Module 10 Project: Individual Project Proposal Draft

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I. Introduction

Locally Inspired, a distinguished handcraft retailer based in Port Washington, WI, is experiencing growth and diversification in its product offerings. However, with this expansion comes, the sponsor has to effectively manage their orders and inventory. To address this challenge, we present a comprehensive proposal for conducting an in-depth analysis of Locally Inspired's orders and inventory datasets. Our objective is to uncover valuable insights that will drive optimized inventory management, streamline order fulfillment processes, and heighten overall operational efficiency.

II. Project Overview

The primary objective of this project is to conduct an in-depth analysis of Locally Inspired's historical orders and inventory data. By examining trends, patterns, and customer behavior, we aim to gain valuable insights that will enable data-driven decision-making and improve business performance.

III. Objectives

The specific objectives of the analysis are as follows:

Identify popular handcraft products and categories based on historical order data.

Analyze seasonal demand variations to optimize inventory levels and avoid stockouts.

Assess the frequency and impact of order returns to minimize returns-related costs.

Investigate customer purchasing behavior to enhance targeted marketing strategies.

IV. Methodology

To achieve the project's objectives, we will employ a combination of data analysis techniques, including:

Data Cleaning: Ensuring the accuracy and consistency of the datasets.

Descriptive Analytics: Summarizing and visualizing order and inventory trends.

Predictive Analytics: Forecasting demand patterns and identifying potential stockouts.

Customer Segmentation: Grouping customers based on their purchasing behavior.

Inventory Optimization Models: Recommending optimal reorder points and stock levels.

V. Timeline

Week 1-2: Data collection and preparation.

Week 3-4: Descriptive analysis of orders and inventory data.

Week 5-6: Predictive analysis and customer segmentation.

Week 7-8: Formulating inventory management recommendations.

Week 9-10: Finalizing the project report and presentation.

VI. Team and Responsibilities

Each team member will have specific responsibilities, including data cleaning, statistical analysis, machine learning implementation, and report preparation.

Project Lead: Team member A

Data Analyst: Team member B

Inventory Specialist: Team member C

Customer Relation Specialist: Team member D

VII.   Prediction model

Objective: Forecasting Monthly Sales Using a Time Series Approach and Machine Learning

Data: Collect historical data on monthly sales, marketing expenditures, seasonality factors (like holidays or special events), and potentially other economic indicators that might influence sales.

Steps:

1. Data Collection and Preparation:

Gather monthly sales data, marketing expenditure data, and relevant additional variables.

Ensure the data is clean, handle missing values appropriately, and consider transforming or normalizing the data if needed.

2. Exploratory Data Analysis (EDA):

Analyze the data to identify trends, patterns, and seasonality effects.

Visualize the data using time series plots to understand how sales and other variables evolve over time.

3.   Time Series Decomposition:

Decompose the time series into its components: trend, seasonality, and residual.

This step helps separate the underlying patterns from noise in the data.

4.   Feature Engineering:

Create lag features to capture the influence of past sales and marketing expenditures on current sales.

Include relevant external factors, like holiday indicators or economic indices, that might impact sales.

5.   Data Splitting:

Divide the data into training, validation, and test sets, considering that time-series data should be split chronologically.

6.   Machine Learning Model - Random Forest Regression:

Train a Random Forest Regression model using the training data.

Incorporate lag features, seasonality indicators, and other variables as input features.

Tune hyperparameters using the validation set to optimize model performance.

7.   Model Evaluation:

Evaluate the model's performance using metrics like Mean Absolute Error (MAE) or Root Mean Squared Error (RMSE) on the validation set.

8.   Time Series Forecasting:

Use the trained model to forecast future sales for the test period.

Compare the forecasted values with the actual sales to assess the model's accuracy.

9.   Model Interpretation and Insights:

Analyze feature importance from the Random Forest model to understand which variables have the most significant impact on sales.

10. Business Insights and Recommendations:

Based on the insights gained from the model, provide recommendations on optimizing marketing strategies, identifying key sales-driving factors, and predicting sales trends for future months.

Benefits:

- Accurate Forecasting: The advanced model can provide accurate sales forecasts, enabling Locally Inspired to plan inventory, staffing, and marketing efforts more effectively.
- Holistic Insights: Incorporating various variables allows for a comprehensive understanding of factors influencing sales, leading to well-informed business decisions.
- Adaptive Strategies: With a data-driven approach, the company can adjust marketing strategies and resource allocation based on changing trends and external influences.
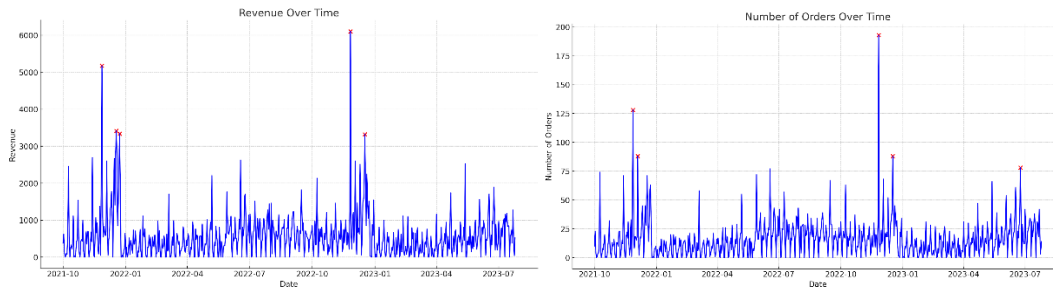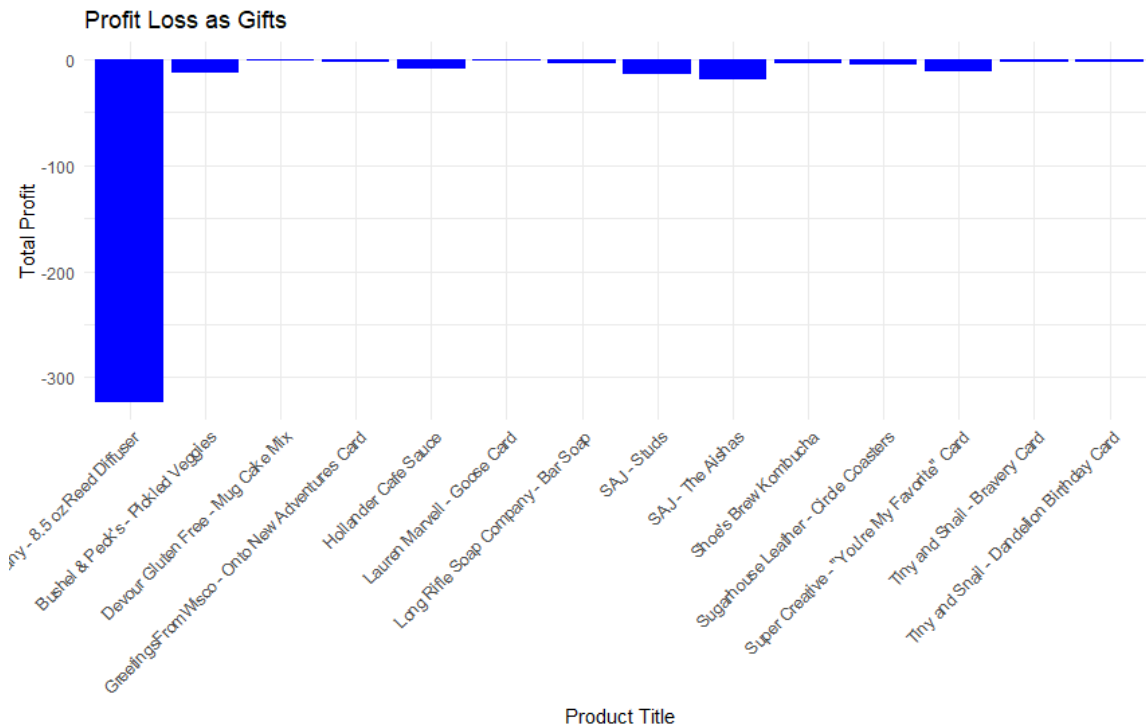

As the sponsor requested, I did deeper investigation into those negative profits. This graph below shows the items that are losing profit while there is no discount on them. It

simply means that the price is lower than the cost, which needs attention.
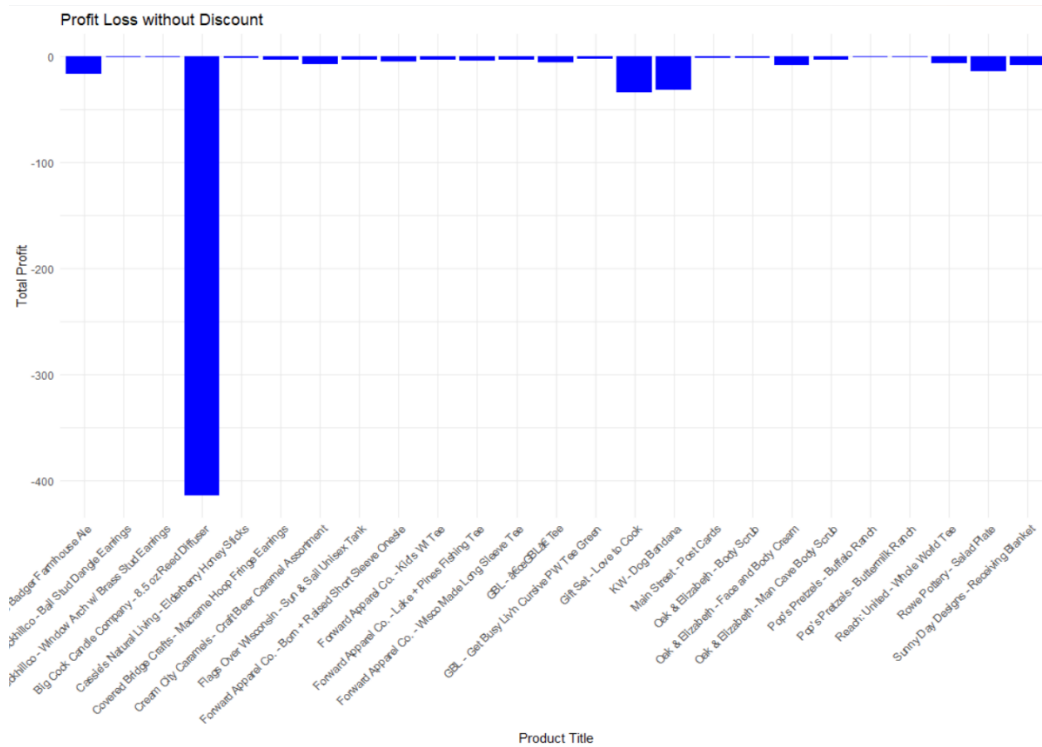
I also did a graph of those item sent as gifts. They also cause negative profits.

Sending less gifts may reduce this part of profit loss.

VIII.   Evaluation

Some of our achievements can be evaluated by key performance indicators:

Reduction in stockouts by X%.

Increase in inventory turnover rate by Y%.

IX. Sustainability and Impact

The insights and recommendations generated from this analysis will have a lasting impact on Locally Inspired's business operations. By implementing the proposed inventory management strategies, the company can improve its overall efficiency, reduce costs, and provide an enhanced shopping experience for its customers.

X. Conclusion

The analysis of Locally Inspired's orders and inventory datasets offers a significant opportunity to optimize business processes, maximize profitability, and ensure customer satisfaction. Through data-driven decision-making, we are confident in delivering valuable recommendations that will contribute to the long-term success of Locally Inspired. We look forward to the opportunity to collaborate on this project and believe that our expertise in data analysis and inventory management will lead to tangible and sustainable benefits for Locally Inspired.

Annotated Bibliography

Article 1

Business Research Insights (BRI). (2023). Arts and Crafts Market Research Report 2023 | Forecast By 2030. *www.linkedin.com*. https://www.linkedin.com/pulse/arts-crafts-market-research-report-2023-forecast/

The report concludes that the arts and crafts market present significant opportunities for businesses to thrive and expand their market presence. By understanding the market size, projected growth rate, and industry trends, companies can align their strategies to capitalize on the growing demand. It is essential for businesses to focus on innovation, quality, and differentiation to succeed in this competitive market. Some industry trends in the arts and crafts market include the integration of technology, where traditional art forms are combined with digital tools and techniques, and a growing emphasis on sustainable and eco-friendly materials.

The article discusses the factors driving the growth of the arts and crafts market, such as consumer interest in personalized products, the popularity of DIY culture, and the influence of online marketplaces. It also acknowledges challenges like competition from mass-produced alternatives and limited access to skilled artisans. However, there is lack of details and data so more original reports will be needed.

Article 2

Global Art and Craft Tools Market Report and Forecast 2023-2028. (2023). Expert Market Research. https://www.expertmarketresearch.com/reports/art-and-craft-tools-market#:~:text=The%20global%20art%20and%20craft,for%20art%20and%20craft%20tools.

> The global art and craft tools market is projected to grow at a CAGR of 6.8% during 2023-2028. The market's growth is driven by an increasing number of people engaging in art and craft activities and the proliferation of businesses related to arts and crafts. Art and craft activities are gaining popularity as a form of recreation, therapy, and education, with social media platforms dedicated to arts and crafts further boosting the trend. Engaging in such activities is believed to enhance creativity, fine motor skills, cognitive abilities, and social skills, especially in children.

> Overall, the article provides valuable information about the art and craft tools market, highlighting its growth prospects and the positive impact of art and craft activities on well-being and skill development. However, it could benefit from additional data, global perspectives, consideration of potential challenges, and transparency in citing sources and methodology.

Article 3

Chhatwal, G., & Chhatwal, G. (2022). The impact of eCommerce on the handmade
industry. *Kadence*. https://kadence.com/the-impact-of-ecommerce-on-the-
handmade-industry/

The article discusses how Etsy, the largest online marketplace for handmade and
vintage goods and craft supplies, successfully carved a niche for the handmade
sector using its e-commerce platform. It outlines Etsy's smart revenue model,
which charges sellers a listing fee and commission while offering advertising
services to enhance product reach. Etsy's approach focused on value creation and
narrowing its product offering to handmade or artisan-made products.

The article emphasizes Etsy's strategic approach of focusing on buyers as the core
market, resulting in a rebound in stock value and revenue growth. Specific data,
such as revenue growth, market cap, and active buyers on the platform, adds
credibility to the case study. Additionally, the article highlights Etsy's global
impact, particularly in developing nations like India, where it positively affects
artisans. While mentioning competitors, the article lacks an in-depth analysis and
specific source citations. Nonetheless, it effectively illustrates Etsy's success and
offers valuable insights applicable to other categories in the e-commerce market.

Reference

Business Research Insights (BRI). (2023). Arts and Crafts Market Research Report 2023 |
Forecast By 2030. *www.linkedin.com*. https://www.linkedin.com/pulse/arts-crafts-
market-research-report-2023-forecast/

Global Art and Craft Tools Market Report and Forecast 2023-2028. (2023). Expert
Market Research. https://www.expertmarketresearch.com/reports/art-and-craft-tools-
market#:~:text=The%20global%20art%20and%20craft,for%20art%20and%20craft%20t
ools.

Chhatwal, G., & Chhatwal, G. (2022). The impact of eCommerce on the handmade
industry. *Kadence*. https://kadence.com/the-impact-of-ecommerce-on-the-
handmade-industry/

Smartsheet. (n.d.). *17 free project proposal templates*. https://www.smartsheet.com/free-
project-proposal-templates