

Achieve margin / revenue / volume goals with optimized pricing guidance and guardrails

As a [Pricing Manager, Pricing Analyst, Data Scientist Manager], I want to empower sales with intelligent pricing guidance (Floor/Target/Ceiling) based on statistical input and business rules, so I can:

- Improve the overall margin expansion by pricing the underperforming customers to be inline with their peer group.
- Increase the sales efficiency by providing guidance on the what price to start the negotiation with (Ceiling Price), what target price to achieve (Target Price), and the walk-away price (Floor Price)
- Improve price consistency

Functional Requirements

- Ability to analyze the last 2 years of historical billing data (aka, sales orders data, or txn data) as the source data to understand the customers willingness-to-pay.
- Ability to use advanced filtering capabilities to determine the data scope of the relevant historical billing data for the purpose of understanding the pricing drivers.
- Ability to use advanced filtering capabilities to filter out negative margin, and/or negative quantity and/or negative revenue.
- Ability to profile the input data after applying the advanced filters to quickly understand the quality of the underlying data that will be used in the model:
 - Transactions count
 - Customer count
 - Product count
 - Total Revenue, Margin and Quantity
 - Min/Max value in each data field (e.g., each column of the science DataMart)
 - # of distinct values (aka, cardinality) for each data
 - Data type
 - Whether each field is a dimension
 - Whether each field is a key
- Ability to select potential pricing drivers for the purpose of determining their historical relevant importance in explaining the variation.
- Ability to use a built-in statistical analysis method to understand the selected pricing driver's relative importance in explaining the overall variation in the data.
- Ability to include and exclude pricing drivers that drive the customer's willingness-to-pay.
- Ability to use an out-of-the-box segmentation model based on prespecified constraints based on:
 - Minimum No. of transactions per segment
 - Minimum No. of customers per segment
 - Minimum No. of products per segment
- Ability to visualize the segmentation tree and understand the data scope within a segment and an associated metrics, e.g., # of txns, # of customers, # of products, segment revenue, segment margin, segment quantity, and segment margin pct.
- Ability to use a built-in statistical model to calculate the segment level elasticity.
- Ability to set the percentile value to calculate the recommended price bands (Floor, Target, Ceiling)
- System to calculate the associate Floor, Target, and Ceiling for each segment node.

- System to calculate projected impacts on volume, revenue and margin based on the pre-determined Floor, Target, Ceiling percentile and the calculated segment level elasticity.
- Ability to leverage a summary report that provide quantitative metrics for each price drivers, so I can determine how the current segmentation model is either over/under segmented e.g.,
 - No. of transactions used by each pricing driver, and the associated % of total no. transactions.
 - No. of customers used by each pricing driver, and the associated % of total no. of customers.
 - No. of products used by each pricing driver, and the associated % of total no. of products.
 - No. of segmented calculated for each pricing drivers.
 - Total revenue used by each pricing driver, and the associated % of total revenue.
 - Total margin used by each pricing driver, and the associated % of total revenue.
 - Total quantity used by each pricing driver, and the associated % of total revenue.
 - Coefficient of determination (R2) that determine how well the pricing driver predicts the recommended margin %
- Ability to assess the margin and revenue uplift potential by setting up hypothesis such as:
 - Assuming X1% of the transactions below Floor will be priced at Floor Price.
 - Assuming X2% of the transactions between Floor and Target will move to Target Price
 - Assuming X3% of the transactions between Target and Ceiling will move to Target Price
 - Assuming X4% of the transactions above Ceiling will move to Ceiling Price

Non-Functional Requirements

- Ability to model a segmentation and calculate the segment level recommendations in reasonable time

Reporting and Dashboards

- This use case has the dashboards and reports as described in the functional requirements section.

Measures, Calculation and Decision-Making Key Performance Indicators

- Pocket Price: Pocket price is a term used to refer to the effective price paid by a customer in a transaction after considering all relevant discounts, promotions, and rebates. It is calculated by subtracting the cost of goods sold from the list price minus discounts, rebates, promotions, free freight, and similar offers
- Pocket Margin % = $(\text{Pocket Price} - \text{GOGS}) / \text{Pocket Price}$
- Weight Measure: It is the measure that will be used to influence the recommendations based on this measure. It is typically a representation of the size of the transaction. Such as Revenue, Margi, or Quantity.
- Customer Revenue Spent: is a pricing driver attribute that will be derived from the underlying data by calculating the customer spend in the last 12 months and assigning a categorical attribute (Small, Medium, Large) based on predefined percentiles.
- Forecasted Sales: Forecasted Sales for the rebate period, based on external forecast (input to Pricefx)
- Forecasted Baseline value: Forecasted Sales for the rebate period which is eligible for the rebate program, based on external forecast (input to Pricefx)

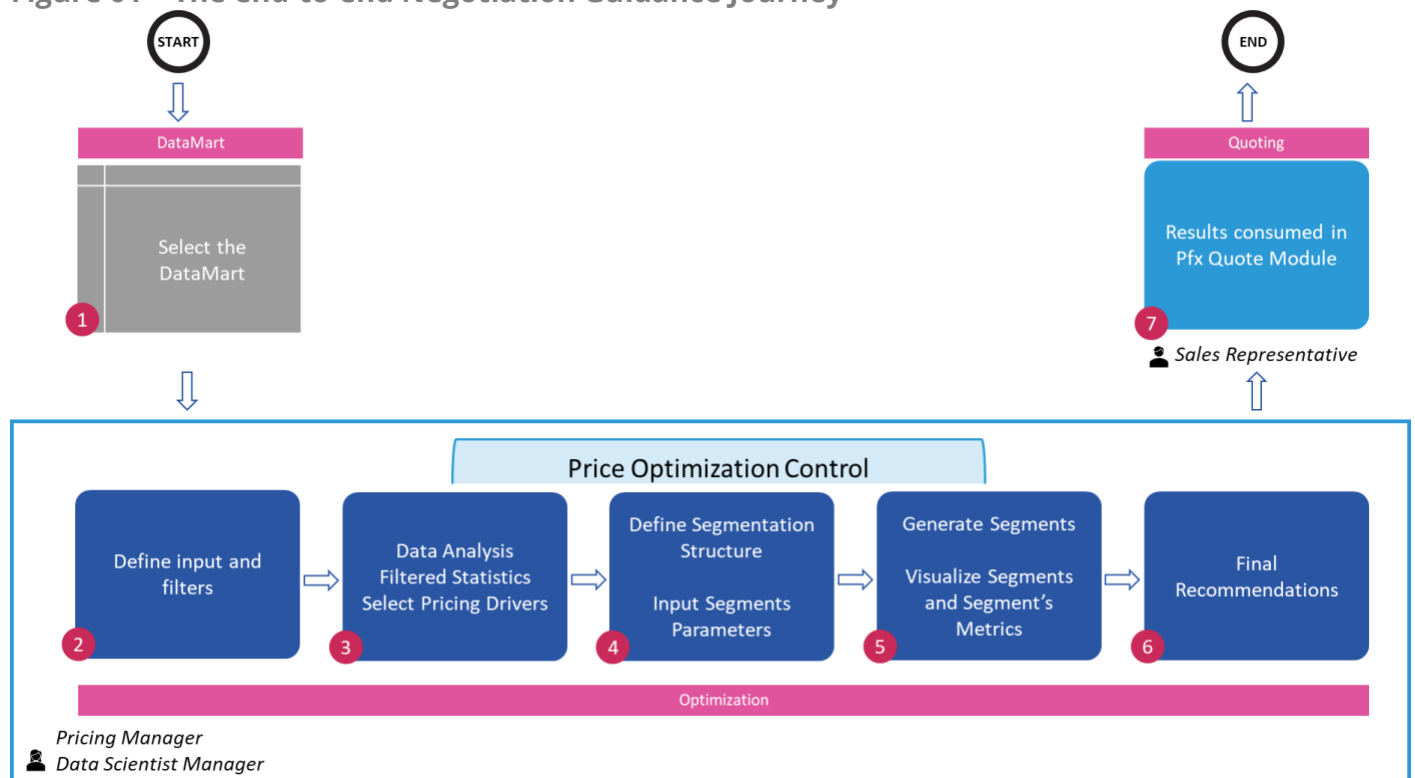
- Forecasted Rebate: the forecasted rebate to be paid out, based on the rebate program conditions and the forecasted baseline value
- Revenue: Revenue based on the Price Waterfall data
- Rebates: Rebates based on the Price Waterfall data
- Net Margin %: Margin % based on the Price Waterfall data

Solution Design

The design and implementation are going to utilize the suite of Pfx out-of-the-box features and capabilities of the Optimization module within Pricefx (Pfx Accelerate Negotiation Guidance). Pfx Accelerate Negotiation Guidance can be deployed for the first time from Pfx Marketplace → Accelerator Packages within Pfx Platform Manager into the desired partition.

As part of the overall design, it is important first to highlight the prescriptive Negotiation Guidance Workflow that Pfx will work with our customer in implementing the end-to-end Pfx Accelerate Negotiation Guidance.

Figure 01 – The end-to-end Negotiation Guidance Journey



1. Select DataMart: Within the Optimization module, the user can select the DataMart that is the subject of optimization. It is important to ensure that data fields listed below are predefined within the DataMart, those data fields will be used as an input for the fast-following steps.

Figure 02 – Initial setup and required data fields.

The image shows a configuration interface with six dropdown menus. Each menu is labeled with a field name followed by an asterisk. The selected values are: CustomerID, ProductID, Quantity, PocketPrice, GrossMargin, and GrossMarginRate.

Field Name	Selected Value
Customer Field *	CustomerID
Product Field *	ProductID
Quantity Measure *	Quantity
Revenue Measure * ?	PocketPrice
Margin Measure * ?	GrossMargin
Optimization Target *	GrossMarginRate

- a. Customer Entity and all Customer Attributes considered for the segmentation.
- b. Product Entity and all product attributes considered for the segmentation.
- c. Quantity Measure
- d. Revenue Measure: Pocket Price
- e. Margin Measure such as Gross Margin
- f. Any data fields required for filters that need to be applied.

These fields must exist in the DataMart:

- 8 -12 potential attributes that may be leveraged in the segmentation structure used to build segments in negotiation guidance.
 - Strategic: attributes considered should be aligned with a customer’s pricing strategy
 - Available: attributes should be available in the historical data and at the time of quote
 - General: attributes should be relevant for a large portion of the business being processed in negotiation guidance
- Compact: attributes should not have more than 20 distinct values to avoid manufacturing sparse segments (rule of thumb)

2. Define Inputs and Transactions Filters:

- a. Inputs: Two inputs:
 - i. Target Type: Pocket Margin %
 - ii. Weight Measure: such as Pocket Price, Gross Margin, or Quantity.
 - b. Transactions Filters: will leverage Pfx robust data filtering capabilities.
 - i. It is important to include transactions data from the last prior two years.
 - ii. It is important to remove irrelevant transactions that will influence the recommendations such as Returns, Promotions, and Credits.
 - iii. It is important to remove any transactions that exhibit negative margin, negative revenue, or transactions that have odd margin (example: margin greater than 99%).
 - iv. Specialized Customer
 1. Intercompany transactions
 2. Large, heavily managed accounts
 - v. Specialized Products
 1. Sample products
 2. Shipping codes
 3. Temp Product codes
 - vi. Isolated / Specialized Geographies
3. Select Pricing Drivers: once the scope of the data is defined, then the user will be able to select the relevant pricing drivers. Pricing drivers are the relevant Products, Customers and Transactions attributes that potentially will help in explaining the variations in the Pocket Margin %.

Figure 03 – Examples of data filters.

Additional filters

- Filter out transactions with negative or 0 revenue
- Filter out transactions with negative or 0 quantity
- Filter out transactions with out of bounds target

Min target value (excluded)
0

Max target value (excluded)
0.95

Figure 04 – Price Drivers selection

Data Profile **Price Drivers Setup**

Select features for Price Drivers assessment

<input checked="" type="checkbox"/> Feature	Cardinality	Min	Max	Type
<input type="checkbox"/> Account group	1	__missing__	__missing__	TEXT
<input type="checkbox"/> BillingID	3455	100-2022-01	994-2022-05	TEXT
<input checked="" type="checkbox"/> Brand	2	Dark Force	Super Power	TEXT
<input checked="" type="checkbox"/> Business Unit	4	Dimensional Measure...	Test, Measure & Insp...	TEXT
<input checked="" type="checkbox"/> Classification	4	A	__missing__	TEXT
<input checked="" type="checkbox"/> Continent	3	Europe	North America	TEXT
<input checked="" type="checkbox"/> Country	4	France	United States of Ame...	TEXT
<input type="checkbox"/> CustomerCategory1	7	1	7	TEXT
<input type="checkbox"/> CustomerCategory2	6	1	6	TEXT
<input checked="" type="checkbox"/> CustomerID	502	C-0001	C-0692	TEXT

32 rows

(Optional Pricing Driver – Derived attribute)

Customer Revenue Spent: System will calculate the 12-month revenue spend of the customer entity to be used in price optimization.

Customer Revenue Spent table structures (to be managed outside the Optimizer module)

Customer Revenue Spent	Percentile	Min Revenue (Calculated)	Min Revenue (user override)
Large	70%	\$154,320	\$150,000
Medium	30%	\$24,600	\$30,000

Small	0%	0	
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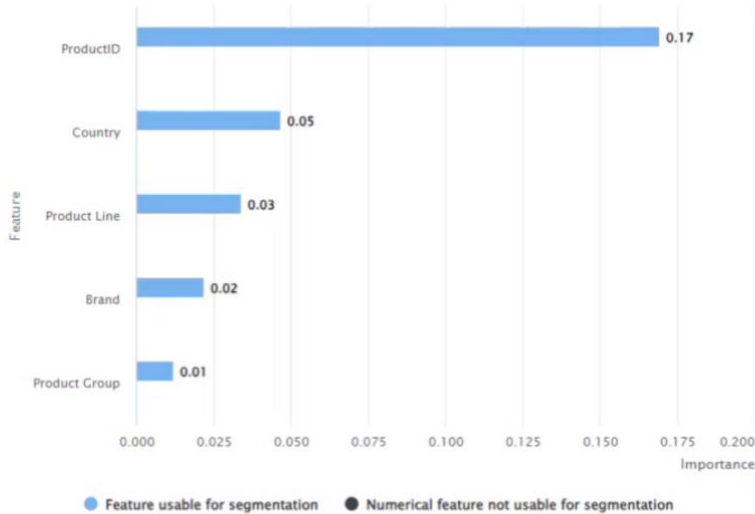
Customer Parent	Customer Name	Annual Revenue	Customer Class (Calculated)	Customer Class (Override)
11210	Patel Brothers	\$184,000	Large	
10595	Pete's Market	\$145,000	Medium	Large
4592	Asian American Market Place	\$4500	Small	

The system will provide diagnostic type of analysis on the selected Price Drivers. This analysis will empower the user with information to determine the Pricing Drivers will be used to structure the segmentation. The analysis will illustrate the Price Driver's importance (power) in explaining Pocket Margin % variation, along with the Price Drivers relative importance.

Figure 05a – Price Drivers Analysis.

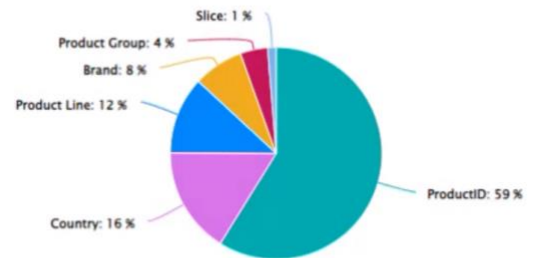
Price Drivers - Feature Importance

Feature with no Importance are removed. Explained variance of 0.87



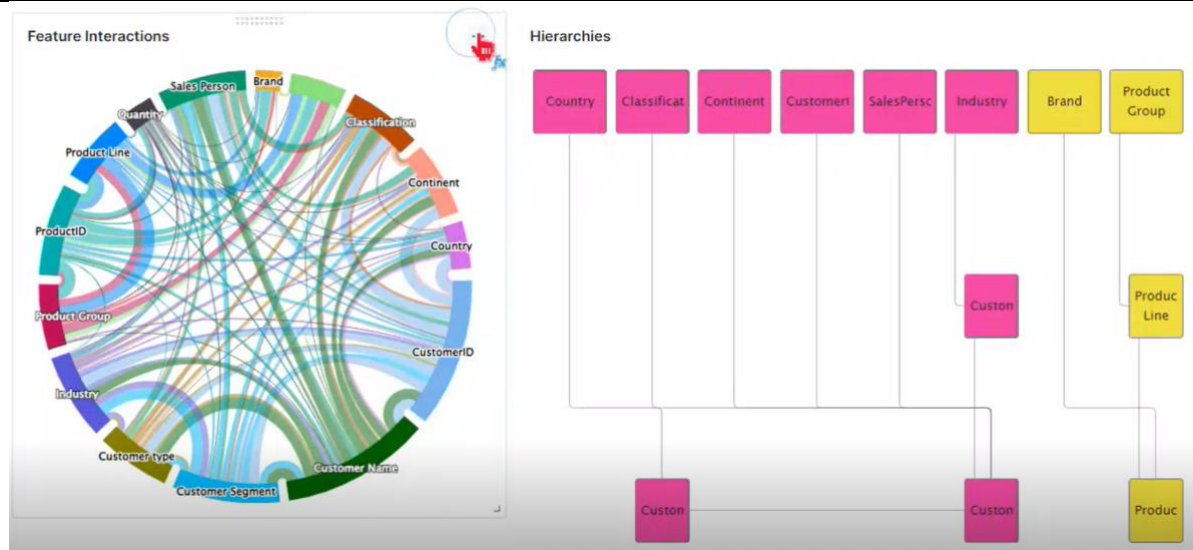
Price Drivers - Relative Importance

Numerical features and feature with no importance are removed



Additionally, the system will provide additional analysis to help deep dive into the inter-relationship between those price drivers. At the end of the process, the user will be able to manually select the relevant price drivers that will form the basis of the segmentation structure.

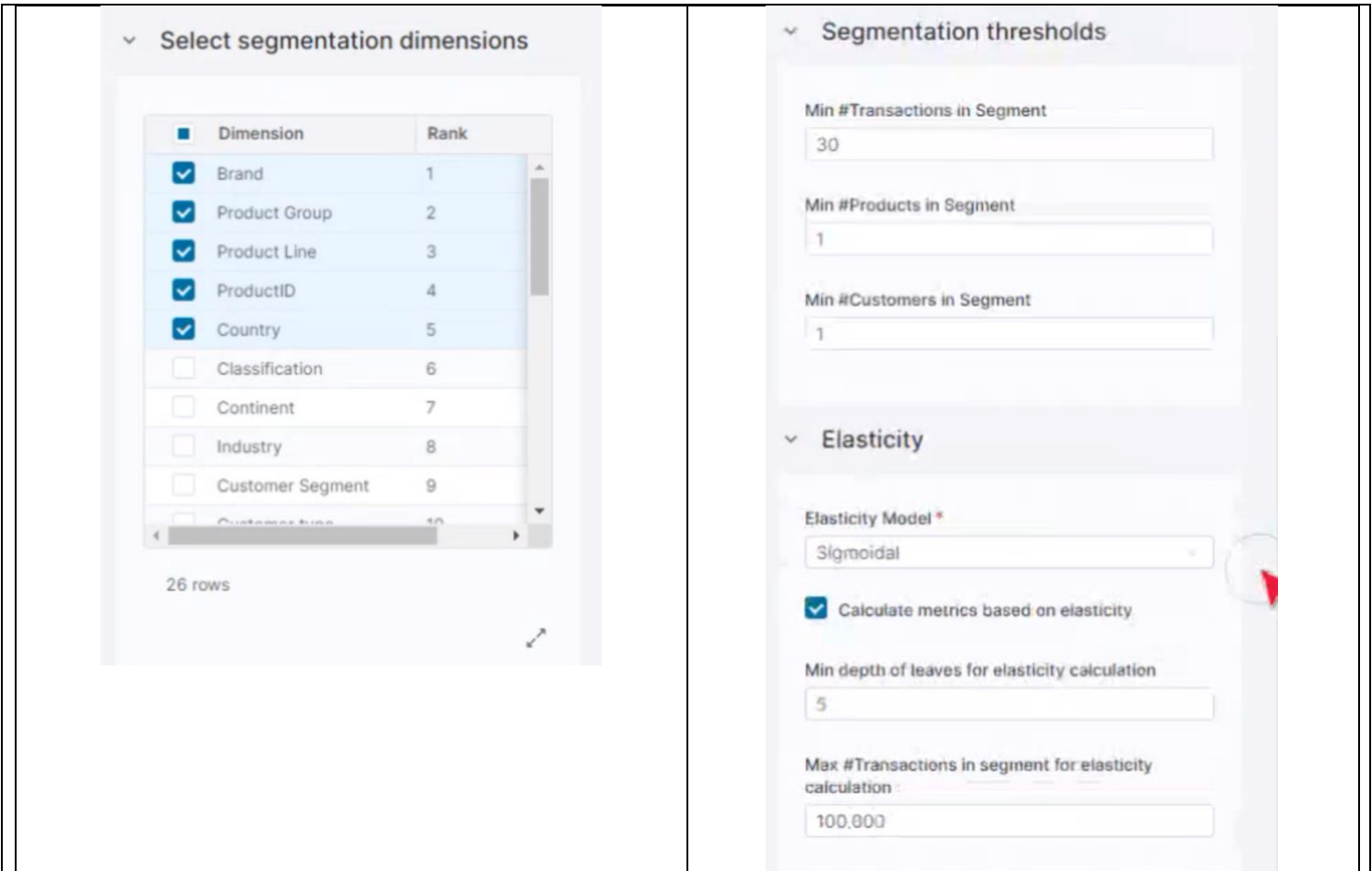
Figure 05b – Price Drivers Analysis.



4. Define segmentation structure: based on the analysis referenced in the prior step, the system will be able to automatically recommend the Price Drivers to form the basis of the segmentation. The system will rank the selected price drivers accordingly. However, it is important that the user review the recommendation and make an educated judgement that will drive the business moving forward. The user must complete two actions before creating the segmentation structure:

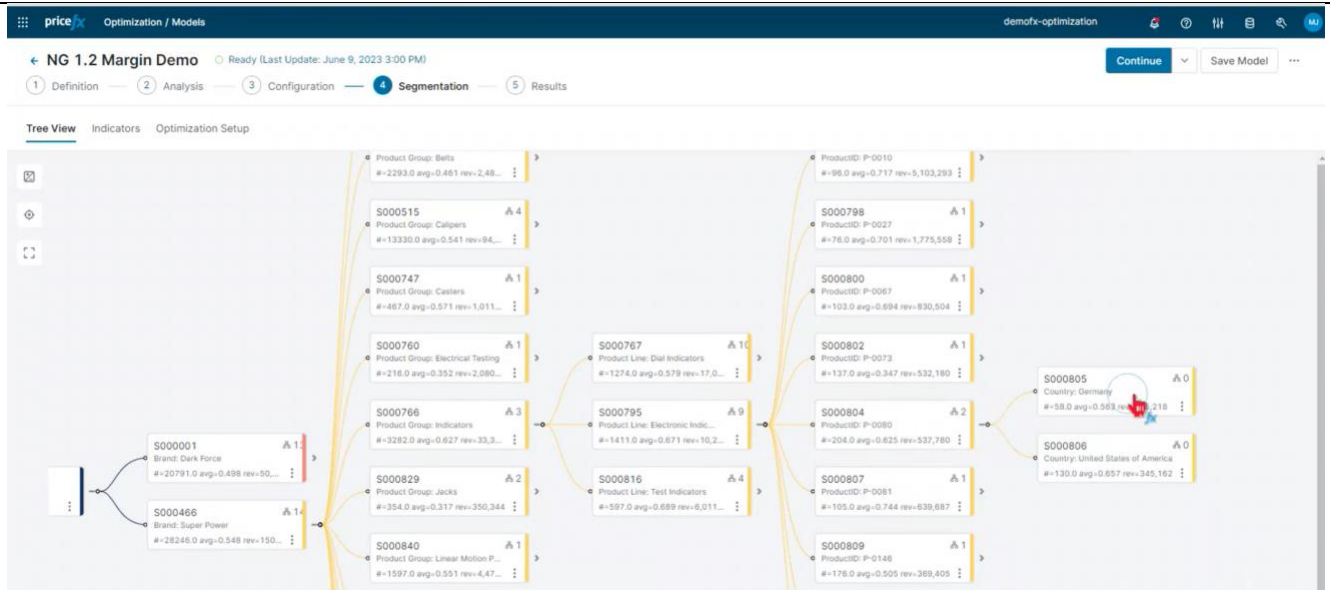
Select the segmentation dimensions.
Figure 06a – Select Price Drivers.

Determine the segmentation thresholds.
Figure 06b – Segmentation Parameters



5. Generate and visualize the Segmentation: based on the prior setup, and the system will generate the segmentation structure accordingly. The user will be able to visualize the segmentation and traverse the segmentation hierarchy as illustrated in the image below.

Figure 07 – Segmentation Visualization (Tree View).



For each one of those leaf nodes, the system will calculate corresponding metrics that will provide 360-degree view on the segments. The following images illustrates the difference metrics and analysis that are autogenerated for each leaf node:

Figure 08a – Segmentation leaf level metrics.

Metrics	
Label	Calculation Result
#Transactions	58
#Customers	20
#Products	1
Revenue	185,218
Margin	121,777
Margin%	65.70%
Quantity	4,000
CoV	11.72%
Elasticity Parameters	Show

Figure 08b – Segmentation metric distribution (at the leaf level).

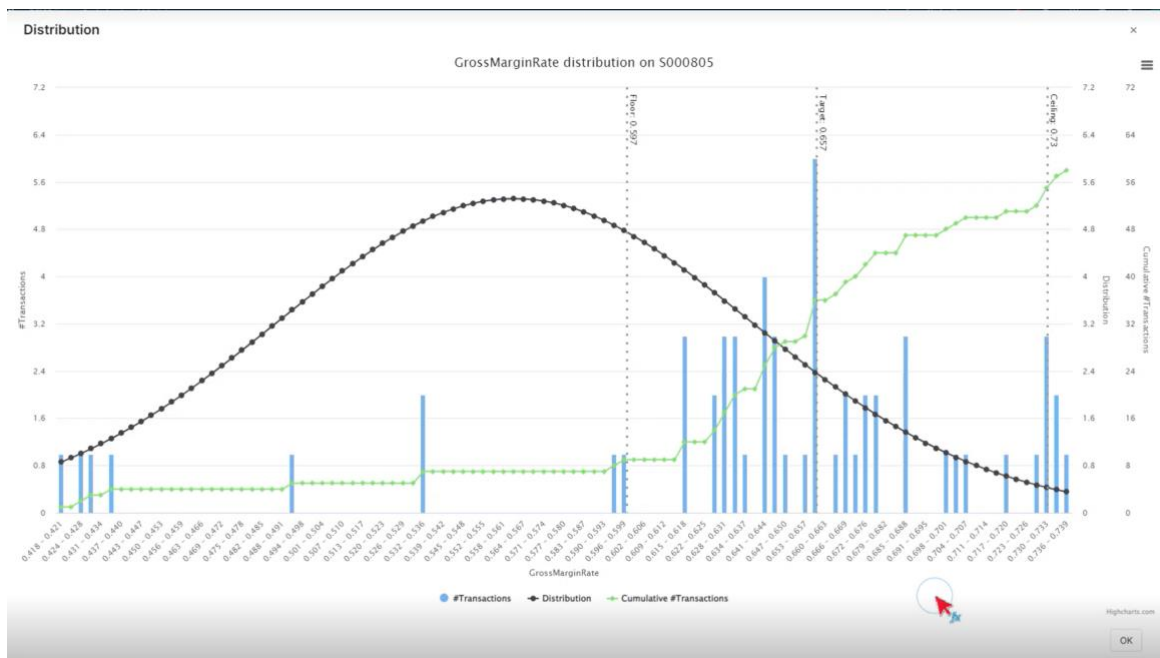
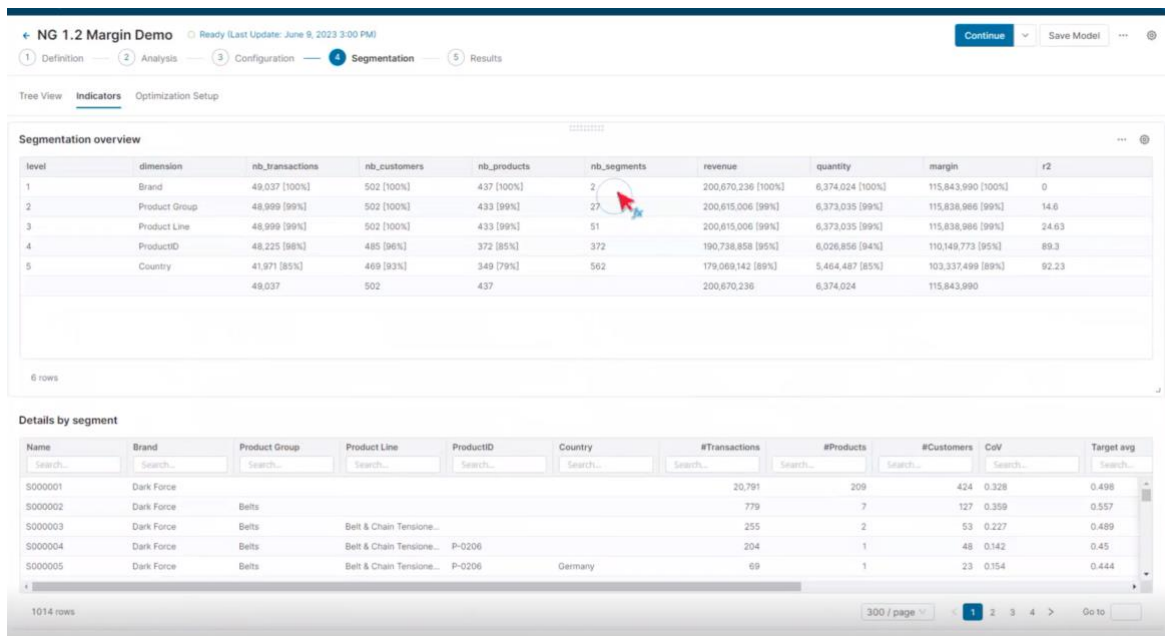


Figure 08c – Details by segment.



Once the segmentation structure is created, the user should be able determine the percentile parameters that will be used to calculate the Floor/Target/Ceiling margin recommendations for each one of those nodes.

Figure 09a – Floor/Target/Ceiling percentiles' setup.

Strategy Positioning - Percentiles

Use percentile values from parameters table when present

Default Floor Percentile * ?

15

Default Target Percentile ?

53

Default Ceiling Percentile * ?

90

In parallel and as part of helping the user understand the financial impact on the revenue and margin. The user can provide assumptions around the expected margin attainment. The image below illustrates those hypothesis parameters will be used to calculate the financial impact once the final recommendations are calculated:

Figure 09b – Setting up the Floor/Target/Ceiling impact parameters.

Impact Assessment Hypotheses

Below floor: move toward floor by (%) ?

100

Between floor and target: move toward target by (%) ?

25

Between target and ceiling: move toward target by (%) ?

25

Above ceiling: move toward ceiling by (%) ?

0

6. Final Recommendations:

The final recommendations are stored in the “Results” step within solution. The Results step consists of 4 components:

- a) **Impact:** is a prescribed dashboard that provides descriptive sets of charts and analytics that help quantify the potential uplift. Additionally, it will provide capabilities on slicing and dicing

the analysis to help the user quickly understand the quality of the potential uplift using the different levels of the segmentation.

Figure 10a – Impact Analysis at the highest level (root) of the segmentation

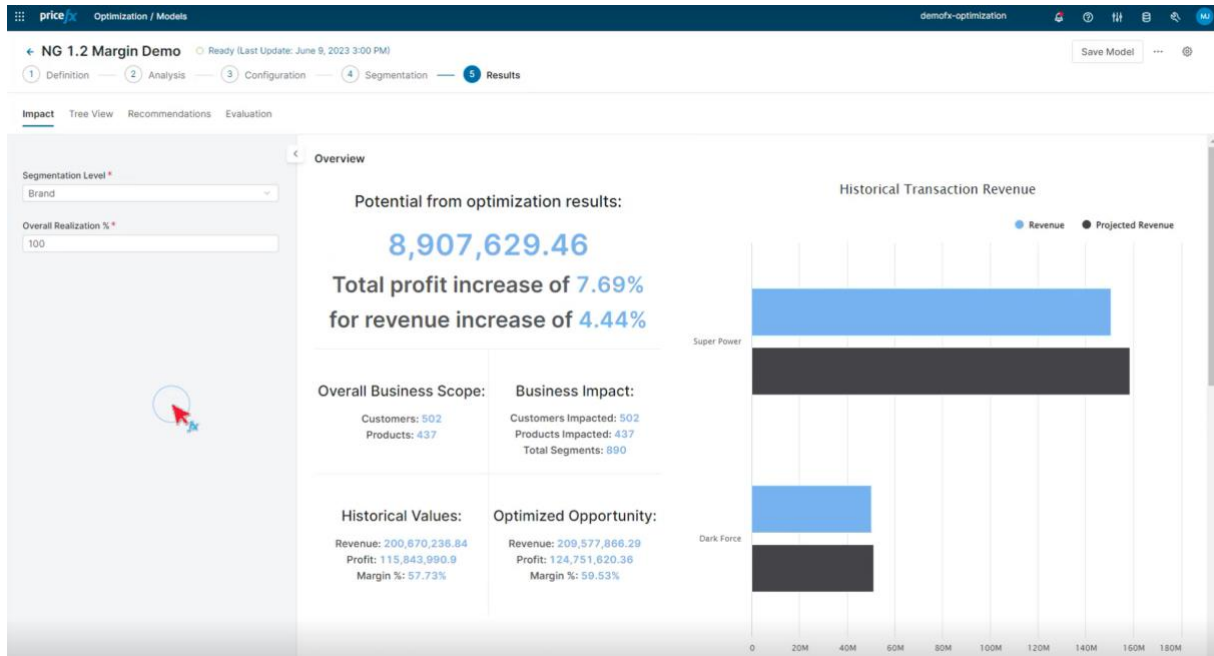
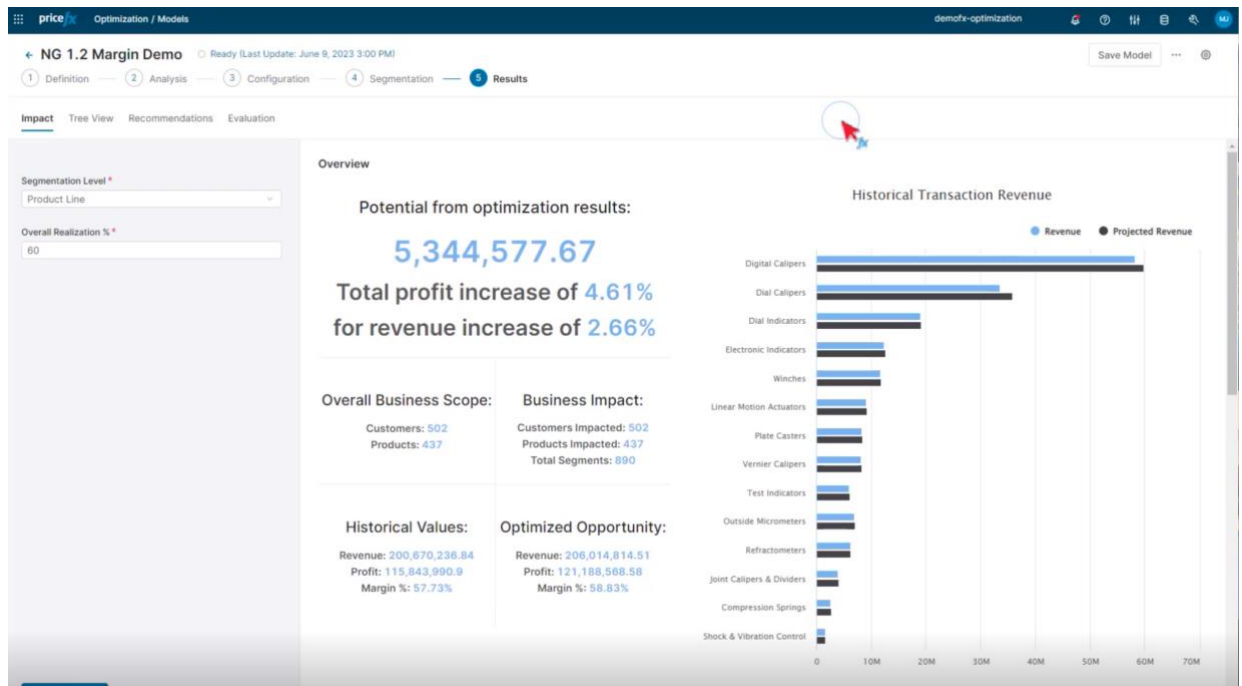


Figure 10b – Impact Analysis at the lower level (leaf) of the segmentation



Note: The Potential uplift is assessed for each line of transaction DataMart that is considered part of the data scope. Each transaction will be enriched with Floor/Target/Ceiling Margin % along with the Segment ID. Using the historical Cost of Goods Sold for each transaction, the equivalent Floor/Target/Ceiling prices will be calculated and enriched.

- b) **Tree View:** it is similar view as in figure # ..., the view tree view will be updated with the segment level Price Recommendations

Figure 10c - Segmentation level metrics

Label	Calculation Result
Method	Fixed Target Percentile
Floor Percentile	15
Target Percentile	53
Ceiling Percentile	90
Floor	0.436
Target	0.509
Ceiling	0.624
Projected Volume	69,360.49
Projected Volume Delta	2,305.49
Projected Revenue	7,886,388.51
Projected Revenue Delta	911,288.44
Projected Margin	4,593,494.45
Projected Margin Delta	717,771.22
Price Δ%	-5.19%
Margin% Δ	-4.70%

- c) **Recommendations:** within this tab, all segment level recommendations will be stored in a table view. This table will be considered the source of truth for all the data that will be consumed in the downstream processes. Such as Pfx Quoting.

Figure 10c – Segmentation Results

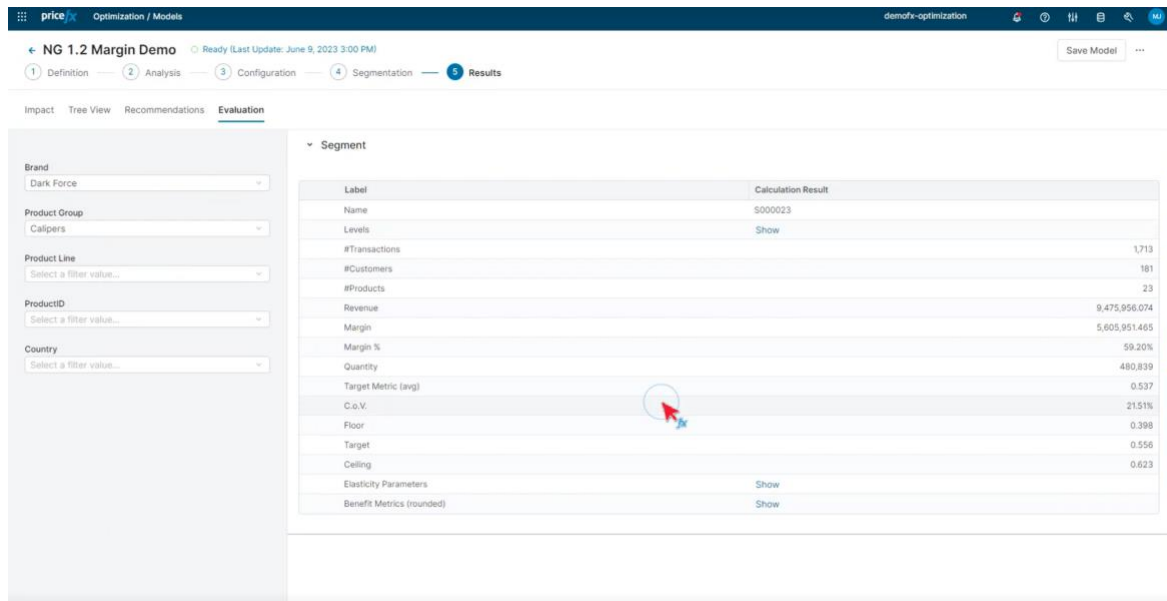
Name	ProductID	Country	Product Group	Product Line	Brand	#Transactions	#Products	#Customers	SSE	Divergence to Normal
S000001					Dark Force	20,791	209	424	586,765	0.479
S000002			Belts		Dark Force	779	7	127	30,989	1.209
S000003			Belts	Belt & Chain Tensione...	Dark Force	255	2	53	3,779	1.899
S000004	P-0206		Belts	Belt & Chain Tensione...	Dark Force	204	1	48	0,968	0.863
S000005	P-0206	Germany	Belts	Belt & Chain Tensione...	Dark Force	69	1	23	0,356	0.999
S000006	P-0206	United States of Ame...	Belts	Belt & Chain Tensione...	Dark Force	124	1	22	0,574	1.173
S000007	P-0463		Belts	Belt & Chain Tensione...	Dark Force	51	1	16	0,016	1.591
S000008	P-0463	United States of Ame...	Belts	Belt & Chain Tensione...	Dark Force	33	1	9	0,011	1.445
S000009			Timing Belts		Dark Force	524	5	124	27,077	1.602
S000010	P-0268		Timing Belts		Dark Force	179	1	45	0,382	2.259
S000011	P-0268	Germany	Timing Belts		Dark Force	68	1	20	0,13	1.253
S000012	P-0268	United States of Ame...	Timing Belts		Dark Force	99	1	22	0,242	1.402
S000013	P-0305		Timing Belts		Dark Force	79	1	28	0,368	1.471
S000014	P-0305	Germany	Timing Belts		Dark Force	46	1	15	0,211	2.361
S000015	P-0305	United States of Ame...	Timing Belts		Dark Force	33	1	13	0,129	1.153
S000016	P-0372		Timing Belts		Dark Force	92	1	37	0,327	0.776
S000017	P-0372	Germany	Timing Belts		Dark Force	47	1	19	0,122	0.839
S000018	P-0372	United States of Ame...	Timing Belts		Dark Force	39	1	16	0,154	0.85
S000019	P-0403		Timing Belts		Dark Force	42	1	19	0,044	1.241

Each line in this table consists of the relevant data associated with each leaf of the segmentation tree. Such data includes:

- Segment ID
- Segmentation Dimensions
- # of Transactions, # of Products, # of Customers
- Statistical values such as: Sum of Error Squared, Divergence to Normal, Coefficient of Variation, Weighted Coefficient of Variation, Standard of Deviations, Weighted Standard of Deviation, Average, and Weighted Average
- Segment level Revenue and Margin
- Segment level Floor/Target/Ceiling percentiles
- Segment level Floor/Target/Ceiling Margin %'s
- Elasticity
- Projected Quantity associated with Floor/Target/Ceiling
- Relevant Revenue/Margin/Quantity deltas.

d) **Evaluation:** within this tab, the user will be able to retrieve the recommendations based on input values that is associated with the segmentation level.

Figure 10d – Retrieving Guidance for evaluation purposes.



Input Data

- 2 years of Billing data (Covered in use case CHEM00)
 - All relevant waterfall elements are available at each line of the billing data. (Pocket Price, Gross Margin, Quantity)
- Customer and Product Masters (Covered in use case CHEM00)

Out-of-scope business functions and features (Can be configured, but not included in the Chemical Industry Catalog)

- Data transformation to enrich each line of the billing data with the relevant waterfall elements. (Cost, Margin Pct)
- Cross Segments rationality rules.
- Customer's level recommendations
- More than one segmentation
- Derived or calculated attributes as potential pricing drivers

Implementation Level of Effort

General Negotiation Guidance Implementation Process

	Discovery, Design and Execution Planning	Configuration and Functionality Acceptance	Optimization Engine Tuning
Description	✓ Understand how to map a customer's pricing scenario(s) to the negotiation guidance solution in order to finalize how the negotiation guidance solution should be leveraged	✓ Configure the functionality of the negotiation guidance solution to align with a customer's business objectives as defined in the design phase. At the end of this phase, the configuration of price optimization will be complete	✓ Run multiple test through price optimization process with different plausible scenarios to validate, and if necessary, adjust platform settings.
Pfx Deliverables	✓ Design Document Outlining Workflow in the Price Optimization Model	✓ Functionality configured in price optimizer to execute the recommendations as described in the design document	✓ Tune platform to properly accommodate the customer's data size and computational needs of the price optimization calculations
Customer Deliverables	✓ Finalized user stories and acceptance criteria ✓ Data that coincides with agreed upon data structure for price optimization	✓ Functionality testing ✓ Fully integrated and processed data required as an input for optimization	✓ Sign-off on Price Optimization Functionality
Estimated Timeline	2 - 3 Sprints	2 - 3 Sprints	1 - 2 Sprints
Person Days per 3-week Sprint	20	20	15

*Based on single Machine Learning Model

Base Line Projected Annual Impact*

Prescribed User Stories

Use Story Name	I want to...	so I can ...	Acceptance criteria
Epic: As a Pricing Manager, Pricing Analyst, Data Scientist Manager, I want to setup a science-based segmentation model based on the relevant price drivers, so I can empower the sales team with negotiation guidance to improve the overall all company financial metrics.			
DataMart Setup	Setup a DataMart for Price Optimization with the necessary fields	Properly: 1) set up the negotiation guidance process. 2) filter data that should not be included in the negotiation guidance process.	- Required a) The DataMart must include all the required data elements outlined in step 1 described in the solution design section. b) The DataMart should contain up to 12 potential attributes that may be used in the segmentation structure. c) The DataMart must include all data required to isolate the data that will be used in price optimization. - Optional The DataMart must include any derived attribute that may be considered for use in the segmentation structure
Historical Customer Spend (Derived Attribute)	the system to automatically classify my customers based on their historical revenue spend	I can consider using this classification as criteria to set pricing	Required <ul style="list-style-type: none"> The system will calculate the historical spend of each customer based on the last X months of data. The system will order the customers based on their spending from lowest to highest. The system will calculate the running total of the

			<p>customers spend based on this ordering, allowing the system to calculate a percentile associated with this running total.</p> <ul style="list-style-type: none"> • The system will classify the customers into 3-8 groupings based on percentiles selected by the user. • The system will calculate the associated revenue “cut-off” points associated with the selected percentiles. • The system will allow the user to override the revenue cut-off points associated with the selected percentiles. • The system will construct a table containing each customer classified using this criterion. • In addition, the user should have the ability to override the automatically calculated classification for any customer in the table
Negotiation Guidance Setup	be able to define the input entities and metrics that should be used in the price optimization process and to define the data that should be excluded/included to assure that only relevant data is processed	Generate results (recommendations) that are meaningful to my business	<ul style="list-style-type: none"> • The user should be able to define both the customer and product entities. • The user should be able to define the optimized metric as either margin % or discount% • The user should the option to define a weight measure which price optimizer will use to define the relative importance of a transaction if the user chooses to do so • The user should be able to exclude data from the analysis by using filters that can be applied to any field in the Datamart
Data Profiling	understand the impact of my filters on the data being used by Price Optimizer	determine that only the data relevant for price optimization is being considered	<ul style="list-style-type: none"> • The user should be able to see a breakdown of the impact of the filters on revenue, profits, quantity, customer count, product count, and transaction count. • The user should be able to see the following details for each field loaded: max/min value, cardinality, number of nulls and distinct values.
Select Price Drivers	select the attributes to consider in the segmentation so that the system can analyze their importance in explaining the historical variation	make an Informed decision when constructing a segmentation structure best aligned with my business objectives	<ul style="list-style-type: none"> • The user should be able to see a list of available attributes in the DataMart fed into the negotiation guidance process.

			<ul style="list-style-type: none"> The user should be able to select the attributes that the user would like to consider for the segmentation structure
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Scope Validation and Project Readiness Workshop – Validation Questions:

Questions		Answers	
Q1		A1	
Q2		A2	
Q3		A3	
Q4		A4	
Q5		A5	
Q6		A6	
Q7		A7	
Q8		A8	
Q9		A9	
Q10		A10	
Q11		A11	
Q12		A12	
Q13		A13	
Q14		A14	