



**IIT Madras**

# **Business Data Management**

**(Helping Offline Retail Stores through E-Commerce)**

## **Project Mid Term Report**

Submitted by

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## DECLARATION

I hereby declare that the Mid Term Report for “*Business Data Management*” Project titled “*Helping Offline Retail Stores through E-Commerce*” is my own work and the idea proposed is completely a result of my thought process and ideas.

I further declare that to the best of my knowledge this proposal report does not contain any part of work that has been submitted for the award of any degree either in this university or in other university / Deemed University without proper citation.

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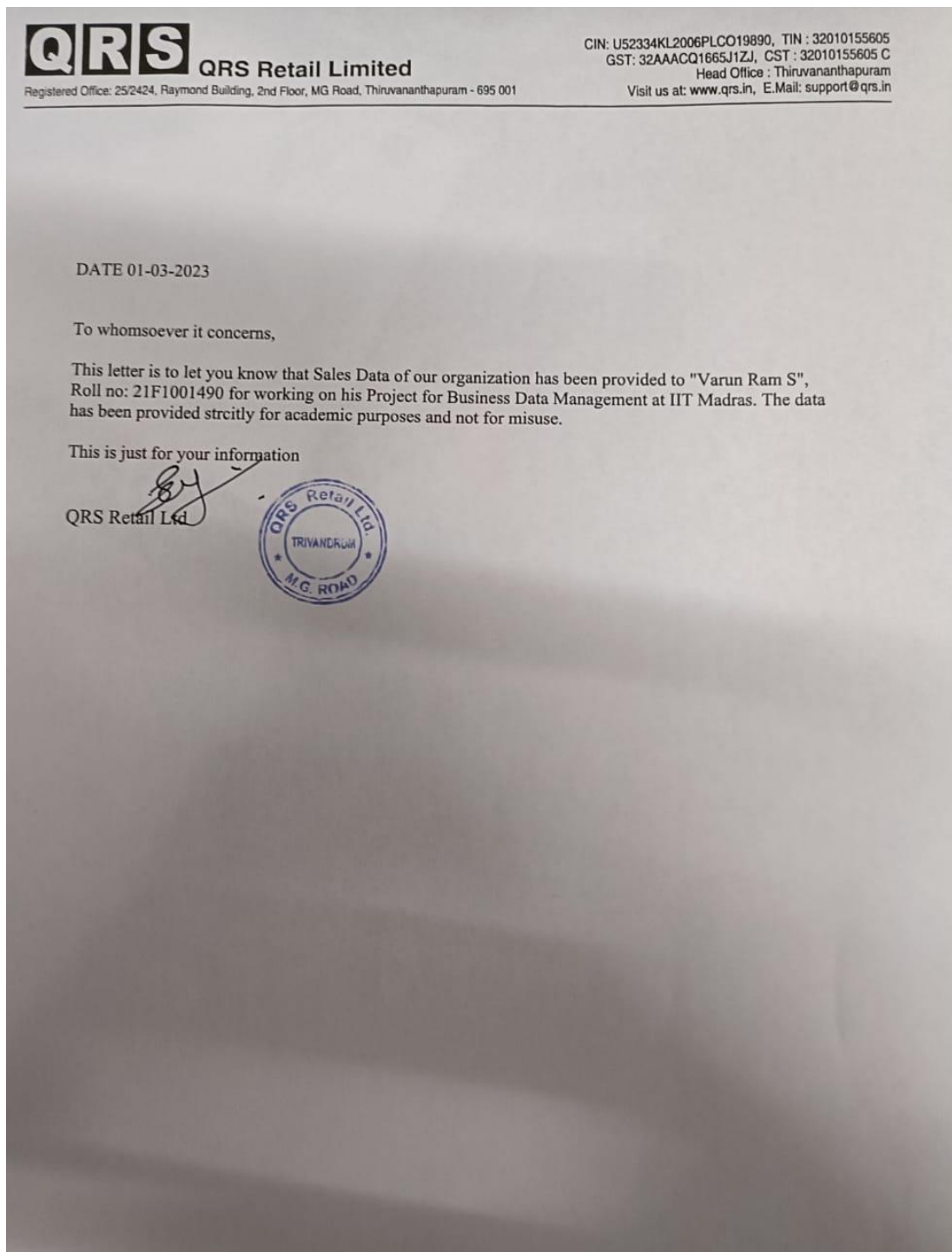
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## **Title of Project: Helping Offline Retail Stores through E-Commerce**

### **Executive Summary**

Consumer electronics companies and other industries with offline storefronts or outlets have been severely impacted by the explosive growth of e-commerce websites and delivery services. With the push of a button on an app and a quick transaction through various digital payment platforms that are crucial to the development of Digital India, many individuals were able to stay at home during the pandemic that hit back in 2019. Services and goods were then delivered to their doorsteps. The idea of a digital India looks fantastic, but a substantial portion of the population still prefers to physically visit a store in their neighbourhood and select a product of their choice. The same sizeable population is, however, declining as a result of the increased competition provided by online goliaths. As a result, several stores have been forced to close, hurting all of the staff members who worked there. This project offers strategies for combating competition from these internet behemoths while also outlining precautions that can be taken to prevent losses through various ad hoc techniques. This report also contains the Data Collected, its descriptive statistics and meta data, and the analysis method that is used to draw the conclusion and make suggestions to the organization for improving their business model.

# 1. PROOF OF ORIGINALITY OF DATA – LETTER FROM ORGANIZATION



Link to Letter PDF:

[drive.google.com/file/d/1rIGC4WP7rHMufljb2fA9dLwV00H0PS5Y/view?usp=share\\_link](https://drive.google.com/file/d/1rIGC4WP7rHMufljb2fA9dLwV00H0PS5Y/view?usp=share_link)

## 2. METADATA AND DESCRIPTIVE STATISTICS

Here is the Data Collected from the organization for the year 2022. This contains only the sales of Television and Refrigerator. Only these two products are taken among all consumer electronics for a better understanding of the sales pattern and season. This includes all brands (like LG, Panasonic, Sony etc.)

Product/Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Sales
Television-all	189	107	85	248	230	225	286	305	118	139	147	205	2284
Refrigerator	201	157	196	303	308	115	157	119	145	108	221	157	2187

Table 1: Sales Data of Television and Refrigerator for 2022

The main objective of the project is to only study the sales pattern of one product (i.e., Television) to study how much percentage of the inventory can be allotted to the online website for sales. This will also help in the understanding in the efficient use of inventory.

This table includes the sales of televisions alone on the basis of their models (separated on the basis of inches).

Model by inches	Yearly Sales	Inventory	Average Price/unit (in INR)
32 Inches	623	1300	15000
43 inches	821	1800	25000
47 inches	551	1100	38000
50 inches	184	500	45000
>50 inches	105	250	70000
Total Sales	2284	4950	

Table 2: Yearly sales and Inventory stock of different models of Televisions with their average price

Metadata for Table 1:

- The data contains monthly sales figures (in units) for two product categories: television and refrigerator, over a period of one year (12 months).
- The sales figures are for "all" televisions, and or brand of refrigerator being sold is very general and there is no specific focus on any specific brand.
- The data does not include any information about the prices of the products, or any other variables that might affect sales, such as advertising expenditure, competitor activity, or seasonality.

### Descriptive statistics for Table 1:

- Television-all:
  - The total sales for televisions in the given year were 2,284 units.
  - The mean monthly sales for televisions were approximately 190 units, with a standard deviation of 70 units.
  - The highest sales month for televisions was August, with 305 units sold, and the lowest sales month was September, with 118 units sold.
  - The range of monthly sales for televisions was from 85 units (in March) to 305 units (in August).
  - The median monthly sales for televisions were 225 units.
  
- Refrigerator:
  - The total sales for refrigerators in the given year were 2,187 units.
  - The mean monthly sales for refrigerators were approximately 182 units, with a standard deviation of 68 units.
  - The highest sales month for refrigerators was April, with 303 units sold, and the lowest sales month was October, with 108 units sold.
  - The range of monthly sales for refrigerators was from 115 units (in June) to 308 units (in May).
  - The median monthly sales for refrigerators were 157 units.
  
- Overall Descriptive results:
  - The total sales for both products combined were 4,471 units.
  - The mean monthly sales for both products combined was approximately 372 units, with a standard deviation of 108 units.
  - The highest sales month overall was August, with 424 units sold, and the lowest sales month was September, with 263 units sold.
  - The range of monthly sales for both products combined was from 85 units (in March) to 424 units (in August).
  - The median monthly sales for both products combined was 391 units.

### Metadata for Table 2:

- The data represents yearly sales figures (in units) for five different models of televisions, based on their screen size measured in inches.
- In addition to sales figures, the data also includes information on the inventory levels and average price per unit for each model.
- The data does not include any information about the distribution channels, customer demographics, or any other variables that might affect sales.

Descriptive statistics for Table 2:

- 32 Inches Model:
  - The total sales for the 32-inch model in the given year were 623 units.
  - The inventory level for the 32-inch model was 1,300 units.
  - The average price per unit for the 32-inch model was 15,000.
- 43 Inches Model:
  - The total sales for the 43-inch model in the given year were 821 units.
  - The inventory level for the 43-inch model was 1,800 units.
  - The average price per unit for the 43-inch model was 25,000.
- 47 Inches Model:
  - The total sales for the 47-inch model in the given year were 551 units.
  - The inventory level for the 47-inch model was 1,100 units.
  - The average price per unit for the 47-inch model was 38,000.
- 50 Inches Model:
  - The total sales for the 50-inch model in the given year were 184 units.
  - The inventory level for the 50-inch model was 500 units.
  - The average price per unit for the 50-inch model was 45,000.
- Models Greater than 50 Inches of Screen Size:
  - The total sales for models larger than 50 inches in the given year were 105 units.
  - The inventory level for models larger than 50 inches was 250 units.
  - The average price per unit for models larger than 50 inches was 70,000.

Overall Descriptive Summary:

- The total sales for all models combined were 2,384 units.
- The total inventory level for all models combined was 4,950 units.
- The average price per unit for all models combined was approximately 28,573.
- The best-selling model was the 43-inch model, which had 821 units sold and an inventory level of 1,800 units.
- The worst selling models were the ones that were >50-inches, which had 105 units sold and an inventory level of 250 units.



### 3. EXPLANATION OF ANALYSIS PROCESS/METHOD

For the Metadata and Descriptive statistics mentioned above, basic statistical formula has been used to compute the same. The total sales, mean monthly sales and etc were computed on Spreadsheet using the basic spreadsheet formulae that are predefined.

The method for predicting sales for the upcoming years for various months can be done using Regression Analysis. Regression analysis is a statistical technique used to analyse the relationship between a dependent variable and one or more independent variables. In the case of predicting sales, the dependent variable would be the number of sales made and the independent variables could be various factors that might affect sales, such as advertising spend, product price, or time of year. We will emphasize our focus on time of year (month) as the independent variable for our analysis. There are different types of regression analysis, but the most commonly used one for predicting sales is linear regression. Linear regression assumes that there is a linear relationship between the dependent variable (sales) and the independent variables. The goal is to find the line of best fit that represents the relationship between the variables.

To conduct a regression analysis for predicting sales, the following steps can be followed:

1. Collect data on the dependent and independent variables. This could involve gathering data on sales, advertising spend, product price, and other potential factors that could impact sales. This part has already been done under the Data Collection.
2. Plot the data to visualize the relationship between the dependent and independent variables. This can help identify any patterns or trends in the data. This section will be covered in the results and findings.
3. Choose the appropriate regression model. In the case of predicting sales, linear regression is often the most suitable model and that shall be applied for our case too.
4. Run the regression analysis to find the line of best fit. This involves using statistical software to calculate the slope and intercept of the line that best fits the data. Python is the best software recommended.
5. Evaluate the results of the regression analysis. This involves analysing the statistical significance of the coefficients and determining the accuracy of the model in predicting sales.

After the regression analysis, we can allocate a certain percentage of the inventory to the online website for sales and we can also make sure to avoid stocking up excess in the upcoming years.

## 4. RESULTS AND FINDINGS – STAGE 1

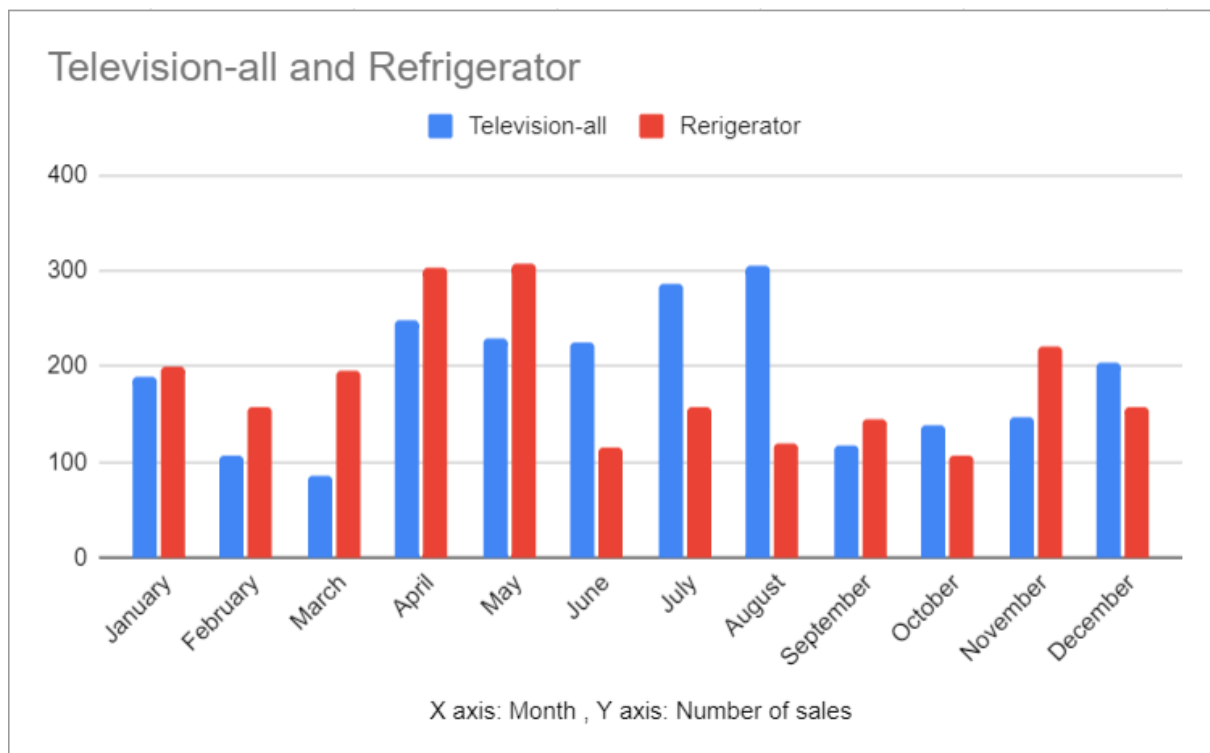


Fig: Comparing the sales between Television and Refrigerator for different months and understanding the similarity

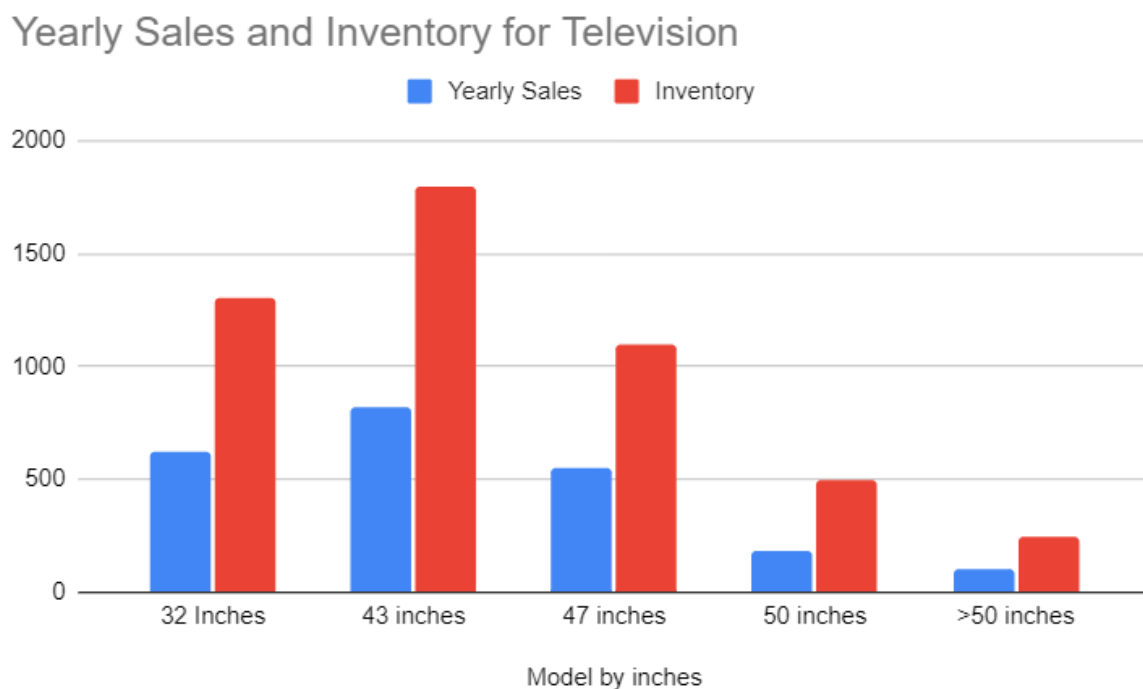


Fig: Sales and inventory comparison for different models of television based on screen size

## **5. CONCLUSION**

The Stage 1 Analysis of the Data has given insights into trends of sales that are generally observed every year during different months. The Stage 2 of Analysis will be performed during the final phase of the project.