



Digital Egypt Pioneers Initiative

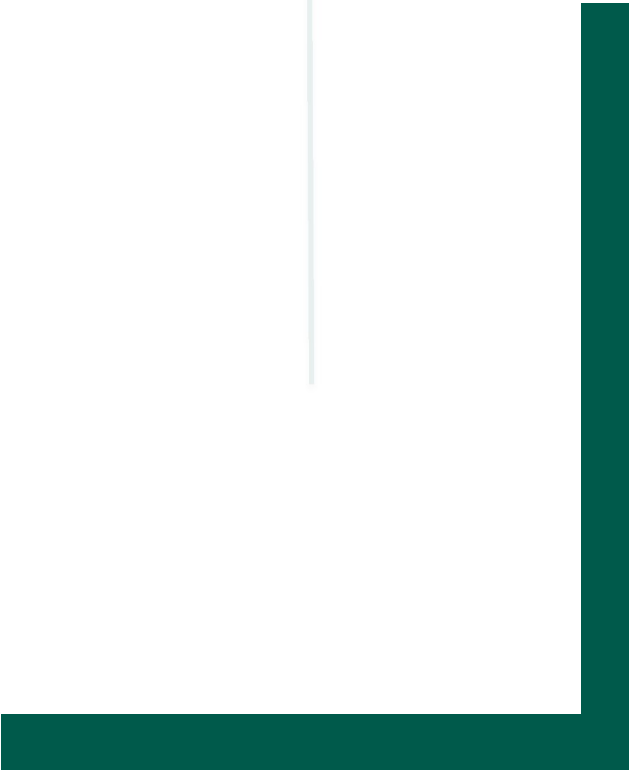
SUPPLY CHAIN PROJECT

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1. INTRODUCTION

This report highlights the skills and knowledge I gained from participating in the Power BI Engineer scholarship offered by the Digital Egypt Pioneers Initiative. The scholarship provided an in-depth, comprehensive overview of the entire data analysis and business intelligence workflow. It began with mastering data extraction techniques, where I learned how to pull data from various sources like CSV files, Excel files, and Microsoft access data base.

Next, the focus shifted to data transformation, where I honed my skills in cleaning, shaping, and organizing raw data using Power Query to ensure its readiness for analysis. Following that, I delved into data modeling, learning to establish relationships between datasets, build robust data models, and optimize the dataset structure for efficient querying.

Additionally, I learned how to create calculated columns and measures using DAX to derive meaningful insights from data. Finally, the scholarship emphasized the importance of data visualization, where I developed interactive dashboards and reports using Power BI's rich visualization tools to effectively communicate insights to stakeholders. Throughout the program, I gained hands-on experience in building end-to-end data solutions that support decision-making processes and drive business performance.

To demonstrate my acquired skills, I will walk through each step of this process using a case study based on "Mexico Toy Sales," which contains detailed data from a Mexico-based toy store spanning from 2022 to 2023. This case study will showcase how I applied the principles of data extraction, transformation, modeling, calculation, and visualization to a real-world scenario

2. MAVEN TOYS

2.1 PROBLEM DEFINITION

The project aims to address inefficiencies in the supply chain, particularly focusing on the relationship between cost structure and pricing efficiency across various product categories. There are challenges related to understanding which product categories contribute most to profitability, determining how pricing strategies align with procurement costs, and identifying potential inefficiencies such as out-of-stock products and excessive inventory holding. Additionally, there is a need to explore seasonal trends and price sensitivity across different products.

2.2 GOAL

The primary goal is to analyze cost structures and pricing efficiency to identify areas for cost optimization. This includes ensuring pricing strategies are aligned with procurement costs, enhancing decision-making in supply chain operations, improving profitability, and optimizing stock levels. The analysis will also aim to find opportunities for cost savings, enhance demand forecasting, and improve supplier negotiations.

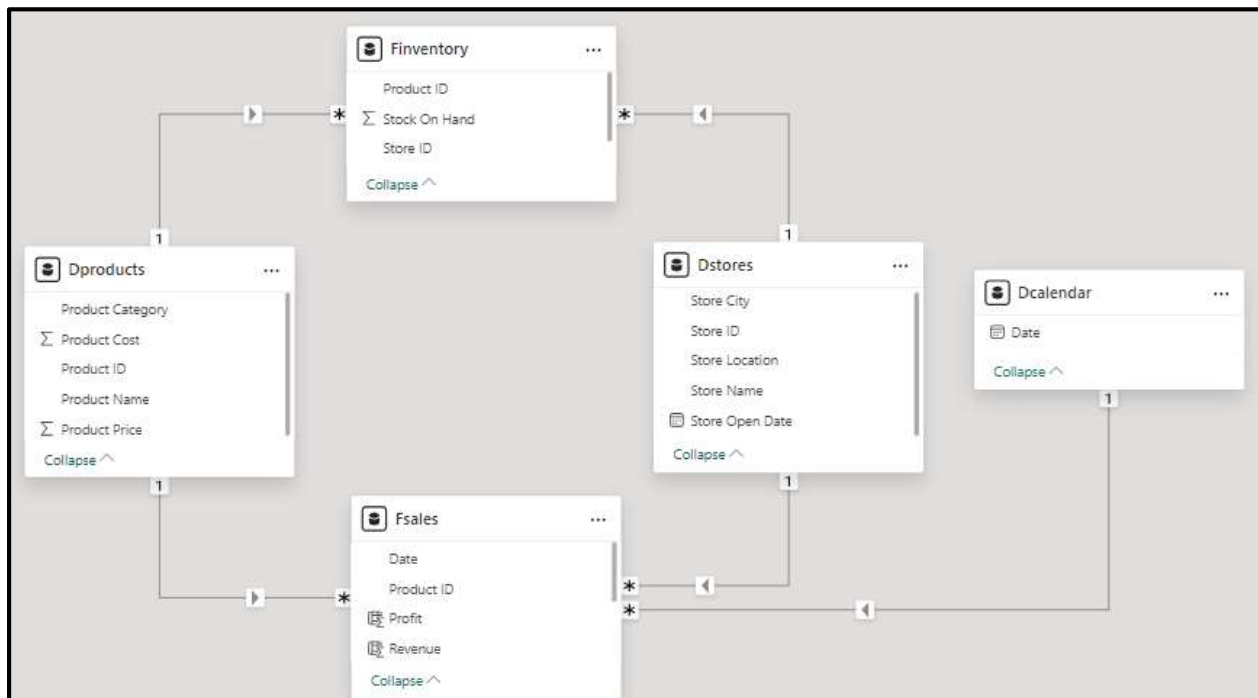
3. ANALYSIS PROCESS

3.1 DATA EXTRACTION & TRANSFORMATION

All the data tables were provided in CSV format. After importing the data into Power BI, I conducted a thorough review and applied necessary formatting and modifications to ensure data accuracy and consistency. This process involved tasks such as adjusting data types to match the correct formats, renaming columns for clarity, and trimming unnecessary text to clean up the data. Additionally, I removed non-essential columns, such as the "sale ID" column, to streamline the dataset and focus on relevant information for analysis.

3.2 DATA MODELING

The dataset consisted of two fact tables: the sales table and the inventory table, along with three dimension tables: the calendar table, the products table, and the stores table. The model schema is illustrated in the image below.



3.3 DEFININING THE KEY PERFORMANCE INDICATORS (KPIS)

The following KPIs were defined in order to assess progress toward strategic goals by providing a clear metric to track performance over time.

- ❖ **Monthly Sales per Branch:** Tracks the number of sales made at each branch per month to assess customer traffic and determine the frequency of stock replenishment needed.
- ❖ **Branch Profitability per Month:** Monitors the monthly profit generated by each branch to ensure it meets the minimum acceptable threshold, enabling timely corrective actions when necessary.
- ❖ **Sold Categories per Area:** Measures the number of product categories sold in each area, helping to identify local preferences and optimize stock management for each region.
- ❖ **Monthly Product Sales:** Evaluates the number of products sold each month to identify peak selling periods and aid in stock management during high-demand times.
- ❖ **Profit Percentage per Category:** Analyzes the contribution of each product category to the overall profit, providing insights into which categories drive the most value.
- ❖ **Profit Percentage per Product:** Assesses the share of total profit attributed to individual products to identify key revenue drivers.
- ❖ **Top 5 Best-Selling Products per Area:** Highlights the five best-selling products in each area to focus marketing and stocking strategies accordingly.
- ❖ **Bottom 5 Least-Selling Products per Area:** Identifies the five least-selling products in each area to consider actions such as offering discounts, bundling with top-selling products, or redistributing stock across areas.

3.4 CALCULATED COLUMNS

- **Tied-Up Captial Column:** The "tied-up capital" column in the inventory table helps assess how much financial resources are currently invested in the inventory. It allows businesses to understand the amount of capital that is not readily available for other uses because it is tied up in unsold products. This insight is crucial for optimizing inventory levels, improving cash flow, and identifying potential overstock situations, ultimately leading to more efficient supply chain and financial management. The column has been calculated using the below formula.

Tied-Up Captial = RELATED(Dproducts[Product Cost]) * Finventory[Stock On Hand]

- **Total Cost Captial Column:** This column reflects the combined costs of producing or procuring the goods, including raw materials, labor, and other overheads. It helps in identifying cost drivers and assessing operational efficiency.

Total Cost = RELATED(Dproducts[Product Cost]) * Fsales[Units]

- **Revenue Column:** This column shows the total income generated from selling products. It's a critical metric for tracking sales performance and understanding the overall earning potential of different product categories or store locations.

$$\text{Revenue} = \text{RELATED}(\text{Dproducts}[\text{Product Price}]) * \text{Fsales}[\text{Units}]$$

- **Profit Column:** The profit column represents the difference between revenue and total cost. It highlights which products or categories are the most profitable and where cost-saving opportunities might exist. Tracking profit is essential for making strategic decisions related to pricing, inventory management, and overall business growth.

$$\text{Profit} = \text{Fsales}[\text{Revenue}] - \text{Fsales}[\text{Total Cost}]$$

3.5 DASHBOARD ANALYSIS

MAVEN TOYS SALES

INFORMATION

1. Overall Financial Performance

<u>COGs</u> \$10.43M	<u>Revenue</u> \$14.4M
<u>Profit</u> \$4.01M	<u>No. of Orders</u> 829.262K

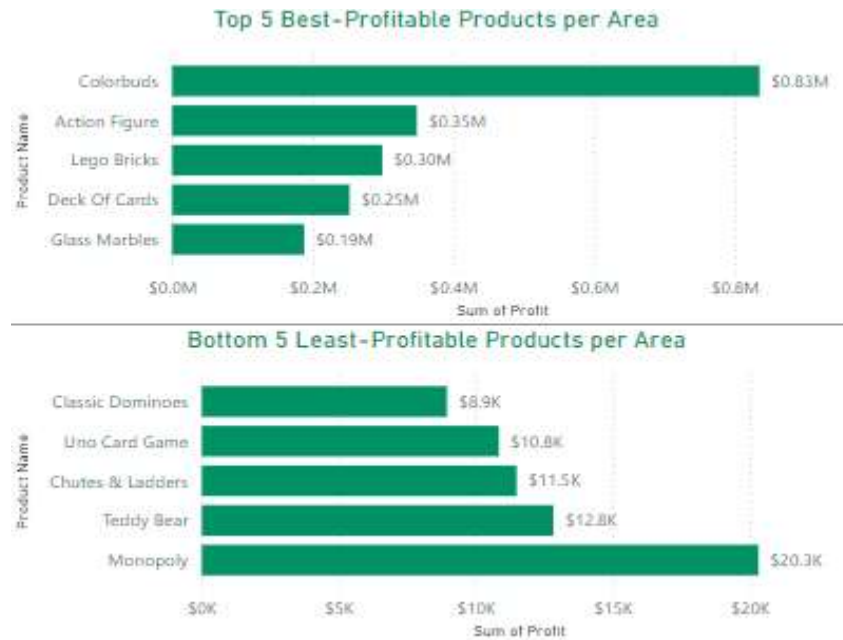
- Revenue: \$14.4M
- Cost of Goods Sold (COGS): \$10.43M
- Profit: \$4.01M
- The profit margin indicates healthy profitability with a significant portion of sales contributing positively.

2. Profit Trends (Monthly):



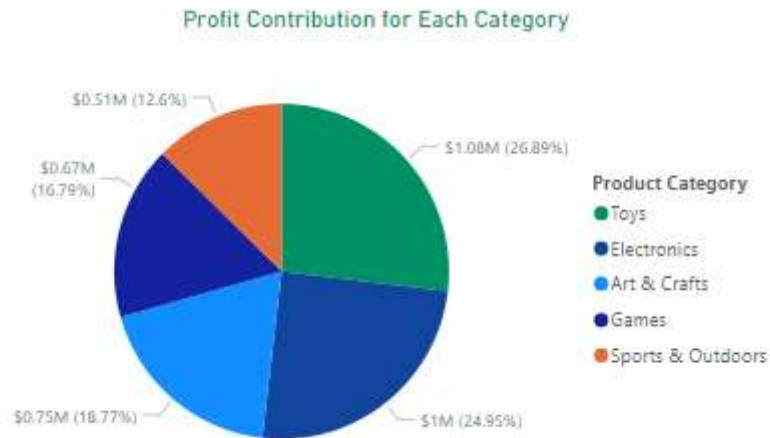
- Profits remain relatively stable across months, ranging from \$0.16M to \$0.25M.
- The highest profits are observed in Q1 and Q2 of 2023
- Achieved peak profit of \$0.25M in December 2022.

3. Product Profitability:



- Top 5 Best-Profitable Products:
 - Colorbuds (\$0.83M), Action Figure (\$0.35M), Lego Bricks (\$0.30M), Deck of Cards (\$0.25M), Glass Marbles (\$0.19M).
- Bottom 5 Least-Profitable Products:
 - Classic Dominoes, Uno Card Game, Chutes & Ladders, Teddy Bear, and Monopoly are the least profitable, with the highest of these bringing in only \$20.3K.

4. Category-Level Performance



- Top-Contributing Categories: Toys (\$1.08M, 26.89% of total profit), Electronics (\$1M, 24.95%), and Arts & Crafts (\$0.75M, 18.77%).
- Other Categories: Games and Sports & Outdoors contribute less but are still significant to the overall profit distribution.

5. Sales Data



- No. of Sales per Month: Sales remain consistent, peaking at 50K per month at certain points.
- Best-Selling Products: Colorbuds, PlayDoh Can, and Barrel O' Slime are the top-selling products by units sold.
- Lowest-selling products include: Uno Card Game with 8.1K units sold, Chutes & Ladders with 7.8K units, Classic Dominoes at 7.3K units, Teddy Bear with 7K units, and Monopoly with 6.5K units sold

QUESTIONS TO ANSWER

- Which product categories drive the biggest profits? Is this the same across store locations?
 - Toys and Electronics are the top profit-driving categories, contributing 26.89% and 24.95% respectively. However, the top profit-driving categories differ according to the city depending on local demand and inventory levels.
- Are there any seasonal trends or patterns in the sales data?
 - Profits remain relatively stable across months, ranging from \$0.16M to \$0.25M.
 - The highest profits are observed in Q1 and Q2 of 2023
 - Achieved peak profit of \$0.25M in December 2022.

RECOMMENDATIONS / DECISIONS

1. For top-selling products that aren't highly profitable, the goal should be to improve their profit margins while maintaining strong sales. Here are strategies to consider:
 - Optimize Pricing:
 - Cost Reduction:
 - Review Packaging & Logistics:
 - Value-Added Features:
2. Also, to increase the sales of the bottom 5 least-selling products, several strategic actions can be taken:
 - Promotional Discounts
 - Improved Marketing & Visibility
 - Product Bundling
 - Seasonal Promotions
 - Customer Feedback
 - Cross-Selling & Upselling
 - Repositioning Product Value

MAVEN TOYS STOCK

INFORMATION

1. Inventory and Tied-Up Capital:

Stock on Hand
29742

Tied-Up Capital
\$300.21K

- Stock on Hand: 29,742 units.
- Tied-Up Capital: \$300.21K, indicating a substantial amount of capital is tied up in unsold inventory.
- Top Products by Tied-Up Capital: Lego Bricks, Rubik's Cube, Magic Sand, Dinosaur Figures, and Nerf Gun are the products with the highest capital investment.

QUESTIONS TO ANSWER

- Are sales being lost with out-of-stock products at certain locations?
 - Upon reviewing the inventory, two products lead the list of shortages: Playfoam and Hot Wheels 5-Pack, which are absent from 13 and 12 stores, respectively. This could lead to lost sales. If Playfoam and Hot Wheels 5-Pack are unavailable in multiple stores, customers may turn to competitors or decide not to make a purchase at all.
- How much money is tied up in inventory at the toy stores? How long will it last?
 - Money Tied Up in Inventory: There is \$300.21K tied up in unsold inventory at the toy stores.
 - Inventory Duration: With 29,742 units in stock, the current inventory levels are significant. How long the inventory will last depends on the ongoing sales rate, but with consistent sales trends, this stock could last a few months.

RECOMMENDATIONS / DECISIONS

For the top products by tied-up capital (Lego Bricks, Rubik's Cube, Magic Sand, Dinosaur Figures, and Nerf Gun), it's essential to optimize the capital investment and reduce the risk of overstocking. By adopting the following strategies:

- Inventory Optimization: Adjust Stock Levels, Implement Inventory Turnover Strategies
- Promotions & Discounts: Offer Promotions, Seasonal Campaigns

- Reevaluate Supplier Agreements: Negotiate with Suppliers / Flexible Restocking
- Demand Forecasting: Refine Forecasting Models / Track Seasonal Patterns
- Cross-Sell and Upsell Opportunities: Cross-Sell with Popular Items / Upsell to Higher Value Versions
- Focus on Product Visibility: Improve Display and Placement / Highlight Unique Selling Points
- Customer Feedback and Adjustment: Survey Customers / Product Refinement

4. CONCLUSION

The Power BI analysis uncovered several critical insights that can significantly impact Maven Toys' business strategy. The company achieved a total revenue of \$14.4 million, with a profit of \$4.01 million, indicating a solid profit margin. Notably, profits remained stable throughout the year, peaking at \$0.25 million in December 2022, highlighting the importance of seasonal demand in driving profitability. The top-performing products, such as Colorbuds (\$0.83 million) and Action Figure (\$0.35 million), were major contributors to overall revenue, while low-performing products like Classic Dominoes and Uno Card Game contributed only \$20.3K, pointing to opportunities for product repositioning or inventory reduction.

Inventory management emerged as a key area for improvement, with 29,742 units of stock leading to \$300.21K in tied-up capital. High-capital items like Lego Bricks and Rubik's Cube pose potential overstock risks, which, if unaddressed, could strain cash flow and operational efficiency. Moreover, the analysis highlighted critical out-of-stock issues for high-demand products such as Playfoam and Hot Wheels 5-Pack, absent in 13 and 12 stores respectively. This could result in lost sales as customers may turn to competitors for these items.

The category-level performance analysis revealed that the Toys category contributed 26.89% to total profit, followed closely by Electronics (24.95%) and Arts & Crafts (18.77%), which are critical to focus on for maximizing returns. Sales trends remained consistent, peaking at 50,000 units sold per month, with top-selling items like Colorbuds, PlayDoh Can, and Barrel O' Slime driving unit sales. These insights underscore the need for strategic inventory optimization, better demand forecasting, and tailored pricing strategies to enhance profit margins and improve operational efficiency. By addressing these areas, Maven Toys can streamline supply chain operations, reduce costs, and capture more sales opportunities in competitive markets.

By acting on these insights and implementing the recommended strategies, Maven Toys can not only optimize its current operations but also position itself for sustainable growth and enhanced competitiveness in the market. This comprehensive analysis lays the foundation for data-driven decision-making, ensuring that the company can capitalize on key opportunities while addressing inefficiencies to maximize profitability and operational effectiveness.

5. APPENDICES

MAVEN TOYS SALES

MAVEN TOYS STOCK



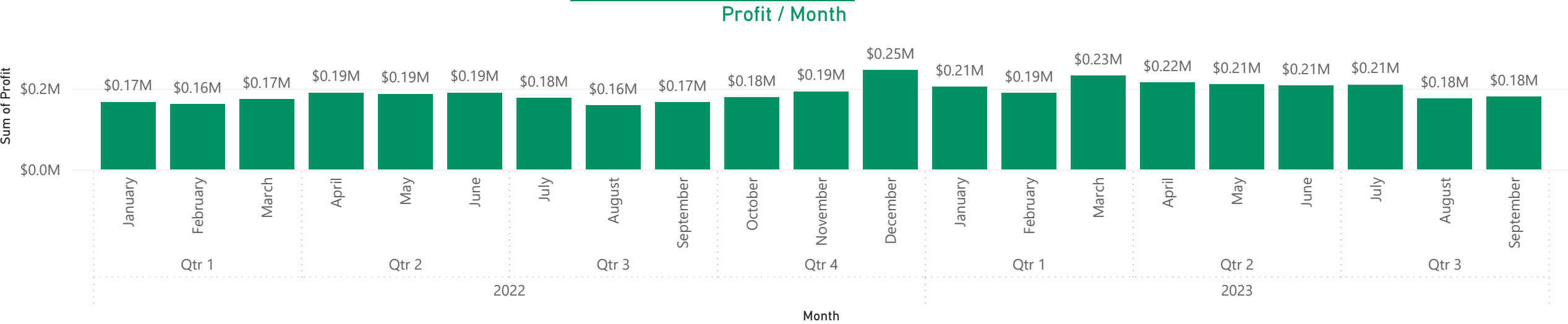
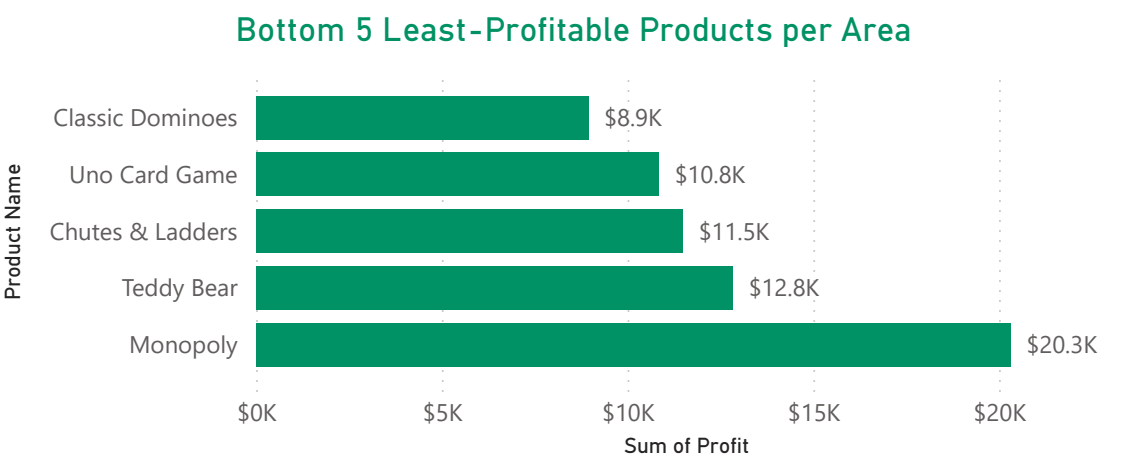
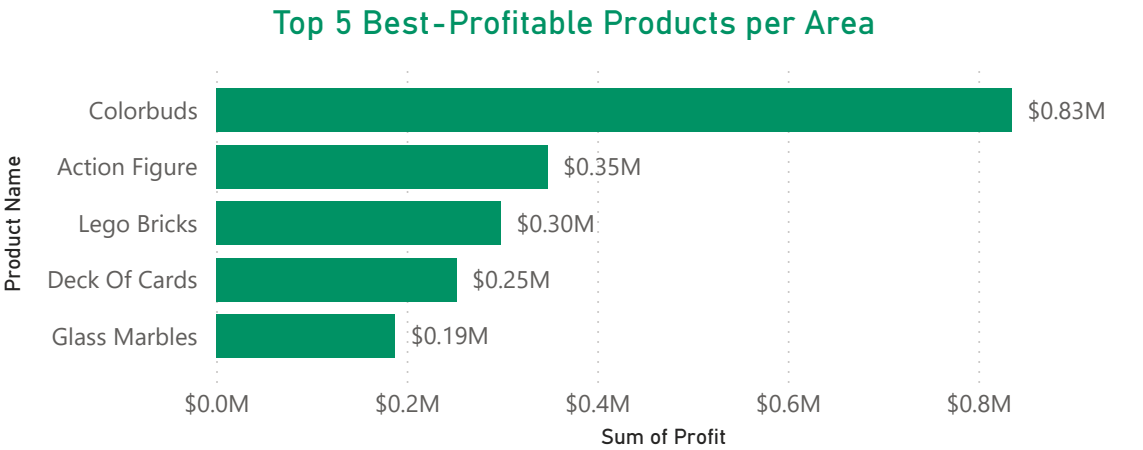
APPENDIX 1

MAVEN TOYS SALES

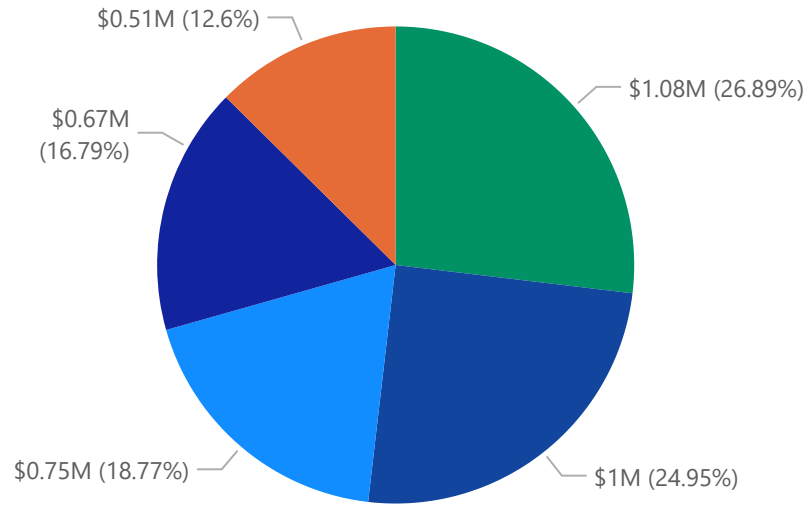
Maven Toys Sales

<u>COGs</u> \$10.43M	<u>Revenue</u> \$14.4M
<u>Profit</u> \$4.01M	<u>No. of Orders</u> 829.262K

Store City, Store Name
<input type="checkbox"/> Aguascalientes
<input type="checkbox"/> Campeche
<input type="checkbox"/> Chetumal
<input type="checkbox"/> Chihuahua
<input type="checkbox"/> Chilpancingo
<input type="checkbox"/> Ciudad Victoria
<input type="checkbox"/> Cuernavaca
<input type="checkbox"/> Cuidad de Mexico
<input type="checkbox"/> Culiacan
<input type="checkbox"/> Durango
<input type="checkbox"/> Guadalajara
<input type="checkbox"/> Guanajuato
<input type="checkbox"/> Hermosillo
<input type="checkbox"/> La Paz
<input type="checkbox"/> Mexico



Profit Contribution for Each Category

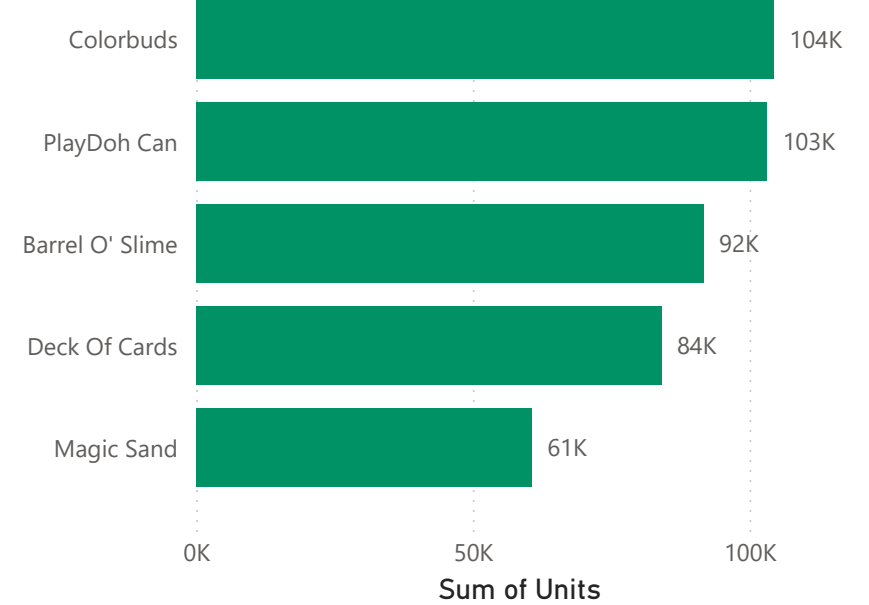


Product Category

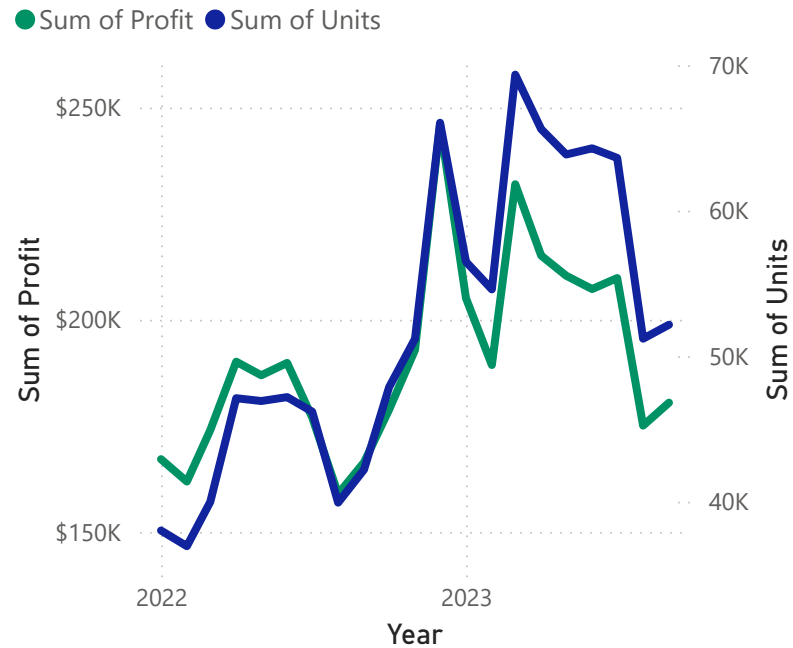
- Toys
- Electronics
- Art & Crafts
- Games
- Sports & Outdoors

Store City, Store Name	
✓	<input type="checkbox"/> Aguascalientes
✓	<input type="checkbox"/> Campeche
✓	<input type="checkbox"/> Chetumal
✓	<input type="checkbox"/> Chihuahua
✓	<input type="checkbox"/> Chilpancingo
✓	<input type="checkbox"/> Ciudad Victoria
✓	<input type="checkbox"/> Cuernavaca
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✓	<input type="checkbox"/> Durango
✓	<input type="checkbox"/> Guadalajara

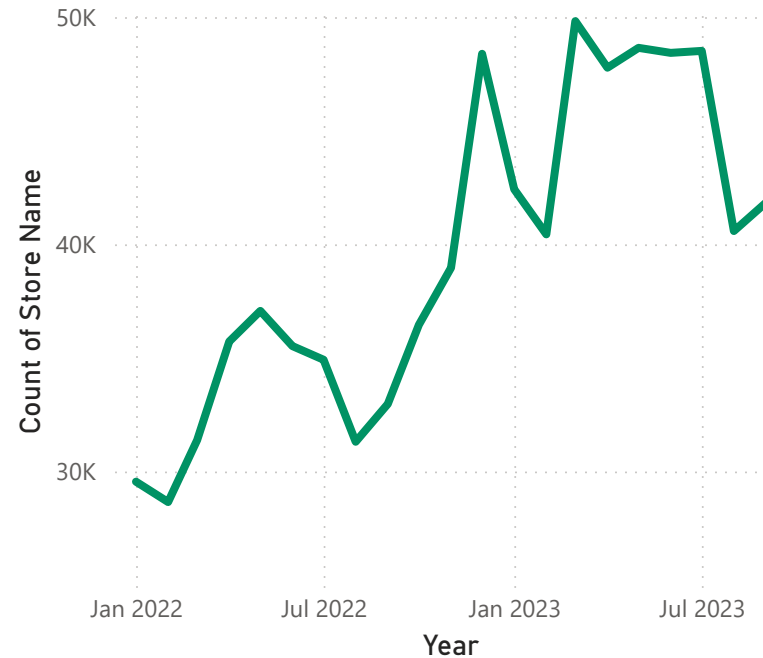
Top 5 Best-Selling Products per Area



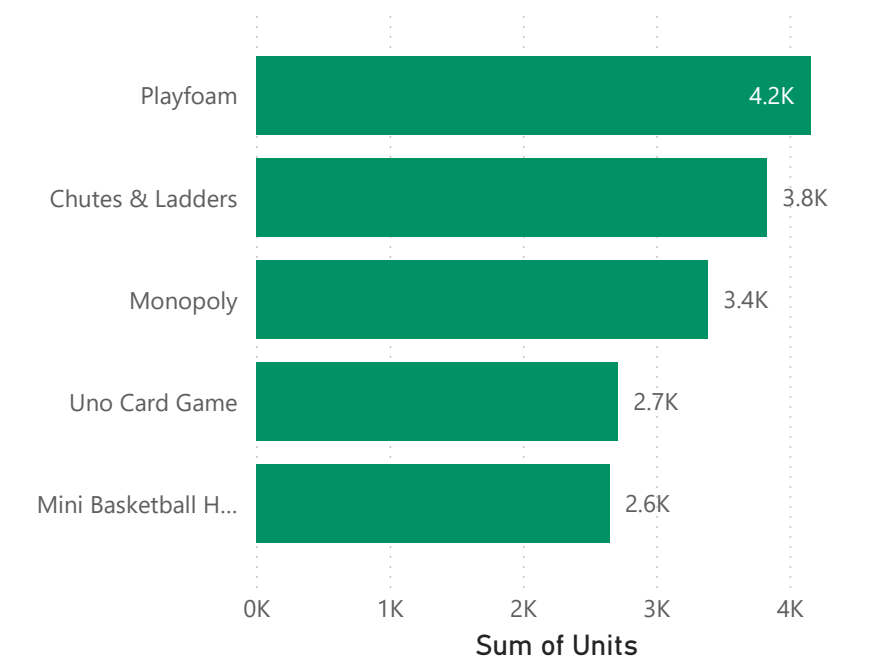
Profit / Units Sold for Each Month



No. of Sales / Month



Bottom 5 Least-Selling Products per Area





APPENDIX 2

MAVEN TOYS STOCK



Maven Toys

Stock

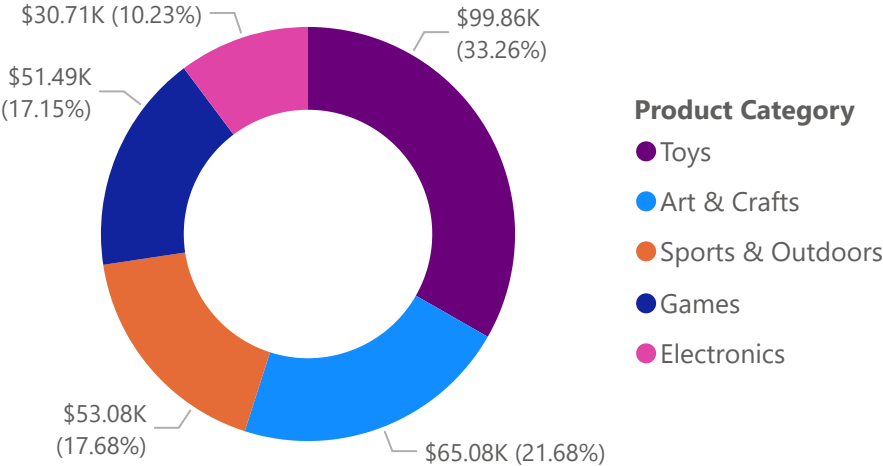
Stock on Hand

29742

Tied-Up Capital

\$300.21K

Contribution of Tied-Up Captial by Category

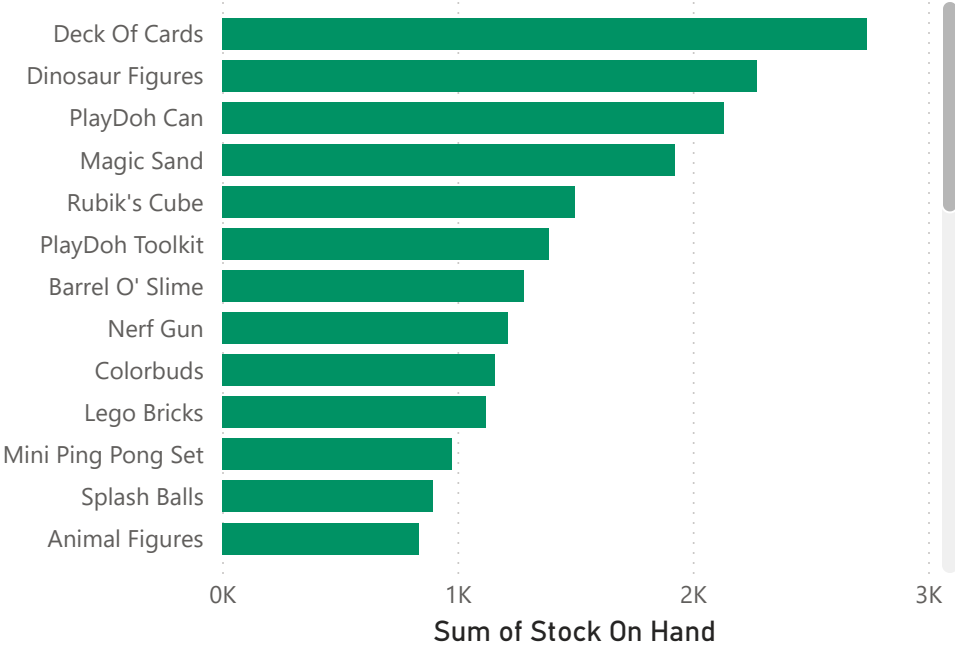


Store City, Store Name	
✓	<input type="checkbox"/> Aguascalientes
✓	<input type="checkbox"/> Campeche
✓	<input type="checkbox"/> Chetumal
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✓	<input type="checkbox"/> Guadalajara
✓	<input type="checkbox"/> Guanajuato
✓	<input type="checkbox"/> Hermosillo
✓	<input type="checkbox"/> La Paz
✓	<input type="checkbox"/> Merida
✓	<input type="checkbox"/> Mexicali
✓	<input type="checkbox"/> Monterrey
✓	<input type="checkbox"/> Morelia
✓	<input type="checkbox"/> Oaxaca
✓	<input type="checkbox"/> Pachuca
✓	<input type="checkbox"/> Puebla
✓	<input type="checkbox"/> Saltillo
✓	<input type="checkbox"/> San Luis Potosi

Product Name

Product Name

Stock On Hand by Product



Tied-Up Capital by Product

