Group 5

BUSINESS REPORT

Dibs organisation

Sales Performance
Product Insights
Sales & Orders Trends
Recommendation

Executive Summary

Dibs, a thriving online retailer specialising in accessories, home goods, and electronics, is currently facing challenges in increasing sales and enhancing customer loyalty. This report aims to address these issues by analysing customer purchasing history to identify shopping behaviour patterns, providing strategic insights for future sales and marketing initiatives.

To achieve this, sales data from the past twelve months were collected and imported into R for detailed cleaning, analysis, visualisation, and predictive modelling. The data underwent rigorous cleaning, including type conversion, data transformation, outlier handling, and sales calculation, to ensure high quality. Key insights were then derived through comprehensive analysis and visualisation of patterns and trends.

Key highlights of this report:

1) **Sales Performance:**
   - Worst Year: 2021.
   - Best Year: 2019.
   - Best month: December.
   - Top Sales City: San Francisco.
   - Optimal Advertising Time: 19:00.

2) **Product Insights:**
   - Most Sold Product: AAA Batteries (4-pack).
   - Least Sold Product: LG Dryer.
   - Products Sold Together: iPhone and lightning charging cable.

3) **Sales & Orders Trends:**
   - Seasonal Trends: Highest sales in Quarter 4, driven by holiday shopping.
   - Geographical Insights: California dominated sales, followed by New York and Texas.
   - Daily and Hourly Order Insights: High orders on weekdays in Apr-Jun, and early in the week in Oct-Dec. While high customer activity at 12pm and 7pm, more bulk purchases at 7am.

4) **Recommendation**:
   - Bundle Offers
   - Fast Delivery
   - Loyalty Programs
   - Happy Hours
   - Customer Segmentation
   - Geographical Expansion
   - Product Discounts

Implementing these recommendations can effectively help Dibs overcome its challenges, thereby boosting sales and cultivating stronger customer loyalty.

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Introduction

Dibs is a flourishing online retailer specialising in a diverse range of products, from accessories and home goods to electronics. Despite its success, the company is currently encountering challenges in increasing sales and fostering customer loyalty. This report aims to address these issues by analysing customer purchase history to uncover shopping behaviour patterns. These insights will be instrumental in guiding future strategic sales and marketing initiatives.

To achieve this, we will utilise the R language to perform a comprehensive analysis and develop tailored visualisations that enhance the team's understanding of customer purchasing habits. Furthermore, predictive modelling will provide long-term insights to key stakeholders. Ultimately, this report will offer actionable recommendations to boost Dibs's sales and enhance customer loyalty.

Methodology

Data Collection and Import

The sales data for the past twelve months were received and imported into R for cleaning, analysis, visualisation, and predictive modelling.

Data Overview

The consolidated dataset comprises 186,894 observations with six key dimensions:

- **Order ID:** A unique identifier for each order.
- **Product:** The items sold to customers.
- **Quantity Ordered:** The total quantity of items ordered before any modifications.
- **Price Each:** The price of each individual product.
- **Order Date:** The date the customer placed the order.
- **Purchase Address:** The address provided for shipping the order.

Data Cleaning and Preparation

- **Combining Datasets:** Sales data from 12 separate files, one for each month of the year, were combined into a single dataset for comprehensive analysis.
- **Cleaning Process:** To ensure data quality and readiness for analysis, several data cleaning steps were performed:
  1. **Type Conversion:**
     i. Convert 'Order ID', 'Quantity Ordered', and 'Price Each' into numeric formats.
     ii. Convert 'Order Date' into date format.
  2. **Data Transformation:**
     i. Decompose the 'Order Date' into separate fields: date, month, year, hour, and a binary indicator for weekends and holidays.
     ii. Break down the 'Purchase Address' into city, state, and postcode.
  3. **Outlier Handling:**
     i. Adjust outlier values to mitigate their impact on the analysis.
  4. **Sales Calculation:**

Compute the total sales for each order by multiplying the 'Quantity Ordered' by the 'Price Each'.

These steps ensured the dataset was clean and structured appropriately, facilitating high-quality analysis in subsequent phases.

Data Visualisation

Using different data visualisation, statistical approaches and critical analysis, to find insights helping Dibs company better understand its consumers' behaviour and detect patterns and trends.

Key Findings

Performance Highlights

a. The worst year of sales is 2021 and the sales earned were $3926.82.

b. The best year of sales is 2019 and the sales earned were $34,456,867.65.

c. The best month of sales in the best year of sales was December.

d. The sales earned in the best month of sales (December) in the best year of sales (2019) were $4,608,295.7.

e. San Francisco had the most sales in the best year of sales (2019).

f. The best time for displaying advertisements was at 19:00. The optimal time slots for displaying advertisements were from 18:00 to 20:00 and from 11:00 to 12:00.

g. The iPhone and lightning charging cable were most often sold together.

h. AAA Batteries (4-pack) was the product that sold the most as it had the highest number of quantities sold. It is also widely used in electronic devices due to its high energy density and lightweight, and therefore, it is often sold together with many electronic devices.

i. The LG Dryer was the product that sold the least in the best year of sales (2019).

Insights Analysis

a. **Sales analysis**

Monthly Sales vs. Average Sales in 2019
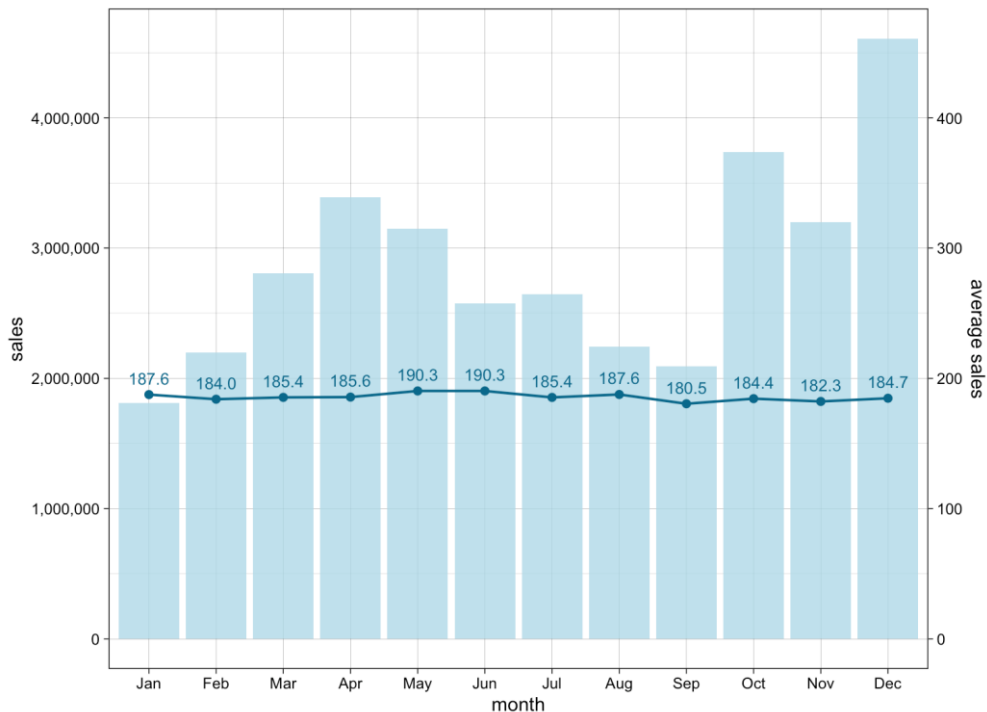
Seasonal trends

Highest total sales in Q4 (Oct - Dec).
➔ Likely driven by holiday shopping, such as Black Friday, Christmas, etc.

Upward trend in total sales from April to September.
➔ Suggest seasonal lull, post-holiday spending slowdown, summer vacations when consumer spending shifts towards travel, entertainment instead of retail goods.

Contrasting trends in average sales and total sales:

From April to August, despite total sales decreased, there was an increasing trend in average sales.
➔ While fewer transactions occurred, the value of each transaction increased, which could be attributed to an increase in the quantity requested or the higher worth of the item, such as the Macbook Pro Laptop, Iphone, etc.

b. **Sales by state**

US States Ranked by Total Sales in 2019
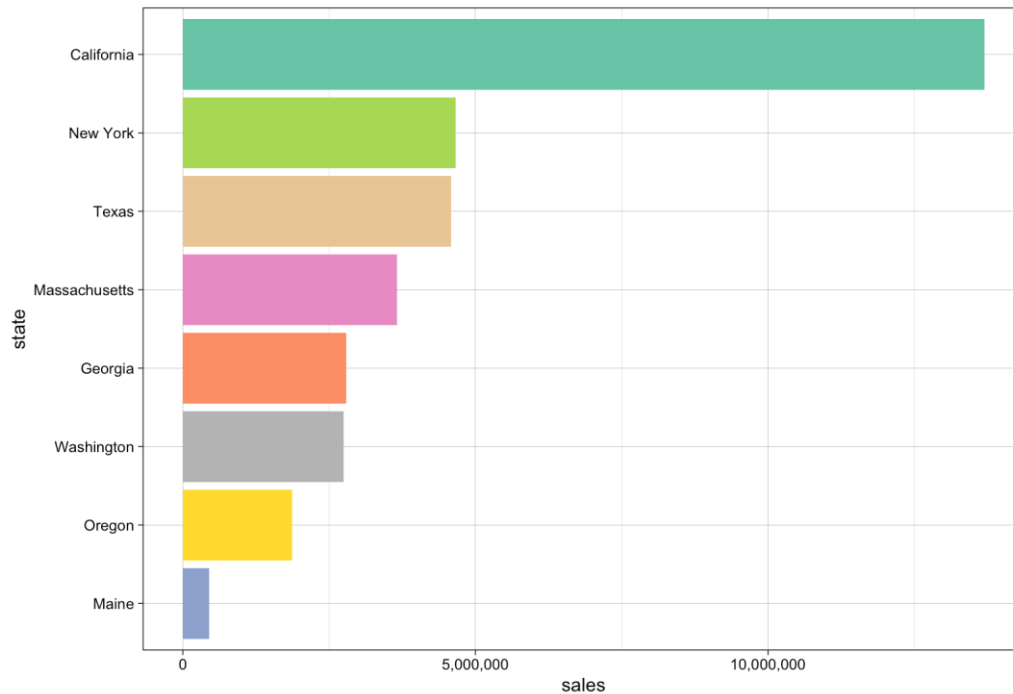
California has the biggest sales volume of 13 million USD, three times that of most other states, due to its enormous population, high income levels, and robust e-commerce activity. New York and Texas had large sales, but lower than California, indicating important but smaller markets. Maine and Oregon, on the other hand, have the lowest market presence and consumer interaction.

c. Top 10 products in 2019

Top 10 Best-Selling Products in 2019
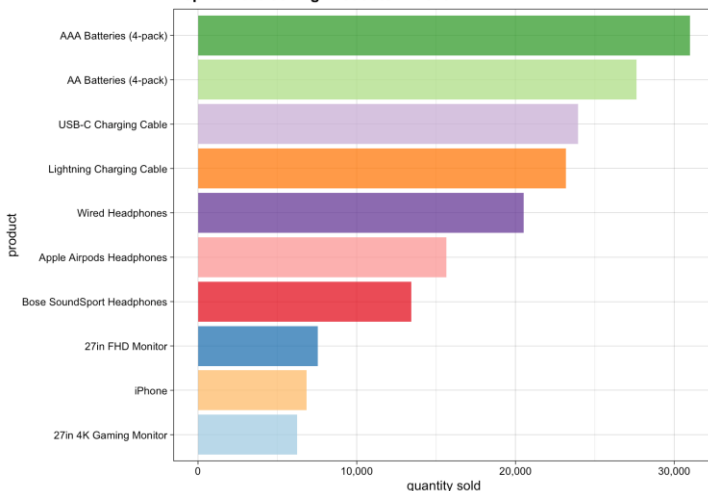
Top 10 Products Ranked by Sales in 2019
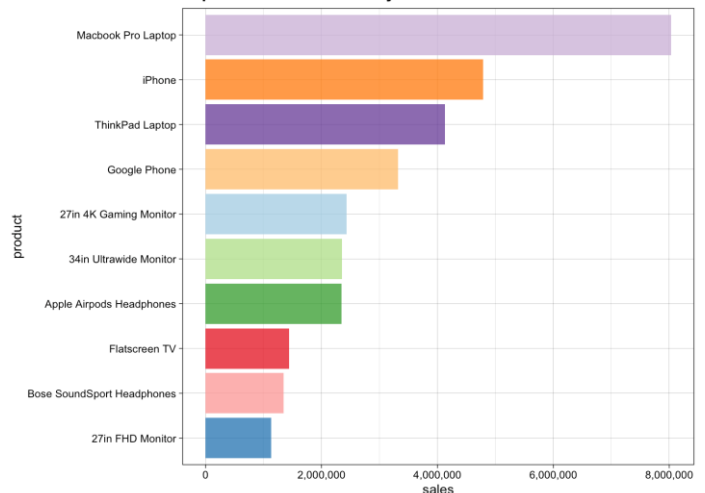
### High demand for everyday essentials
The highest number of orders are for AAA and AA batteries, followed by Charging Cables. These items are everyday essentials with frequent repurchase cycles.

### Comparably high demand for high-value electronics
The Apple Airpods Headphones, Bose SoundSport Headphones, 27in FHD Monitor, iPhone and 27in 4K Gaming Monitor make up five of the top ten best-selling items and also top-

revenue lists. Their appearance on both lists demonstrates their significance to the company's overall financial performance in 2019.

d. Monthly order analysis

2019 Monthly Orders vs. Average Orders
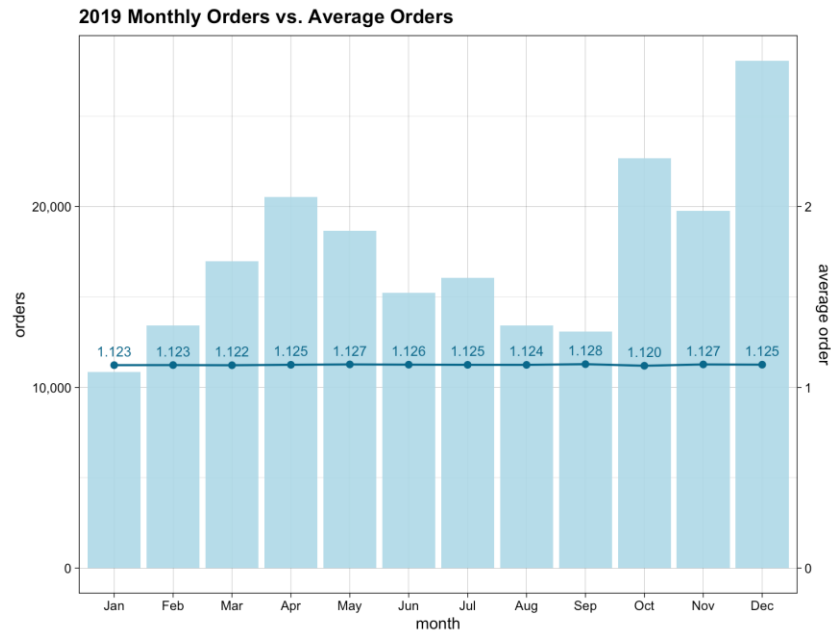
Overall, the trend in the number of orders mirrors the trend in total sales (from question a). The average order value remains relatively stable but also does not align with the total order trends.

Monthly Trends in Top Product Orders in 2019


Monthly Orders Trends by US States in 2019
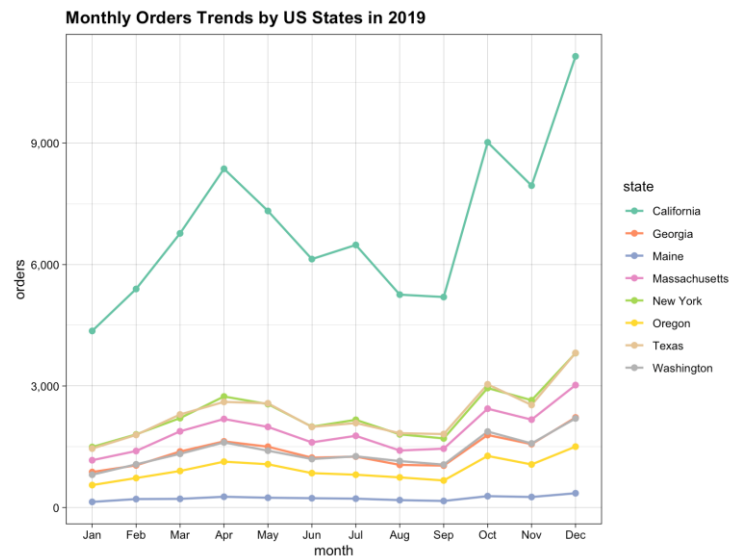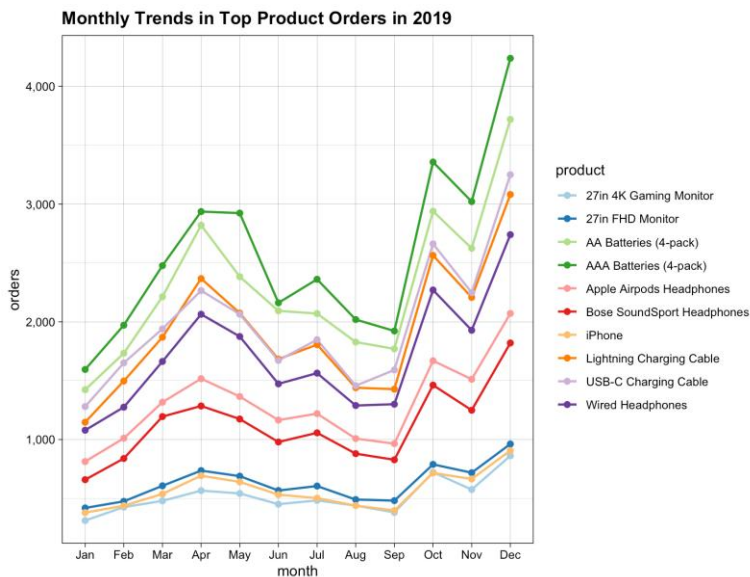
The top ten best-selling products show monthly order patterns that closely follow the overall trend, maintaining their ranking month after month, indicating a steady and reliable market, providing opportunities for bundled offers and cross-selling strategies to boost sales of these frequently repurchased products. California, with the highest monthly sales volume, significantly influences overall patterns, especially during the holiday season. Low-sales states like Maine and Oregon have minimal impact but still follow national trends, suggesting

potential for focused marketing to boost sales in these regions and capitalise on seasonal peaks elsewhere.

### e. Daily order analysis

2019 Daily Orders Trend
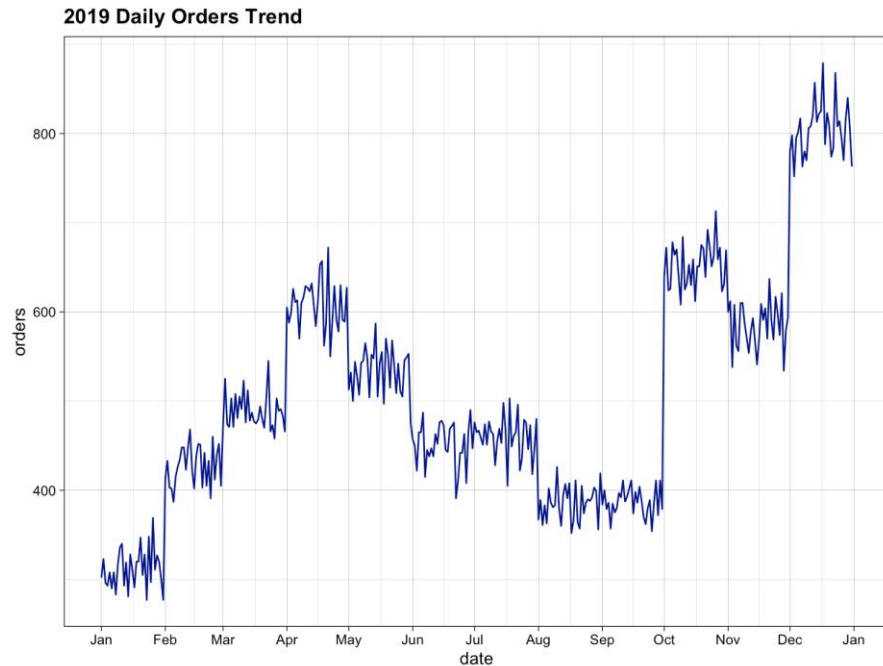
Overall, daily orders change throughout the month, showing varying levels of demand, highlighting the need for further research into the weekday effect in order to better understand these swings and uncover trends.

Orders by Day of the Week and Term
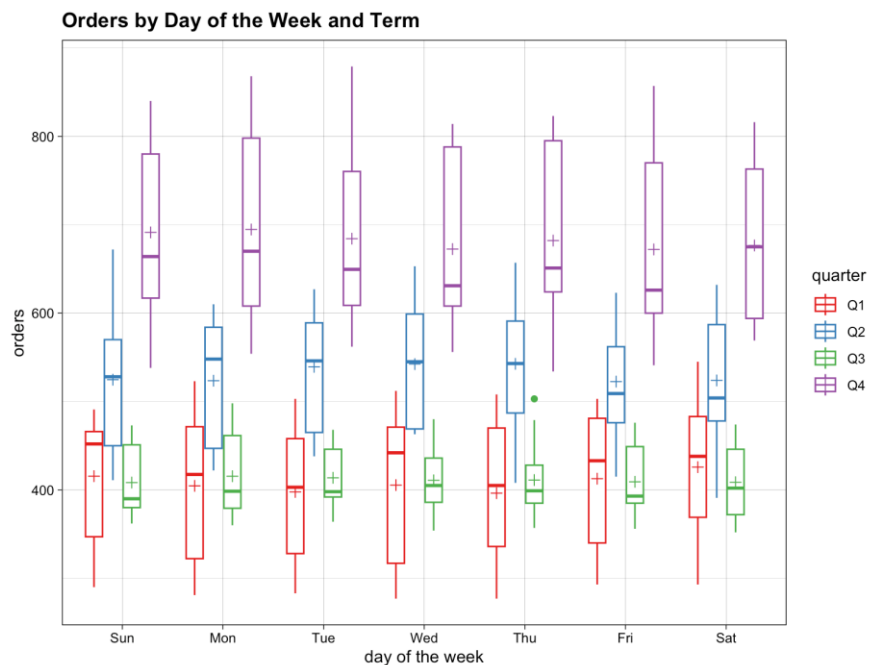
Box plot above shows the distribution of daily orders for each day of the week by quarter, including a marker to indicate the mean value for each distribution.

- Q1 (Jan-Mar): Higher average orders on Friday to Sunday, indicating high frequent weekends shopping.
- Q2 (Apr-Jun): Higher average orders from Monday to Thursday, indicating regular weekday shopping patterns dominate.
- Q3 (Jul-Sep): Moderate order patterns during the week.
- Q4 (Oct-Dec): Highest average value of orders on Monday and Tuesday holiday season effect, customers tend to make purchases early in the week.

f. Hourly order analysis
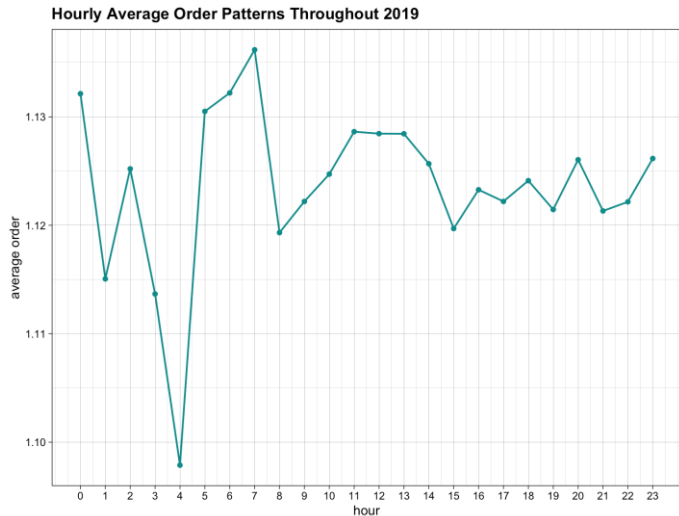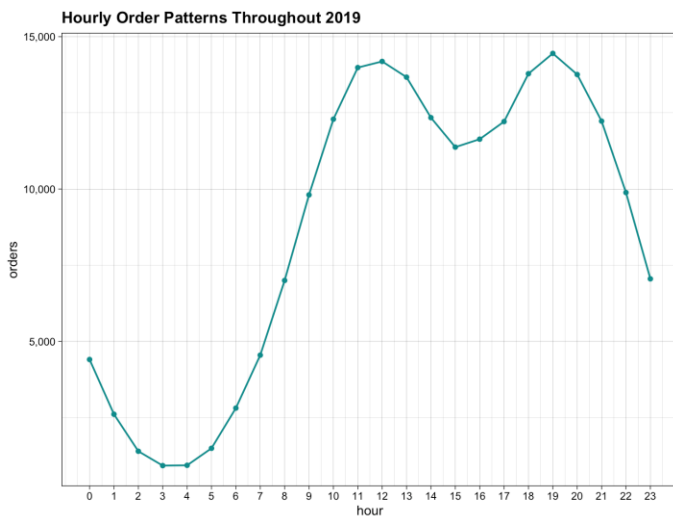
Orders peaked at 12pm and 7pm, coinciding with lunch and dinner times, when people are more likely to order online. The hourly average peaked at 7am, suggesting a surge in early morning orders, possibly for bulk purchases.
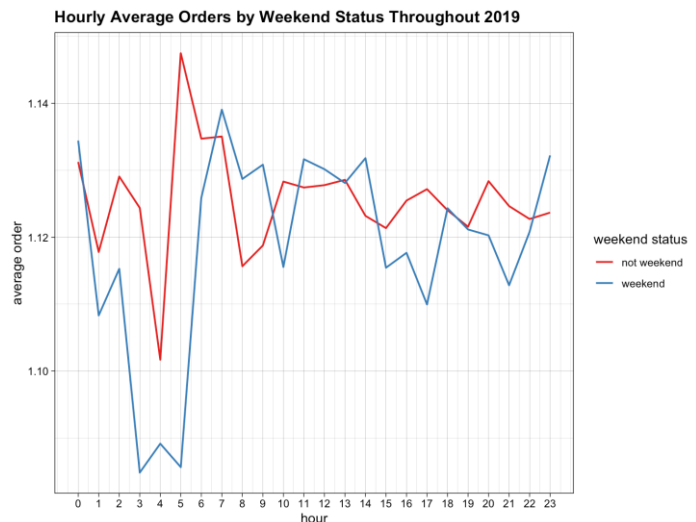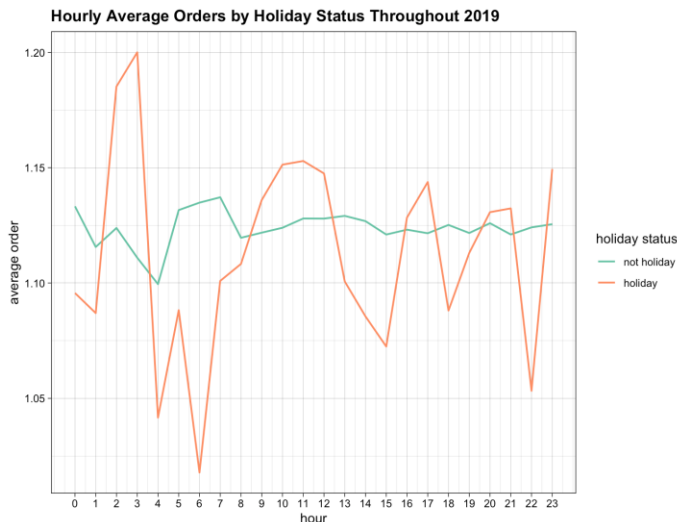
The holiday season shows more fluctuating sales compared to regular days, whereas the weekend effect is less noticeable, likely due to the nature of Dibb's online retail business.

Recommendations

Dibs can improve its sales and customer loyalty by implementing practical recommendations that have been customised with meticulous analysis and justification based on the company's background.

Seasonal Strategies
Conduct different marketing strategies corresponding to the shopping patterns in each quarter. For example, offer end-of-year discounts in the fourth quarter due to the holiday season.

Happy Hours
Launch a Golden Hour, focusing on advertisements at 7 PM and 12 PM, and display the massive discount offers on the company's websites and social media platforms.

Bundle Offers
Conduct reward and promotion programs on packs of products that are often sold together and account for a high proportion of company's sales, such as:
- iPhone, Lightning Charging Cable.
- Google Phone, USB-C Charging Cable.
- iPhone, Wired Headphones

Market Concentration
Offer various delivery options, such as fast delivery and 24/7 delivery, especially in dominant states like California, New York, and Texas.

Customer Segmentation
Develop appropriate marketing strategies to target customer groups. For example, if the company's customer segments were mothers, tech enthusiasts, and organisations, some recommendations would be as follows:

- Since mothers often purchase home goods and accessories, Dibs can implement loyalty programs like happy hours, referral rewards, or holiday discounts.
- Tech enthusiasts are passionate about electronic devices. Offering bundle discounts and advertisement rewards (benefits when they receive sponsorship for commercialising their products) can appeal to them.
- Organisations often place large orders at the beginning of each month, especially at the start of the financial year. Offering bundle discounts, seasonal discounts, or creating more favourable terms in the supply agreements can extend the agreement period.