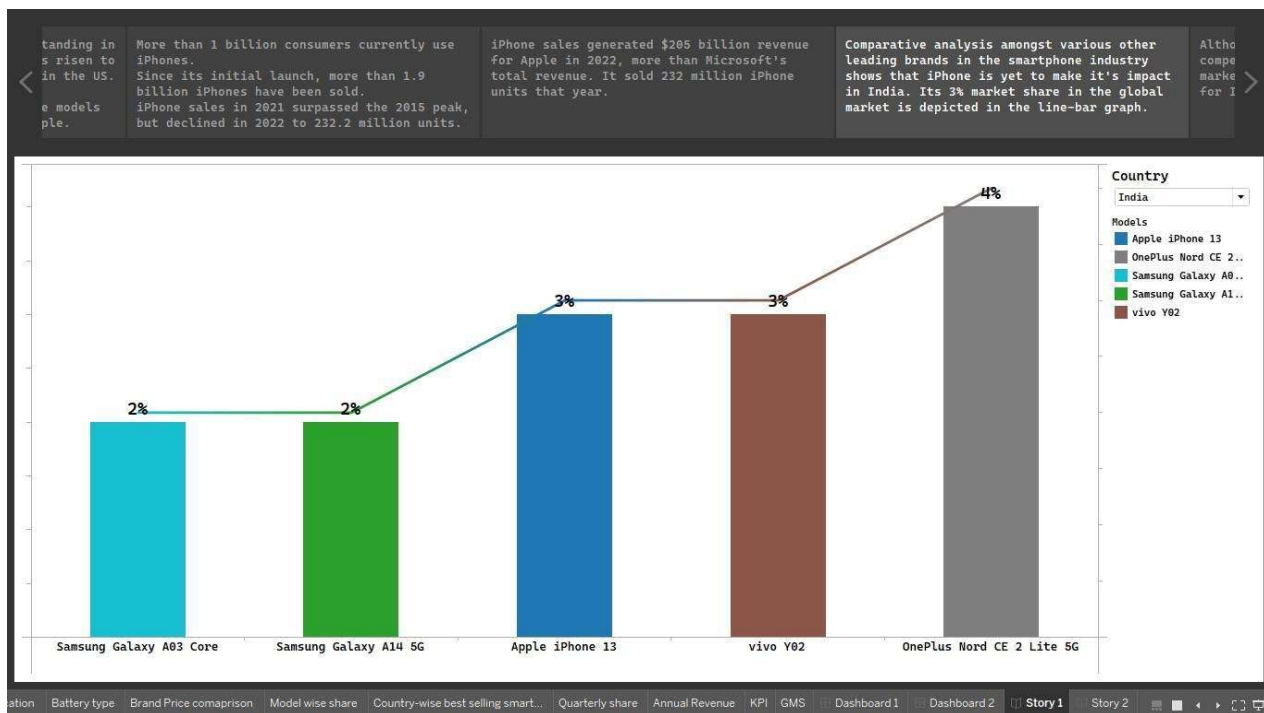
- A data story is a way of presenting data and analysis in a narrative format, with the goal of making the information more engaging and easier to understand. A data story typically includes a clear introduction that sets the stage and explains the context for the data, a body that presents the data and analysis in a logical and systematic way, and a conclusion that summarizes the key findings and highlights their implications. Data stories can be told using a variety of mediums, such as reports, presentations, interactive visualizations, and videos.

No Of Scenes Of Storys:

- The number of scenes in a storyboard for iRevolution will depend on the complexity of the analysis and the specific insights that are trying to be conveyed. A storyboard is a visual representation of the data analysis process and it breaks down the analysis into a series of steps or scenes.





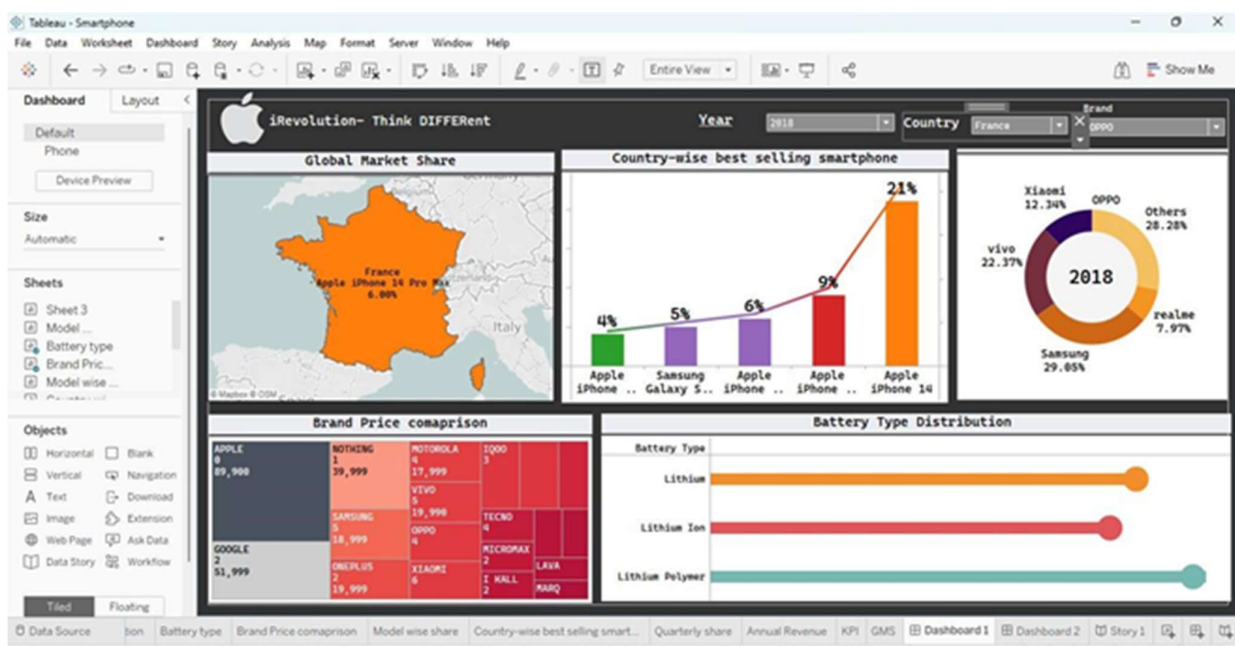
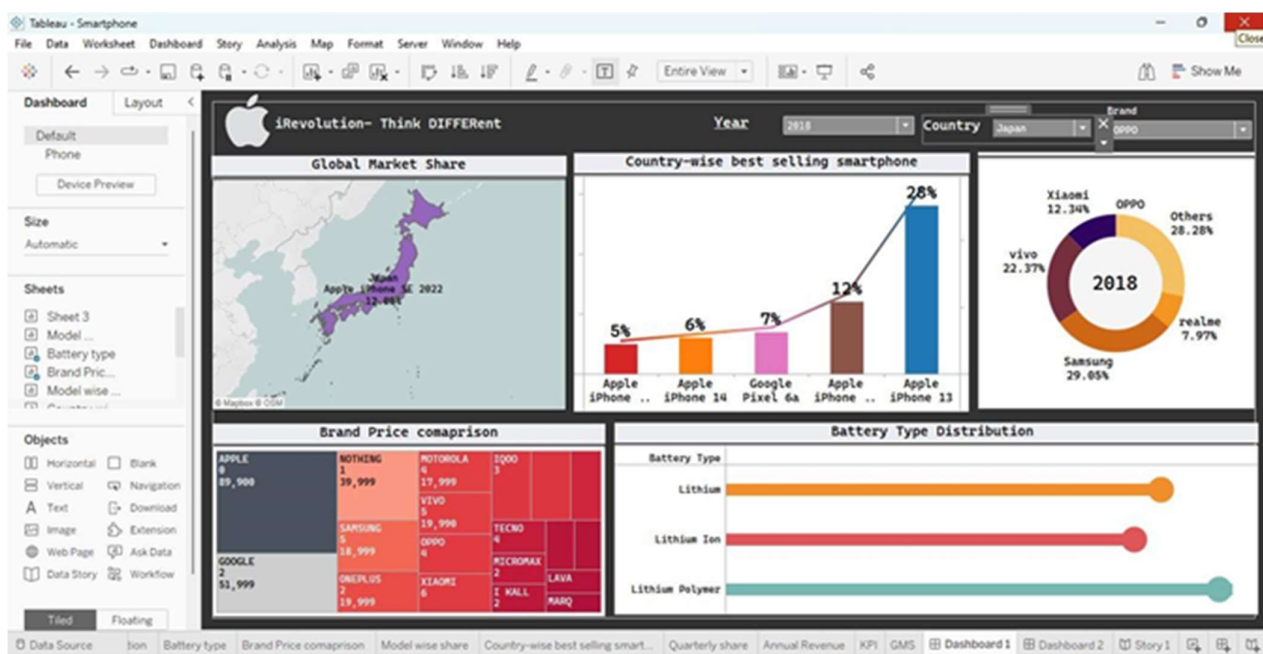


Performance Testing

- Performance testing in data analysis involves evaluating the efficiency and effectiveness of data processing and analysis tasks. It is a crucial step to ensure that data analysis processes can handle large volumes of data and deliver results within acceptable time frames. Performance testing helps identify potential bottlenecks and optimize the data analysis pipeline for better performance.

Utilization Of Filters

- In Tableau, filters are a crucial feature that allows you to focus on specific data within your visualization or analysis. They enable you to dynamically control what data is displayed based on certain conditions or criteria. Tableau offers various types of filters to refine and manipulate your data, providing you with more flexibility in your visualizations.



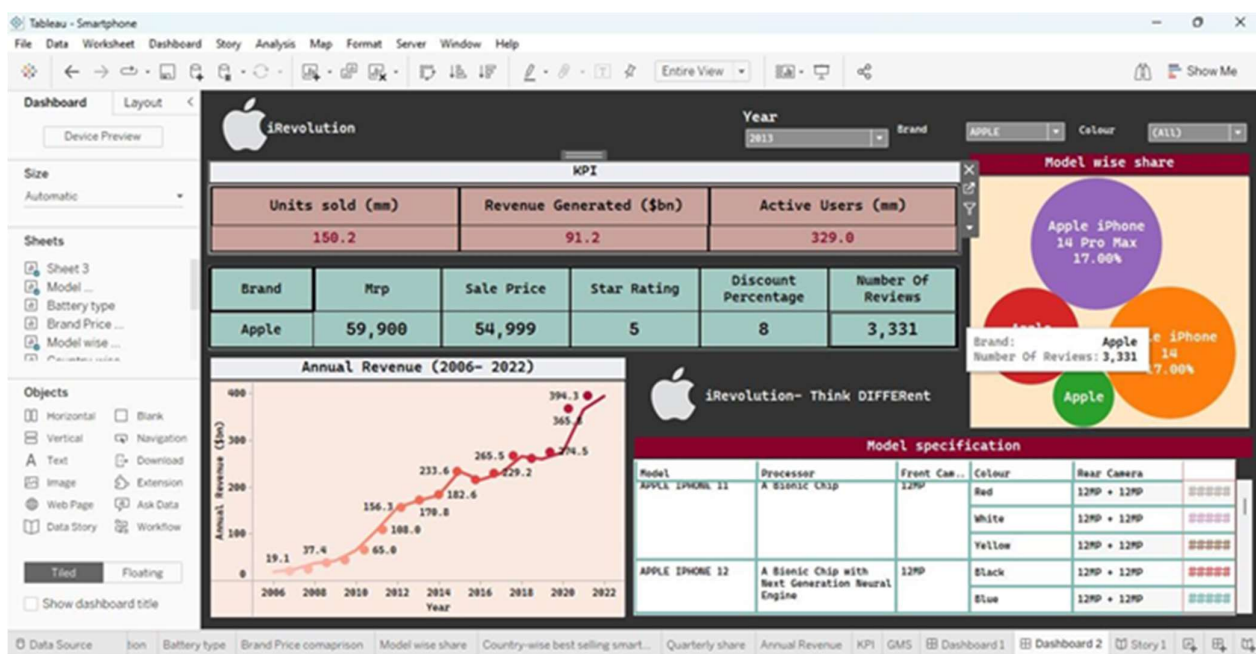


Tableau - Smartphone

File Data Worksheet Dashboard

Data Analytics

apple_products

Search

Tables

- Brand
- Product Name
- Product URL
- Ram
- Upc
- Measure Names
- Discount Percentage
- Mrp
- Number Of Ratings
- Number Of Reviews
- Sale Price
- Star Rating
- apple_products.csv (Count)
- Measure Values

Tableau - Smartphone

File Data Worksheet Dashboard

Data Analytics

flipkart_smartphones

Search

Tables

- Battery Type
- Brand
- Colour
- Front Camera
- Model
- Processor
- Rear Camera
- Measure Names
- Battery Capacity
- Discounted Price
- Display Size
- Memory
- Original Price
- Rating Count
- Ratings
- Reviews
- Storage
- flipkart_smartphones.csv ...
- Measure Values

No Of Visualizations/ Graphs:

- ✚ KPI
- ✚ Model Specification
- ✚ Model- Wise share
- ✚ Battery-Type distribution
- ✚ Brand- Price Comparison
- ✚ Model- Wise Share of iPhone
- ✚ Country-Wise Best-Selling Smartphone
- ✚ Annual Revenue Year-Wise
- ✚ KPI-2
- ✚ Global Market Share

Publishing:

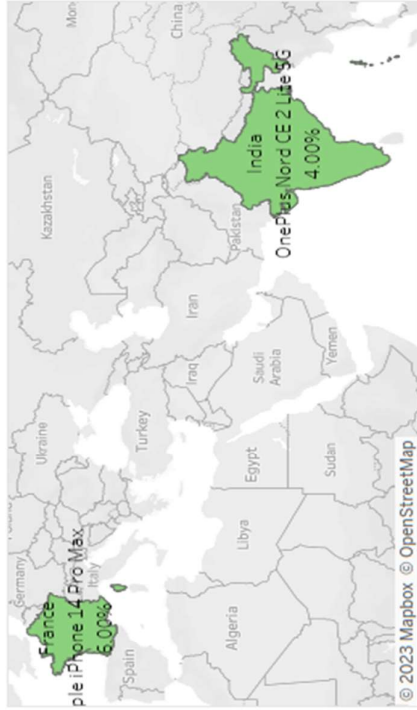
- Publishing Tableau Desktop to Tableau Public is a process which allows to share Tableau visualizations publicly on the internet. Tableau Public is a free cloud-based platform provided by Tableau Software specifically designed for sharing interactive data visualizations with the world. When you publish to Tableau Public, your visualizations become accessible to anyone on the web, and you can embed them in websites, blogs, and social media.
- Publishing Dashboard And Reports To Tableau Public



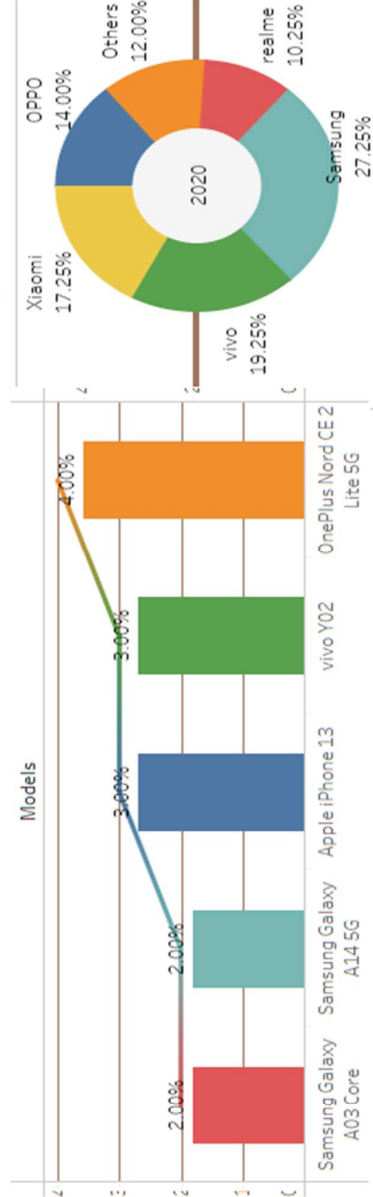
IRevolution: A Data-Driven Exploration Of Apple's iPhone Impact In India

Year
2020

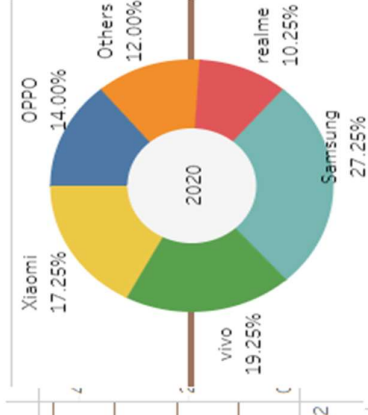
Gobal Market Share



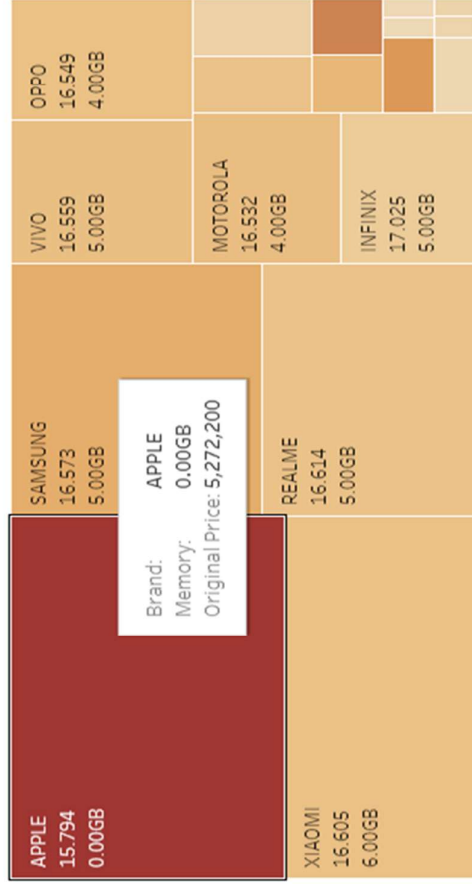
country wise best selling smartphones



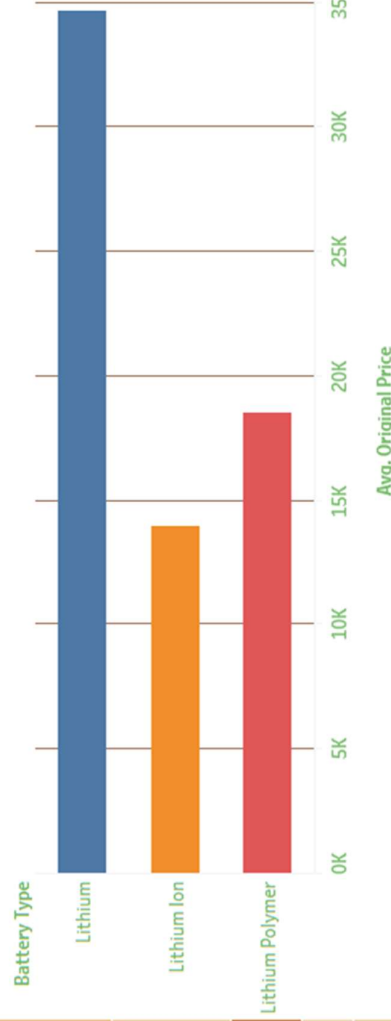
Quartely -share



Brand price comparsion



Battery Type Distribution



❖ Use full links:

- ✓ *Tableau profil link:* <https://public.tableau.com/app/profile/janarthanan.v>
- ✓ *DemoVideolink:* [https://drive.google.com/file/d/1xLZyJdfmsLf9_qOWevjo0Ix4dAIJ7yjk/view?usp=drive link](https://drive.google.com/file/d/1xLZyJdfmsLf9_qOWevjo0Ix4dAIJ7yjk/view?usp=drive_link)
- ✓ *GidHub profil link:* <https://github.com/appu-jpg/IRevolution-NMID-13979>

PROJECT presentation:

Data collection and ideas : *Y.Sakthivel & Kamesh*

Suggestion, Development ideas&

Technical support: *J.Vignesh*

Team leader: *V.Janarthanan*

Project Collaboration: *smart internz*

Software Provider : *Tableau.*

Thank you

