

Project Capstone

Astra Data Intelligence Internship Program
2025 – Batch 2



Capstone Project

CONFIDENTIAL

Interns must finish their project within 5-6 weeks then present the result on last week of September. There will be 2 mentors that will accompany interns through the Capstone Project.

	Product Substitutability
Description	Build a product substitutability framework and visualize the result for Spare Part retail company
Expected Output	<ul style="list-style-type: none">• Market Analysis (Potential Market, Competitor Analysis)• Dashboard to visualize product substitutability framework result.• Project documentation.
Data Source	Gather data from open sources or generate synthetic data for model training
Mentor	<ol style="list-style-type: none">1. Faizah Dayu U.2. Katherine Gozali
Team	<ol style="list-style-type: none">1. Yoel Dinata Suwito2. Matthew Owen3. Ilhan Rafif Nagata4. Tiva Adhisti5. Muhammad Salman Al Farisi

Product Substitutability - Background

Background

1. Pricing Without Insight

Businesses often ignore how price changes affect demand, leading to missed opportunities to maximize profits with smarter pricing and promotions.

2. Bad Bundles Mean Lost Sales

Without data-driven insights, companies create weak product bundles and miss chances to boost sales during key promotional periods.

3. Out-of-Stock Items Lead to Missed Revenue

If a customer can't find the product they want, they often leave without buying anything — costing retailers' sales and damaging customer loyalty.

Objectives

1. Set Smarter Prices

Utilize historical data to analyze price impact on demand, optimizing pricing and discounts to maximize sales during peak and seasonal periods.

2. Boost Sales with Product Bundling & Cross Selling

Leverage analytics to identify optimal product combinations that maximize sales, enhance customer satisfaction, and boost transactions.

3. Drive Revenue with Intelligent Substitution

Leverage data insights to recommend substitutes products, boosting basket size and enhancing customer experience, particularly during promotions.

Solution

Price Elasticity

- Promotion recommendation :** Identify the optimal promotions based on the number of transactions. Prioritize products and strategies that generate more transactions to maximize returns.
- Pricing Calculator:** Develop model for each item to understand simulation on price changes toward sales quantity and revenue.

Product Substitution

- Product Similarity Analysis:** Analyze product attributes to determine which products are similar enough to be substituted.
- Product Recommendation:** Suggest alternatives items that are available for out-of-stock items.

Product Bundling

- Market Basket Analysis:** Analyzed frequently co-purchased items to identify optimal bundle combinations.
- Inventory Optimization:** Identify slow-moving items and pair them with fast-moving products in a bundle to clear stock.

Product Substitutability - Background



Definition

Substitutability refers to the degree to which **one item can be used in place of another**, either completely or partially, without significantly impacting the desired outcome or preference.



Method

- Define the product that you want to substitute (Find why we must substitute the product?)
- Calculate a **substitutability score** (Please **explore the method that can be used for calculating** the score)
- **Create a visualization** that easy to understand by business user (For **example**, you can visualize using 2-dimensional diagram called a **dendogram or tree**)

Product Substitutability - Example

We need to analyse related products to understand 'why' customers are substituting and what constitutes a 'customers need'. This could be a result of;

- Products grouped by brand, i.e. customers substituting *within* a brand
- Products grouped by type, e.g. flavour, format or packaging type etc.
- Products grouped by price point, e.g. budget or value products together

