| IS 6813: MSBA Capstone Completion | Feb. 4, 2024 |
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| Business Problem Statement | Louis Ackumey  Aiden Coutin  Shane Nisley  Gustav Vollo |

**Business Problem and Benefits**

The primary business problem is to accurately forecast demand of Swire’s limited-release products, preventing both out-of-stocks and overproduction, and ensuring optimal production quantities that align with evolving consumer preferences. Achieving this goal will help Swire drive revenue growth and cost savings, expand market reach, and maintain a competitive edge in response to evolving consumer preferences and industry dynamics.

**Success Metrics**

Success metrics may evolve pending discussion with Swire. Preliminarily, the metrics below will be used, and compared to the performance of a model using the data’s average demand.

1. Forecast Accuracy

* Evaluate precision using Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE), providing insights into the predictive model’s accuracy.

2. Cost Optimization

* Assess the reduction in costs due to production inefficiencies and overproduction
* Assess the revenue impact of improved production planning and inventory management

**Analytics Approach**

This problem is a supervised regression problem, where the target variable is demand over a period of time. The questions posed by Swire vary in character, but are all based on a desire to predict product performance (demand) over a period of time. The EDA and modeling process will explore the data available and a variety of modeling methods (ARIMA, linear regression, etc.) to determine the most useful inputs and methods.

**Scope**

Swire has provided seven different questions (tabulated below) they hope to have answered. Group 1 has chosen to focus on Questions 2, 4, 6, and 7 to provide specific answers. These questions will be answered using an analytical model developed using the data provided by the Swire team. Depending on the performance of the model on test data, other questions may also be answered.. An output that may be added is a sensitivity of demand to the input factors, allowing the company to understand the model more - similar to an explainable-AI approach.

| **#** | **Question** |
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| 1 | Which 13 weeks of the year would this product perform best in the market? |
| 2 | Swire plans to release this product 2 weeks prior to Easter and 2 weeks post Easter. What  will the demand be, in weeks, for this product? |
| 3 | Which 13 weeks of the year would this product perform best in the market? |
| 4 | Swire plans to release this product for the duration of 1 year but only in the Northern  region. What will the demand be, in weeks, for this product? |
| 5 | Swire plans to release this product for 13 weeks, but only in one region. Which region  would it perform best in? |
| 6 | Swire plans to release this product for 6 months. What will the demand be, in weeks, for  this product? |
| 7 | Swire plans to release this product in the Southern region for 13 weeks. What will the  demand be, in weeks, for this product? |

**Details and Milestones**

This project will be executed by the members of Group 1 within the Capstone Completion class, MSBA program at the University of Utah. This project will be presented on April 21, 2023, with intermediate milestones of an EDA summary (February 25), and a completed model with performance metrics (March 24).