Final Project Report Template

1. **Introduction**

1.1 Project overviews

Objective: *Enhance market competitiveness and customer satisfaction for a toy manufacturer by gaining deeper insights into consumer preferences and behavior.*

Key Components:
Data Collection & Processing: Gathering & cleaning cosmetics-related data.
Data Analysis & Visualization: EDA using Python; dashboards in Tableau.
Website Development: A Flask-based single-page website displaying insights.
Final Implementation: Hosting Tableau dashboards for interactive exploration.
Outcome: A data-driven dashboard & web platform offering actionable insights into the cosmetics market.

1.1. Objectives

Identify Consumer Preferences: Analyze sales data to determine which toy categories, materials, and price points are most popular among different customer segments.

Optimize Pricing Strategy: Evaluate the impact of discounts and pricing structures on sales and profitability to maximize revenue while maintaining customer satisfaction.

Enhance Market Competitiveness: Compare sales performance across different regions and manufacturing locations to identify growth opportunities and optimize market strategies.

Improve Production Efficiency: Assess defective unit rates and manufacturing costs to minimize waste, reduce expenses, and improve product quality.

Monitor Seasonal Sales Trends: Analyze sales by quarter and year to identify peak seasons and adjust inventory and marketing strategies accordingly.

Strengthen Regional Marketing Strategies: Use sales data to understand regional demand variations, allowing for targeted marketing campaigns and region-specific product adjustments

2. Project Initialization and Planning Phase

2.1. Define Problem Statement

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	A Toy manufacturer	Gain deeper understanding of consumer preferences	Struggling to analyse and make	Data is scattered across various	Frustation , uncertain and worried

			sense of vast amount of data	sources and lack data visualization tools	
PS-2	**A Toy manufacturer**	**Create products that resonate with our target audience and drive sales growth**	**Struggling to translate market research and customer feedback into actionable insights**	**Lack of a unified data platform and effective analytics capabilities**	**Frustated , uncertain and worried**

2.2. Project Proposal (Proposed Solution)

Project Proposal:

Project Overview	
Objective	**Enhance market competitiveness and customer satisfaction for a toy manufacturer by gaining deeper insights into consumer preferences and behavior.**
Scope	**Develop a comprehensive data analytics and visualization solution using Tableau to integrate disparate data sources, uncover hidden patterns, and drive innovation in product development and marketing strategies.**
Problem Statement	
Description	**The toy manufacturer is struggling to analyze and make sense of vast amounts of data from various sources, including sales trends, customer demographics, and market research.**
Impact	**Solving this problem will enable the toy manufacturer to make data-driven decisions, drive business growth, and improve customer satisfaction.**
Proposed Solution	
Approach	**Approach: Develop a data analytics and visualization solution using Tableau to integrate disparate data sources, apply data visualization**

	techniques, and uncover hidden patterns and trends.	
Key Features	- Data integration and warehousing - Data visualization and dashboard creation - Predictive analytics and modeling - Real-time data monitoring and alerts	

Resource Requirements

Resource Type	Description	Specification/Allocation
Hardware		
Computing Resources	2 x NVIDIA V100 GPUs	2 GPUs for data processing and visualization
Memory	16 GB RAM	16 GB RAM for data storage and processing
Storage	2 TB SSD	2 TB SSD for data storage and retrieval
Software		
Frameworks	Tableau, Python	Tableau for data visualization, Python for data processing and modeling
Libraries	Scikit-learn, pandas, Numpy	Scikit learn for machine learning, pandas for data manipulation, numpy for numerical computing
Development Environment	Jupyter Notebook, Git	Jupyter Notebook for data exploration and visualization, Git for version control
Data		
Data	Sales data, customer demographics	Sales data for trend analysis, customer demographics for segmentation, market research reports for industry insights

2.3 Initial Project Planning

Phase	Planned Duration	Completion Date
Data Collection	3 Days	☑ Completed
Data Cleaning & EDA	4 Days	☑ Completed
Dashboard Development	5 Days	☑ Completed
Web Integration	5 Days	☑ Completed
Testing & Deployment	3 Days	☑ Completed

3. Data Collection and Preprocessing Phase

3.1. Data Collection Plan and Raw Data Sources Identified

Data Exploration and Preprocessing Template

Section	Description
Data Overview	The dataset consists of sales data, customer demographics, and market research reports from various sources, including CSV files, Excel spreadsheets, and JSON files.
Data Cleaning	-Impute missing values using mean, median, or mode. - Remove duplicate records based on unique identifiers. - Correct data entry errors and inconsistencies.
Data Transformation	Filtering: Filter out irrelevant data, such as cancelled orders or test data. - Sorting: Sort data by date, customer ID, or product category. - Pivoting: Pivot data to create summary tables for analysis. - Calculated fields: Create calculated fields for metrics such as total sales, average order value, and customer lifetime value.
Data Type Conversion	Convert date fields to date time format. - Convert numeric fields to integer or float format. - Convert categorical fields to string format.
Column Splitting and Merging	-Split customer name column into first name and last name columns. - Merge address columns into a single address column.

Data Modeling	- Define relationships between sales, customer, and product tables. - Create a star schema for data warehousing.
Save Processed Data	- Save cleaned and processed data to a CSV file or database. - Document data processing steps and transformations for future reference.

3.2. Data Quality Report

Data Source	Data Quality Issue	Severity	Resolution Plan
Sales Data (CSV)	Missing values in date column	Moderate	Impute missing values using mean/median date from existing data
Market Research Reports (JS)	Inconsistent data formatting data formatting	Moderate	Resolution Plan: Standardize data formatting using Python's pandas library

3.3. Data Exploration and Preprocessing

Data Exploration

Checked Data Structure – Reviewed column names, data types, and values.
Statistical Summary – Analyzed price distribution, average ratings, and brand frequency.
Missing Values – Identified and handled null or incomplete data.
Outliers Detection – Verified unusual price variations or extreme ratings

Data processing

Preprocessing Step	Action Taken
Handled Missing Data	Filled missing values where possible; removed rows with excessive missing data.
Data Type Conversion	Converted pricing, sales, and discount columns to numerical format.
Category Standardization	Unified toy categories, materials, and sales regions for consistency.
Duplicate Removal	Eliminated repeated records to ensure accurate sales analysis.
Outlier Detection	Identified and handled extreme sales or pricing variations.
Created Derived Columns	Added new metrics like Profit Margin, Sales Growth Rate, and Regional Demand Score.

4. Data Visualization

4.1. Framing Business Questions

1.Which product category contributes the most to total revenue, and how can we optimize sales across lower-performing categories?

2.How does the discount offered impact net sales across different product categories?

3.Which toy contributes the most to total revenue, and how can we boost sales for lower-performing toys?

4.Which toy category sells the most units across regions, and how can we improve sales in lower-performing regions?

5.How does pricing impact the sales volume of different toy categories?

6. How does total revenue vary across different sales quarters?

7.How have sales trends changed over time for different product categories?

8.How does the number of units produced compare to the number of units sold for each toy category?

9.What is the relationship between the number of defective units and the total units sold for different toy categories?

4.2. Developing Visualizations

Steps for Visualization Development

1. **Data Preparation:**
   - ○ **Cleaned and imported the dataset into Tableau.**
   - ○ **Connected Tableau to the data source for real-time updates.**
2. **Chart Selection:**
   - ○ **Selected chart types that best represent the data, such as bar charts, pie charts, and scatter plots.**
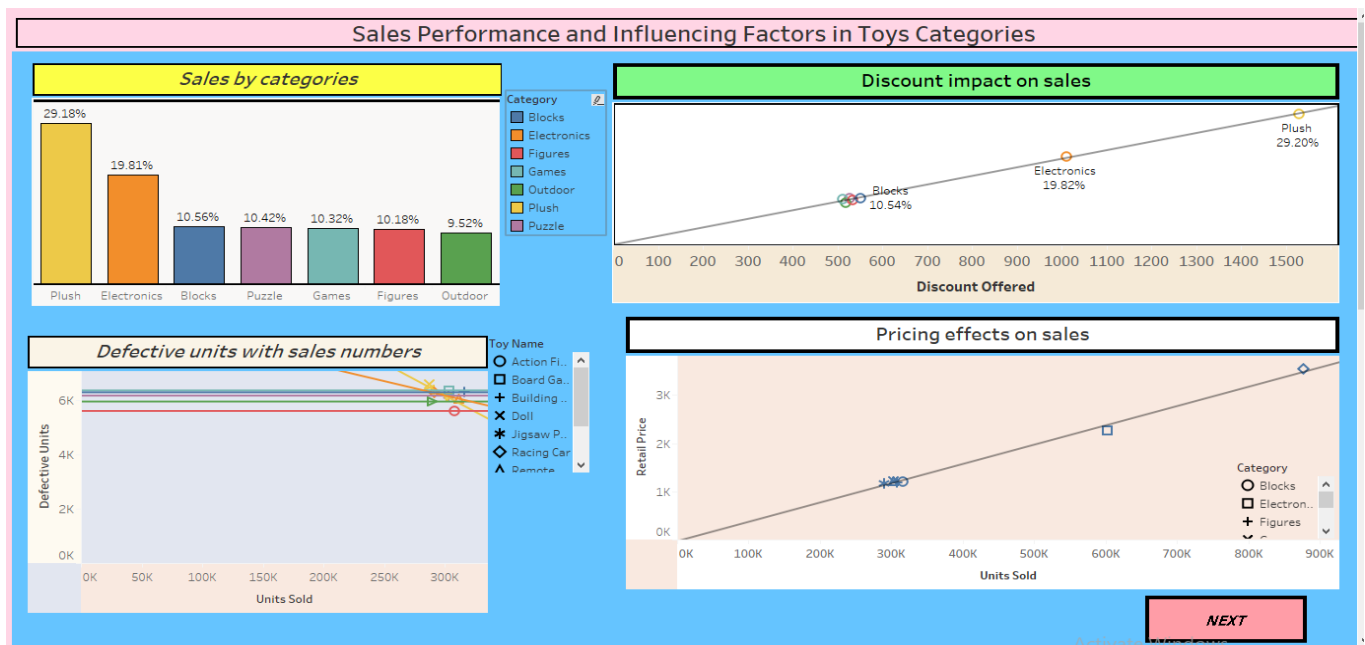3. **Interactive Features:**
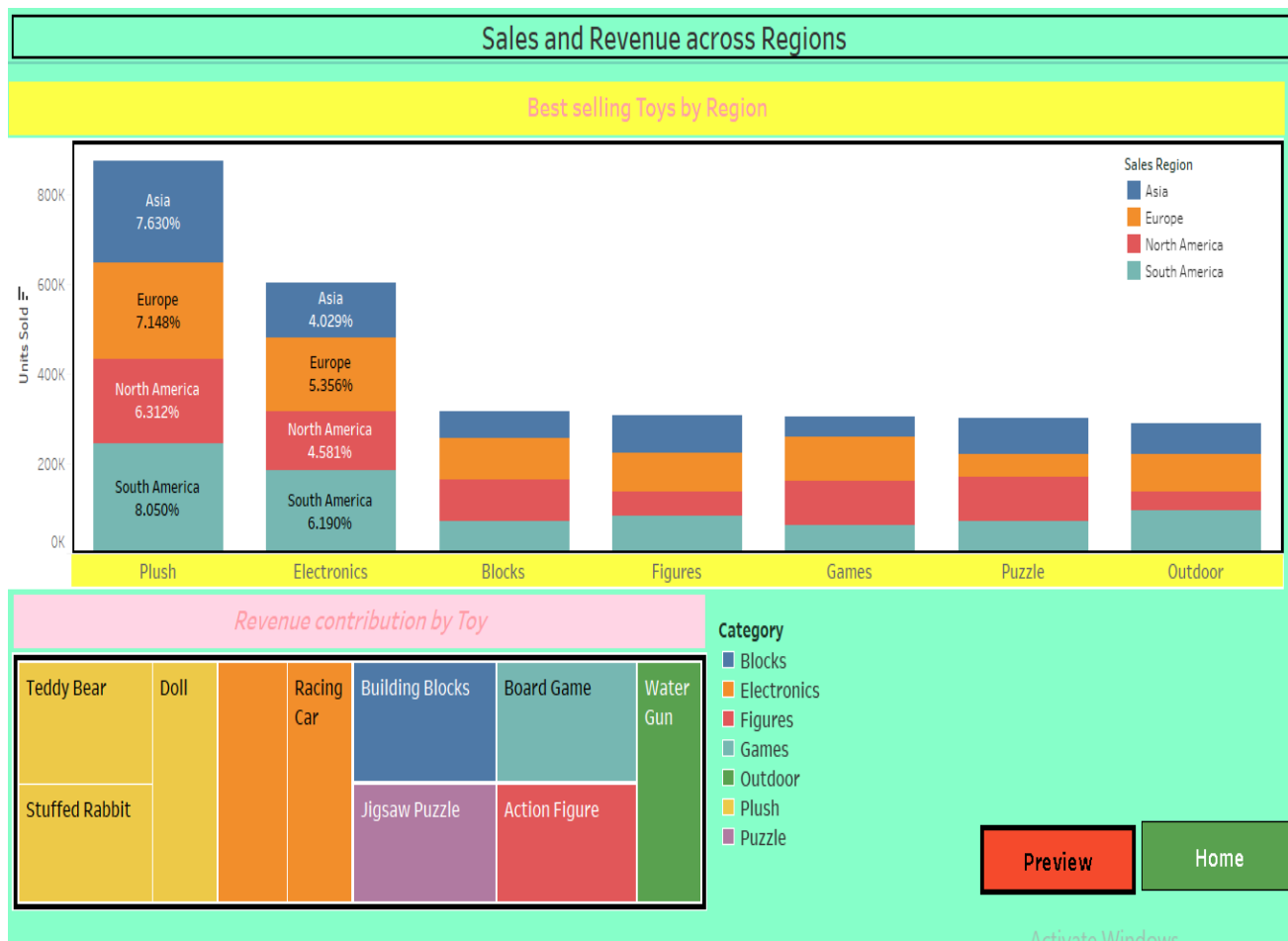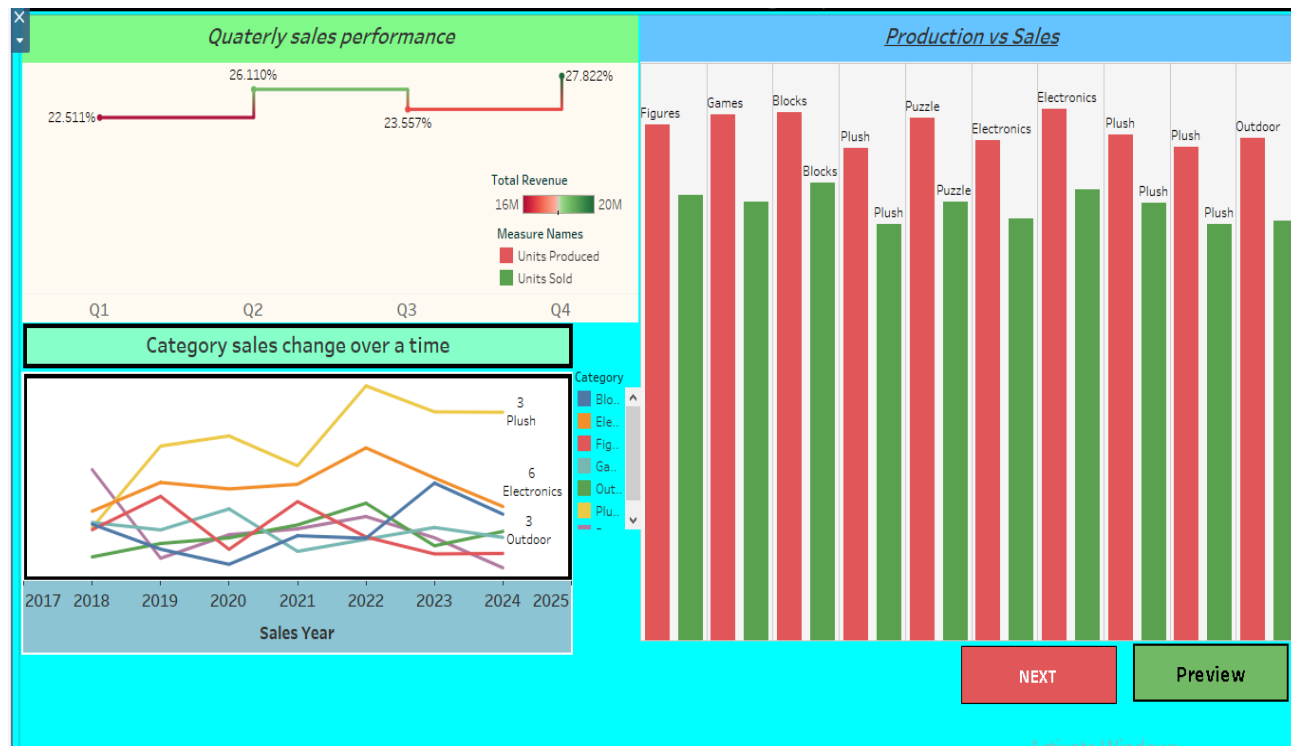   - ○ **Added filters and tooltips for enhanced user interactivity.**
4. **Dashboard Integration:**
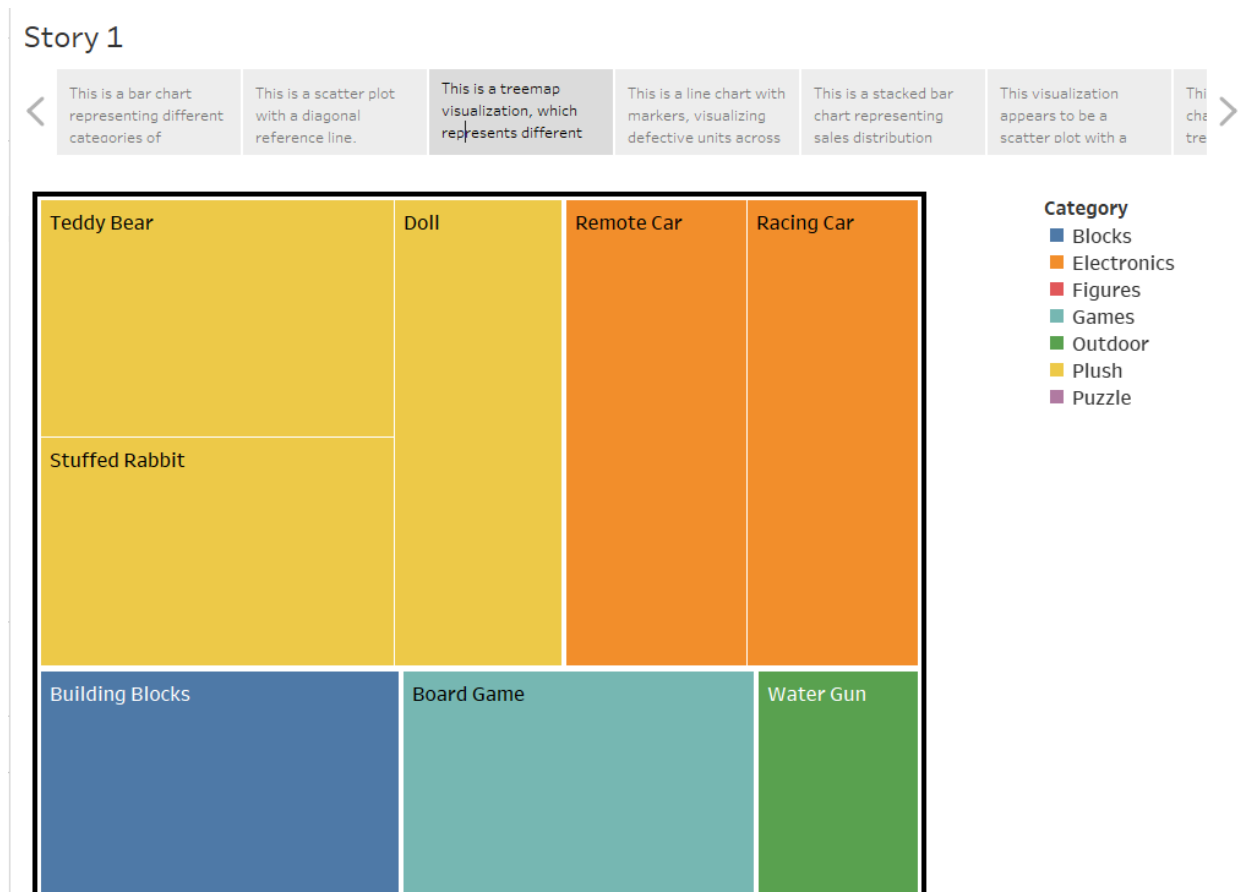   - ○ **Combined charts into a cohesive dashboard for better storytelling and analysis**

5. Dashboard

5.1. Dashboard Design File

Quaterly sales performance

26.110%

22.511%

23.557%

27.822%

Total Revenue
16M �... 20M

Measure Names
- Units Produced
- Units Sold

Q1   Q2   Q3   Q4

Category sales change over a time

Category
- Blo...
- Ele...
- Fig...
- Ga...
- Out...
- Plu...

3 Plush

6 Electronics

3 Outdoor

2017 2018 2019 2020 2021 2022 2023 2024 2025

Sales Year

Production vs Sales

Figures | Games | Blocks | Plush | Puzzle | Electronics | Electronics | Plush | Plush | Outdoor

Blocks | Puzzle | Plush | Puzzle | Plush | Plush

NEXT   Preview

Activate Windows

Sales and Revenue across Regions

Best selling Toys by Region

Sales Region
- Asia
- Europe
- North America
- South America

800K

600K

Units Sold

400K

200K

0K

Asia 7.630%						
Europe 7.148%	Asia 4.029%					
North America 6.312%	Europe 5.356%					
South America 8.050%	North America 4.581%					
	South America 6.190%					

Plush | Electronics | Blocks | Figures | Games | Puzzle | Outdoor

Revenue contribution by Toy

Category
- Blocks
- Electronics
- Figures
- Games
- Outdoor
- Plush
- Puzzle

| Teddy Bear | Doll | | Racing Car | Building Blocks | Board Game | Water Gun |
| Stuffed Rabbit | | | | Jigsaw Puzzle | Action Figure | |

Preview   Home

Activate Windows

6. Report

6.1. Story Design File

Story 1

| This is a bar chart representing different categories of | This is a scatter plot with a diagonal reference line. | This is a treemap visualization, which represents different | This is a line chart with markers, visualizing defective units across | This is a stacked bar chart representing sales distribution | This visualization appears to be a scatter plot with a | This cha tre |

7. Performance Testing

7.1 Utilization of Data filters

Filters Used in the Dashboard:

Toy Category Filter – Enables users to select and compare different toy categories (e.g., plush, electronics, puzzles).

Price Range Filter – Allows filtering products within different price categories (low, medium, high).

Material Filter – Helps users find toys based on material type (plastic, wood, metal, etc.).

Manufacturing Location Filter – Filters data based on the country of manufacturing to analyze regional production trends.

Sales Region Filter – Allows filtering based on geographic sales data to assess market performance in different regions.

Sales Quarter & Year Filter – Filters data by time periods to track sales trends over quarters and years.

Discount Range Filter – Enables users to analyze how different discount levels affect sales and profitability.

7.2 No of Calculation Fields

Added Fields in the Dashboard:

Profit Margin Calculation – (Retail Price - Manufacturing Cost) / Retail Price

Defect Rate Calculation – (Defective Units / Units Produced) * 100

Sales Growth Rate – ((Current Sales - Previous Sales) / Previous Sales) * 100

Revenue per Unit Sold – Total Revenue / Units Sold

7.2 **No of Visualization**

-sales by categories

-Discount impact on sales

-Revenue contribution by Toy

-Defective units with sales numbers

-Best selling Toys by region

-Pricing effects on sales

-Category sales change over a time

-Quarterly sales performance

-Production vs Sales

8. Conclusion/Observation

Conclusion

The project "Toy Industry Insights: Understanding Market Trends and Consumer Preferences with Tableau" provides a comprehensive analysis of the toy manufacturing industry. It highlights key sales trends, customer preferences, and market performance using data visualizations.

Top-Selling Toy Categories – Identifies the most popular toy types (e.g., plush, electronics, puzzles) based on sales performance.

Region-wise Product Demand – Determines which toy categories are most preferred in different sales regions.

Sales Trends Over Time – Analyzes seasonal variations and overall sales patterns to optimize production and marketing strategies.

Customer Purchase Behavior – Highlights how pricing, discounts, and promotions impact consumer buying decisions.

Manufacturing Cost vs. Profitability – Examines the relationship between manufacturing costs, retail pricing, and overall profit margins.

Impact of Defective Units – Evaluates the effect of defective products on sales, returns, and customer satisfaction.

Market Competition Analysis – Compares sales and revenue across different regions and toy categories to assess competitive positioning.

Pricing Strategy Optimization – Studies how different pricing structures and discount strategies influence consumer demand and profitability.

The analysis reveals that consumer preferences vary across regions and seasons, with pricing and discounts playing a major role in purchasing decisions. To stay competitive, the toy manufacturer must adapt to changing trends, focus on product quality, optimize pricing strategies, and enhance customer engagement through targeted marketing. Additionally, reducing defective units and improving manufacturing efficiency will contribute to higher profitability and brand reputation.

1. Future Scope

Our project "Toy Industry Insights: Understanding Market Trends and Consumer Preferences with Tableau" provides valuable industry insights, but there are several ways to enhance and expand its impact in the future:

Advanced Predictive Analytics – Implement machine learning models to predict future toy trends, customer preferences, and sales forecasts.

Real-Time Data Integration – Connect dashboards to live data sources for real-time monitoring of toy industry trends.

Enhanced Consumer Insights – Incorporate sentiment analysis from customer reviews and social media to understand consumer perceptions better.

Geospatial Analysis – Use location-based analytics to study toy demand variations across different regions.

Personalized Recommendations – Develop AI-driven recommendation systems to suggest ideal toys for different age groups and preferences.

Sustainability and Ethical Analysis – Track the impact of eco-friendly and sustainable toy manufacturing on market demand.

Expansion of Data Sources – Integrate additional datasets from e-commerce platforms, market reports, and customer surveys for deeper analysis.

Interactive Web Application – Transform the project into a fully interactive website where users can explore insights dynamically.

By incorporating these enhancements, the project can evolve into a more powerful decision-making tool for toy manufacturers, retailers, and consumers in the industry.

2. Appendix

1. Source Code(if any)

   Source Code

   The project utilized **Flask, HTML, and CSS** to develop a web application that integrates **Tableau dashboards** for visualizing cosmetic industry insights.

   - **Flask (Python)** – Used to create the web framework for hosting the dashboard.
   - **HTML & CSS** – Designed the website layout and styling for an interactive user experience.
   - **Tableau Embed Code** – Integrated Tableau Public dashboards into the website for real-time insights.

   This source code enables seamless visualization and accessibility of analytics, making the project interactive and user-friendly.

2. GitHub & Project Demo Link

   GitHub Link:

   https://github.com/shareef123-sana/ToyCraft-Tales-Tableau-s-Vision-into-Toy-Manufacturer-Data

   Demo Link:

   https://drive.google.com/file/d/1eS13TMQiEdb6w5e3vT6spVEDrdgyPl6o/view?usp=drivesdk