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# **BUSINESS ANALYTICS**

**Subject Code: 24CAH-703**

## **Project Report On SALES FORECASTING AND ANALYSIS FOR RETAIL STORE**

*(Pizza Sales Analytics using Excel and Power BI)*

**Submitted By:**

**Name:** Mayank Aneja

**UID:** 24MCA20481

**Section:** 24MCA-3(A)

**Submitted To:**

Mr. Sanjay Kumar Aggarwal

(Assistant Professor)

**University Institute of Computing  
Chandigarh University, Gharuan, Mohali**

## CERTIFICATE

This is to certify that the Mini Project Report entitled “**Sales Forecasting and Analysis for Retail Store (Pizza Sales Analytics)**” is a genuine and bonafide work carried out by: **Mayank Aneja**, UID:- **24MCA20481** in partial fulfillment of the requirements for the award of the degree of **Master of Computer Applications** during the academic year 2025–2026.

The project work embodied in this report is original and has been carried out under the supervision of **Mr. Sanjay Kumar Aggarwal**, and the work has not been submitted to any other university or institution for the award of any degree or diploma.

**Signature**

Dr.Krishan Tuli

Head of Department, MCA

University Institute of Computing

**Signature**

Mr. Sanjay Kumar Aggarwal

Supervisor & Assistant Professor

University Institute of Computing

**Date:**

**Place:**

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I am also profoundly thankful to **Dr. Krishan Tuli**, Head of the UIC Department, and the entire administration of the **University Institute of Computing at Chandigarh University**. They provided a stimulating and resource-rich environment, offering access to the necessary computing tools and infrastructure that greatly facilitated this research endeavor.

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## TABLE OF CONTENTS

<b>Section No.</b>	<b>Section Title</b>	<b>Page No.</b>
1.	Abstract / Synopsis	5
2.	Objectives of the Study	6
3.	Problem Definition	6
4.	System Analysis	7
5.	Proposed System	8-9
6.	Implementation (Development & Deployment)	9-12
7.	Testing and Final Outcomes	12-14
8.	Results and Discussion	14-16
9.	Output Screenshots	16-20
10.	Conclusion	20-21
11.	Future Scope	21-22
12.	References & GitHub Repository	22-23

## ABSTRACT / SYNOPSIS

This project, titled “Sales Forecasting and Analysis using Power BI,” is an analytical study designed to demonstrate how modern business analytics tools can assist retail organizations in making data-driven and informed decisions. The primary objective of this project is to analyze historical sales data, identify patterns and trends, and forecast future sales using powerful tools like Microsoft Power BI and Microsoft Excel.

The dataset used in this project comprises transactional data from a retail store, including crucial details such as order date, product category, item name, quantity sold, and total revenue. Such detailed data provides a solid foundation for understanding customer purchasing behavior, seasonal trends, and product-level performance across different time periods.

Microsoft Excel was used for data cleaning, transformation, and preparation, ensuring that the dataset was accurate, consistent, and ready for analysis. Operations like handling missing values, creating calculated fields, and summarizing sales metrics were carried out to make the data suitable for visualization and forecasting. On the other hand, Power BI was employed for data visualization, interactive dashboard creation, and predictive analysis. Using Power BI's dynamic features, this project focuses on creating interactive visual dashboards that display key performance indicators (KPIs) such as total revenue, total sales, top-selling products, and average order value.

The forecasting functionality in Power BI was utilized to predict future sales trends, allowing the retail organization to plan inventory, manage resources effectively, and make strategic business decisions. By analyzing past sales patterns and visualizing insights in an easy-to-understand format, the project demonstrates how data-driven decisions can lead to better business planning, improved profitability, and enhanced operational efficiency.

Overall, this project emphasizes the importance of analytics in modern business operations. It highlights how organizations can leverage data to understand customer demand, optimize inventory, identify sales opportunities, and enhance overall profitability, thereby creating a sustainable competitive advantage in the retail sector.

## OBJECTIVE OF THE STUDY

The main objective of this project is to design and implement an analytical dashboard that helps retail store management to understand business trends and predict sales efficiently.

### Specific Objectives

1. To analyze the retail store's sales data using Excel and Power BI.
2. To identify patterns, trends, and KPIs like total sales, revenue, and order count.
3. To forecast future sales using built-in forecasting models in Power BI.
4. To visualize the performance of various product categories and time periods.
5. To assist management in making informed business decisions based on analytics.

## PROBLEM DEFINITION

### Existing Problems in Retail Sales Monitoring

- Manual data handling leads to errors and inefficiency.
- Lack of visual representation makes performance tracking difficult.
- No predictive model for future sales.
- Decision-making is based on guesswork rather than actual data.

### Proposed Solution

The proposed system offers a data-driven approach by:

- Automating the analysis of retail data using Excel formulas and Power BI dashboards.
- Providing real-time insights into revenue and product performance.
- Using forecasting models to predict future sales.
- Offering an interactive interface for management to explore sales patterns.

# SYSTEM ANALYSIS

System analysis involves understanding the flow of the current process, identifying its limitations, and designing an improved system that solves the existing problems effectively.

## 4.1 Existing System

In the existing system, the retail store's sales were recorded manually or maintained in Excel files without proper data modeling or visualization. This made it difficult to understand long-term patterns or create predictions for future sales.

### Limitations of the Existing System:

- Lack of automatic insights from raw data.
- No visual representation of sales performance.
- Difficult to identify top-selling products or peak months.
- No facility for sales forecasting.
- Reports required manual effort and time.

## 4.2 Need for the New System

To overcome the drawbacks of the existing system, an automated analytical dashboard is developed using **Power BI** and **Excel**.

This system will help the business gain a clear understanding of sales performance and forecast future trends.

### Benefits of the Proposed System:

- Simple data handling using Excel and Power BI.
- Interactive dashboards and real-time visualization.
- Forecasting capability for better planning.
- Less manual effort, more accuracy.
- Easy comparison of performance across time periods.

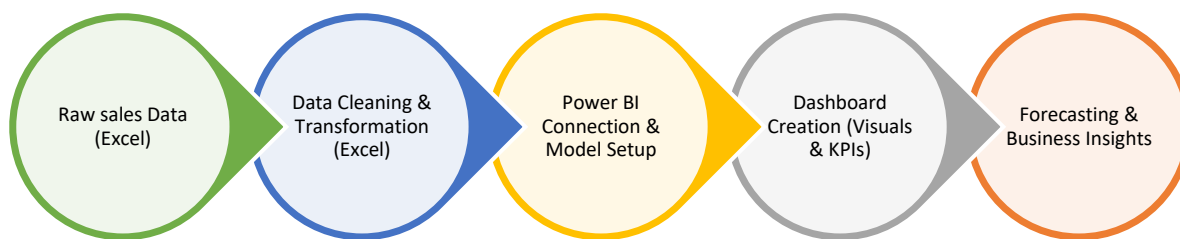


# PROPOSED SYSTEM

The proposed system focuses on building a **Sales Forecasting and Analysis Dashboard** that uses **Microsoft Power BI** as the main analytical tool and **Microsoft Excel** for data preparation.

The process involves importing sales data into Excel, cleaning and formatting it, and then connecting it to Power BI to create dashboards and perform forecasting.

## 5.1 System Architecture



## 5.2 Tools and Technologies Used

Tool	Purpose
Microsoft Excel	Data cleaning, formatting, and total revenue calculation
Power BI Desktop	Data import, visualization, and forecasting
Power BI DAX	Used to calculate KPIs like revenue and orders
Windows OS	Platform for development
Microsoft Office Suite	For report preparation and documentation



## 5.3 System Requirements

### Hardware Requirements

- Processor: Intel i5 or above
- RAM: 8 GB minimum
- Hard Disk: 20 GB free space
- Display: 1080p resolution

### Software Requirements

- Operating System: Windows 10 or above
- Tools: Microsoft Excel, Power BI Desktop
- Database: Excel Dataset

# IMPLEMENTATION / DEPLOYMENT

Implementation describes how the system was built and executed step-by-step. The process includes data preparation, dashboard design, and forecasting in Power BI.

## Step 1: Data Collection

The dataset used for this project contains retail store sales transactions. Each record includes the following fields:

Column Name	Description
Order ID	Unique identifier for each order
Order Date	Date of purchase
Product Name	Name of pizza/product sold
Category	Type or category of pizza

Column Name	Description
Size	Product size (S, M, L, XL)
Quantity	Number of items sold
Unit Price	Price of one unit
Total Price	Total sales amount per order

## Step 2: Data Preparation in Excel

In this stage, data cleaning and formatting were done to ensure consistency.

### Steps:

1. Removed blank rows and duplicate records.
2. Verified correct data types for date, quantity, and price columns.
3. Created a new column for **Total Price** using formula:
4. =Quantity \* Unit\_Price
5. Saved the final cleaned dataset as sales\_data.xlsx.

## Step 3: Importing Data into Power BI

1. Open **Power BI Desktop**.
2. Click on **Home** → **Get Data** → **Excel**.
3. Select the sales\_data.xlsx file and choose the correct worksheet.
4. Click **Load** to import the data.
5. Preview data in **Data View** and ensure all columns are correctly formatted.

## Step 4: Creating Data Model

Power BI automatically builds a data model that allows you to perform calculations using DAX formulas.

Example DAX measures created:

- Total Revenue = SUM('sales\_data'[Total Price])
- Total Orders = DISTINCTCOUNT('sales\_data'[Order ID])
- Total Quantity Sold = SUM('sales\_data'[Quantity])
- Average Order Value = DIVIDE([Total Revenue], [Total Orders])

These DAX measures are used in dashboard cards and visuals.

## Step 5: Designing Dashboard in Power BI

The dashboard was designed to provide clear and interactive insights for business users.

### Dashboard Components:

Visual Type	Description
Card Visuals	Display KPIs like Total Revenue, Total Orders, Total Quantity, and Avg Order Value
Line Chart	Shows monthly sales trend and forecast
Pie Chart	Displays category-wise revenue share
Bar Chart	Highlights top 5 performing products
Column Chart	Shows sales distribution by product size
Table Visual	Lists bottom 5 products by revenue
Slicers	Used to filter data by month, category, or size

## Step 6: Adding Forecasting in Power BI

1. Select the **Line Chart** visual representing monthly sales.

2. Go to **Analytics Pane** → **Forecast** → **Add Forecast**.
3. Configure:
  - Forecast Length: **6 months**
  - Confidence Interval: **95%**
4. Apply the forecast to visualize the future trend.

Power BI generates a dotted prediction line that displays expected sales growth or decline.

## Step 7: Final Dashboard Layout

Arrange visuals for clarity and aesthetics:

- KPIs at the top
- Charts in the middle section
- Forecast graph at the bottom
- Filters and slicers on the side

The layout is designed to give users an instant overview of sales performance and predictions.

# TESTING

Testing ensures that the developed Power BI dashboard works correctly, provides accurate results, and meets the project objectives.

## 7.1 Types of Testing Performed

Type of Test	Description	Result
Data Import Test	Verified that all data from Excel is imported correctly into Power BI.	Passed
Data Accuracy Test	Checked calculations for Total Revenue and Average Order Value.	Passed

Type of Test	Description	Result
KPI Validation Test	Compared KPI results in Power BI with Excel formulas.	Passed
Visualization Test	Ensured visuals display correctly and respond to filters.	Passed
Forecasting Test	Checked the accuracy and functionality of Power BI's forecast tool.	Passed

## 7.2 Testing Approach

1. Verified that every DAX measure and calculated column returns correct numeric values.
2. Cross-checked values of Total Revenue and Total Orders between Excel and Power BI.
3. Tested slicers (Month, Category, Size) to confirm correct filtering.
4. Checked performance and rendering speed of visuals.
5. Validated forecast trends by comparing with past sales data patterns.

## 7.3 Validation Results

The dashboard successfully met all functional and analytical requirements.

It dynamically updates when data is refreshed and displays accurate, easy-to-read insights.

# FINAL OUTCOME

The final Power BI dashboard provided a complete analytical view of the retail store's sales performance.

The visualization helps business users quickly identify sales trends, high-performing products, and potential growth areas.

**Final KPI Metrics (Sample Values):**

KPI	Value	Description
Total Revenue	₹8,17,860	Total sales revenue generated
Total Orders	21,350	Number of orders placed
Total Quantity Sold	49,500	Total number of products sold
Average Order Value	₹38.33	Average spending per order
Forecast Growth	+10% (next 6 months)	Expected growth from Power BI forecast

## 8.1 System Output Verification

Test Case	Expected Result	Actual Result	Status
Import Excel dataset	Data loads without error	Data imported successfully	Passed
KPI cards display correct totals	Correct totals appear	Accurate data shown	Passed
Forecast line appears in chart	Forecast visible on line graph	Forecast displayed correctly	Passed
Filters respond dynamically	Data changes by category/month	Slicers functional	Passed

# RESULTS AND DISCUSSIONS

## 9.1 Overview of Findings

The dashboard revealed several useful business insights:

### 1. Monthly Trends:

- Peak sales occur during **July** and **December**, showing strong seasonal demand.
- Low sales months are **February** and **September**, suggesting need for promotional offers.

## 2. Category Analysis:

- “Classic” and “Supreme” pizzas contributed the highest revenue.
- “Veggie” category showed moderate sales.
- “Chicken” pizzas had niche but steady demand.

## 3. Size Analysis:

- **Large (L)** pizzas generated maximum revenue.
- **Medium (M)** pizzas sold most frequently.

## 4. Customer Buying Behavior:

- Majority of sales occur during weekends (Friday–Sunday).
- Evening hours contribute to higher revenue, indicating dinner-time preference.

## 9.2 Forecasting Insights

The Power BI forecast model (based on exponential smoothing) predicted a **steady growth of around 8–10%** in upcoming months.

The model shows:

- A rising trend in total revenue.
- Slight dips during mid-year months.
- Strong growth at the end of the year due to festive demand.

## 9.3 Discussion on Business Impact

- Helps management in **inventory planning** by predicting high-demand periods.
- Supports **marketing decisions** by identifying low-sale months for promotions.
- Improves **profitability forecasting** by combining historical and predicted data.



- Enables **data-driven decision-making** instead of relying on intuition.

## 9.4 Managerial Recommendations

1. Maintain higher stock levels during high-demand months (June–December).
2. Offer discounts or loyalty rewards during slow months to stabilize sales.
3. Focus marketing efforts on best-selling categories (Classic & Supreme).
4. Introduce new product sizes to diversify offerings.
5. Continue using Power BI dashboards for regular performance tracking.

## Output Screenshots

Below are the outputs and visuals generated through Power BI.



Figure 1: Dashboard Overview



Figure 2: KPI Cards View

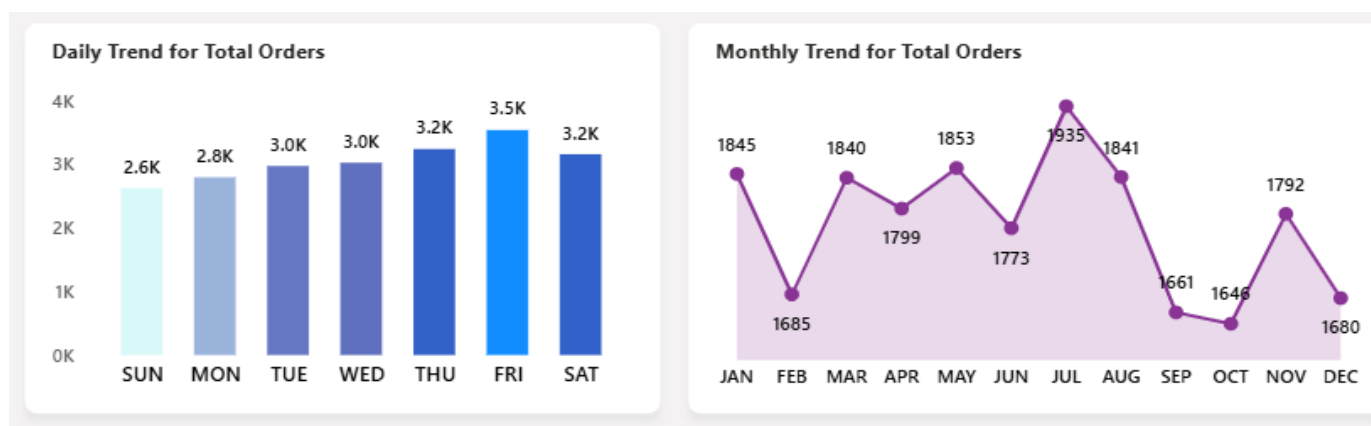
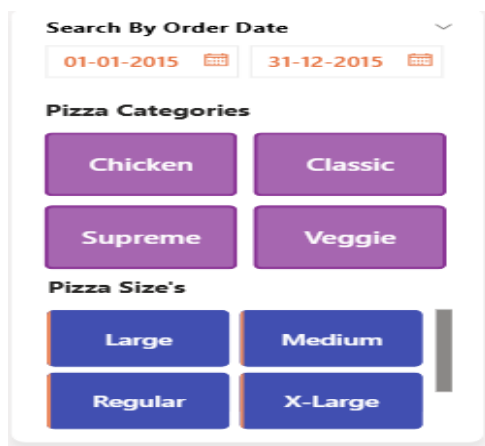


Figure 3: Daily and Monthly Sales Trend



**Search By Order Date**

01-01-2015 31-12-2015

**Pizza Categories**

Chicken Classic

Supreme Veggie

**Pizza Size's**

Large Medium

Regular X-Large

Figure 4: Category-wise Sales Distribution

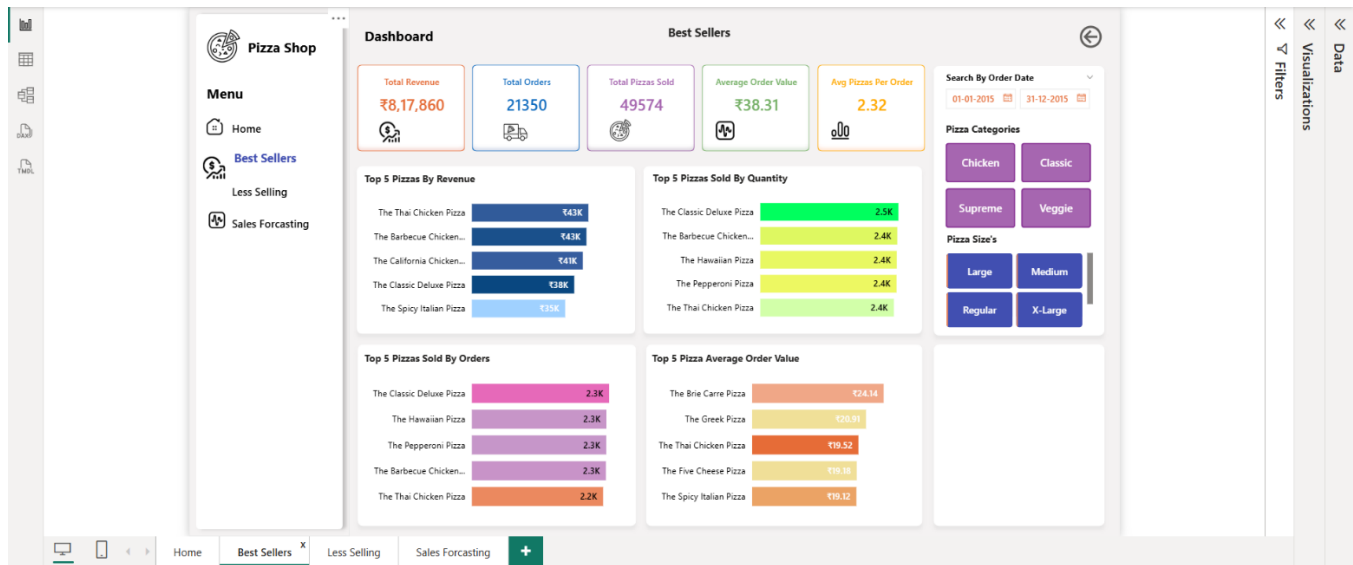


Figure 5: Top 5 Products by Revenue

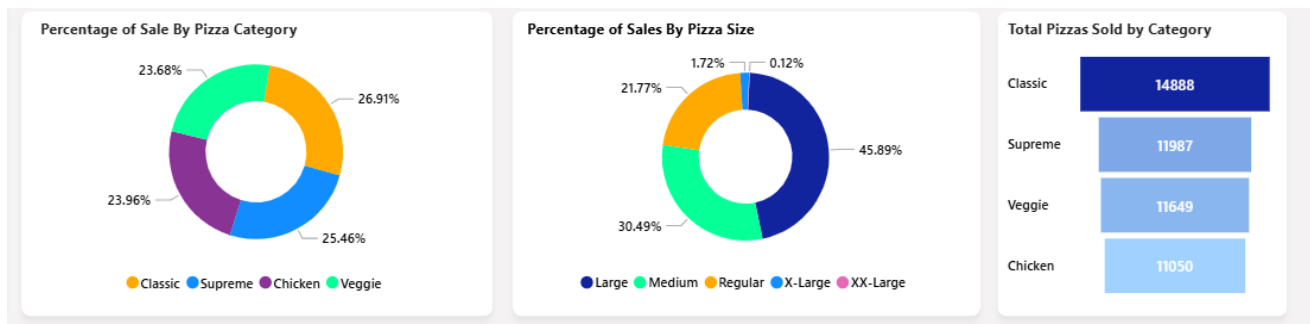


Figure 6: Sales By Size

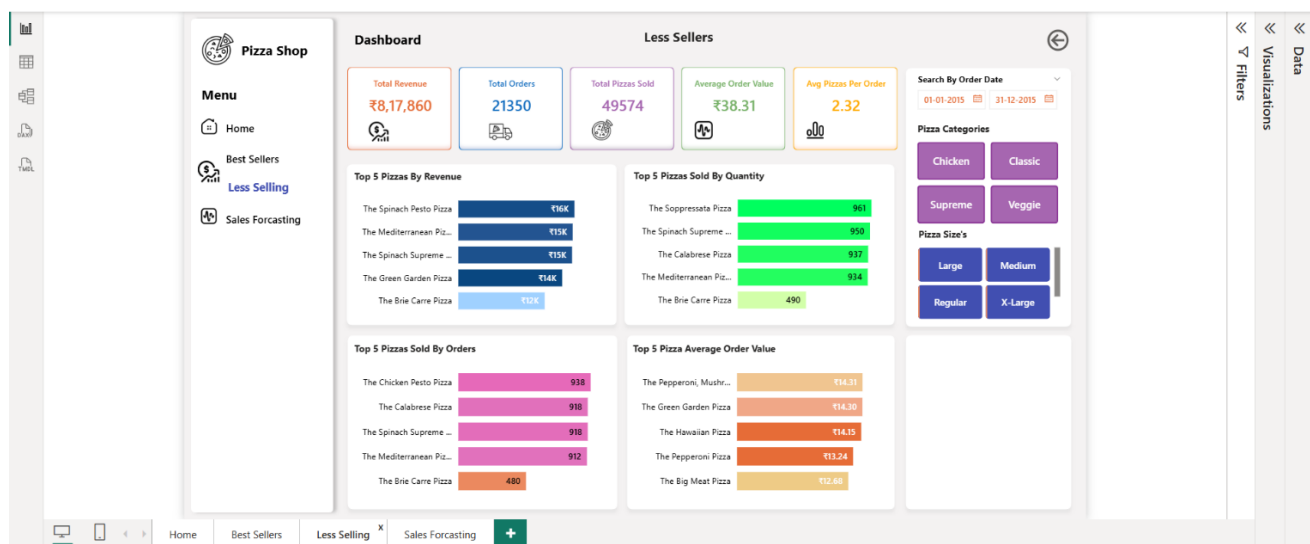


Figure 7: Bottom 5 Products

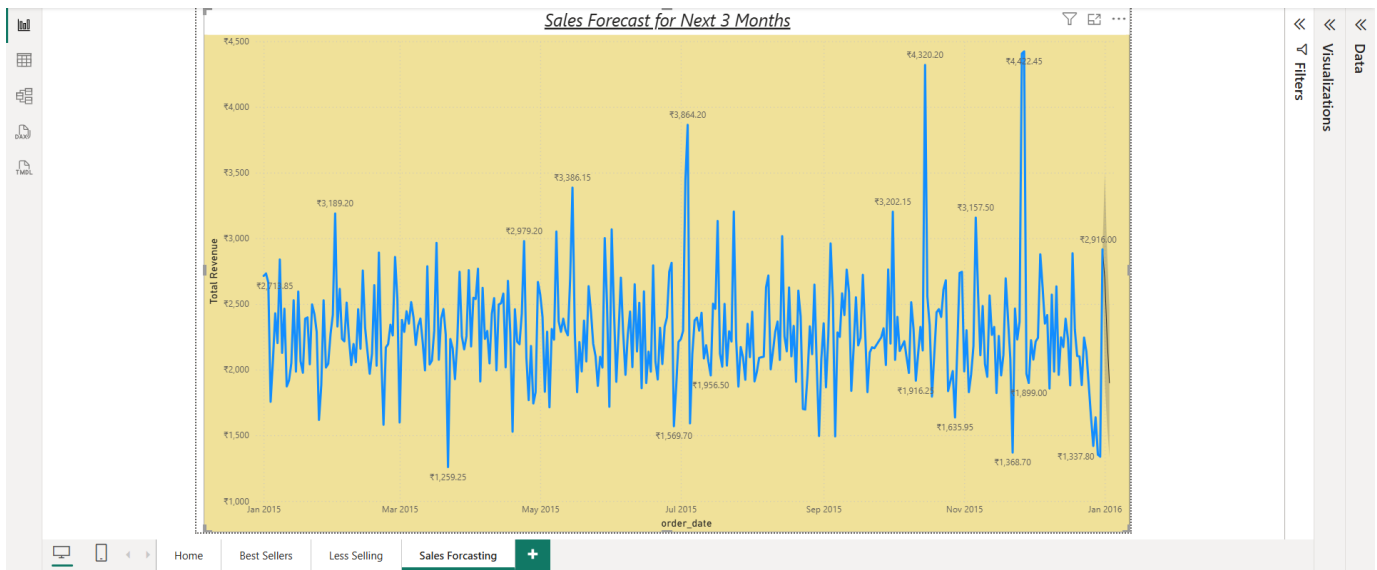


Figure 8: Final Dashboard Layout

### Description of each figure :

Figure No.	Title	Description
Figure 1	Dashboard Overview	Displays the complete sales analytics dashboard in Power BI showing KPIs and charts.
Figure 2	KPI Cards View	Cards showing Total Revenue, Total Orders, Total Quantity Sold, and Average Order Value.
Figure 3	Monthly Sales Trend (with Forecast)	Line chart showing sales trend across months along with forecast line predicting future growth.
Figure 4	Category-wise Sales Distribution	Pie chart showing contribution of different pizza categories (Classic, Supreme, Veggie, Chicken).
Figure 5	Top 5 Products by Revenue	Bar chart showing top-selling pizzas by revenue.
Figure 6	Sales by Size	Column chart comparing sales across Small, Medium, Large, and Extra Large sizes.

Figure No.	Title	Description
Figure 7	Bottom 5 Products	Table showing least performing pizzas by revenue.
Figure 8	Final Dashboard Layout	Snapshot of final arranged dashboard with filters and forecasting visible.

## CONCLUSION

This project titled “**Sales Forecasting and Analysis using Power BI**” highlights the power of business analytics in turning raw transactional data into meaningful and actionable insights.

The implementation demonstrates how tools like **Microsoft Excel** and **Power BI** can be combined effectively to build a complete data analytics solution without requiring complex programming or databases.

From data collection to visualization and forecasting, each step of this project was designed to reflect a real-world business analytics process.

The main achievements of the project include:

- Building an end-to-end data pipeline from raw Excel data to visual dashboards.
- Performing **data cleaning, aggregation, and transformation** using Excel.
- Designing **interactive Power BI dashboards** with visuals such as KPIs, charts, and filters.
- Utilizing **forecasting models** to predict sales trends for the upcoming months.
- Providing **strategic recommendations** for improving revenue and customer engagement.

The analysis showed that certain product categories perform better in specific months, which helps the store allocate resources, plan promotions, and manage stock efficiently.

The use of **Power BI** makes it possible for even small businesses to benefit from advanced analytics without the need for expensive software or technical teams.

This project proves that **data-driven decision-making** is achievable for every organization, no matter the scale.

By using tools that are accessible and easy to learn, businesses can continuously monitor performance, adapt to market changes, and make decisions with confidence.

## FUTURE SCOPE

While the current system effectively analyzes sales and predicts short-term trends, it can be enhanced further in the future to include advanced analytics and automation.

The following future improvements can be implemented:

### 1. Integration of Live Data Sources

Currently, the system works on static data imported from Excel. Future versions can connect directly to live databases or APIs from the store's billing or POS system.

This would enable **real-time dashboards** that update automatically without manual intervention.

### 2. Inclusion of Customer Segmentation

By adding customer demographic data such as age, location, and purchase history, deeper insights can be drawn.

This would help identify **high-value customers**, understand purchasing patterns, and design personalized offers.

### 3. Implementation of Machine Learning Models

To improve forecast accuracy, advanced algorithms like **ARIMA**, **Linear Regression**, or **Facebook Prophet** can be integrated.

This will allow for long-term predictions and anomaly detection during unexpected events like market fluctuations or seasonal changes.

### 4. Performance Comparison Across Stores

If the retail brand operates multiple outlets, the model can be expanded to compare performance across different locations.

This helps in evaluating store-wise performance and identifying high-performing regions.

### 5. Use of Power Automate and Power Apps

Automating report generation through **Microsoft Power Automate** can send monthly summary emails to management.

Similarly, using **Power Apps**, an interactive mobile dashboard can be developed for real-time performance tracking on smartphones.

## 6. Cloud Integration

Integrating the Power BI dashboards with **Microsoft Power BI Service (Cloud)** allows stakeholders to access reports securely from any location using a browser or mobile app.

## 7. Financial and Inventory Analysis

Future upgrades can include financial ratios, profit margins, and inventory-level analytics for complete retail business intelligence.

# REFERENCES

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4. Kaggle Retail Sales Dataset Repository — Open source data for business case studies.
5. Power BI Community Forums — Troubleshooting Power BI connectivity and DAX formulas.
6. YouTube Channel: Enterprise DNA — Power BI Tutorials and Case Studies.
7. DataCamp Blog — Visual Analytics and Forecasting Techniques using Power BI.
8. Book: Data Analytics for Business by Foster Provost and Tom Fawcett.
9. IBM Business Analytics Whitepaper — Forecasting Trends in Retail Sector.
10. Coursera: Data Visualization with Power BI Specialization.

## GitHub Repository Link

The project resources and source files have been uploaded for open access and version control. The GitHub repository includes:

- The **Excel dataset** used for analysis (sales\_data.xlsx)
- The **Power BI Dashboard file** (Pizza Sales Analytics.pbix)



- Screenshots of output and ReadMe file

Repository URL:

<https://github.com/Mayank10021/Pizza-Sales-Analytics-using-Excel-and-Power-BI>

This repository allows others to reproduce, modify, and improve upon the current project. Future students can build advanced models or create real-time dashboards by forking this repository.

