



Business Requirements Definition –Market Edge Associates

Consumer Pricing and Trade Promotions Analysis Tool

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I. Overview

The purpose of this analytical tool is to automate a set of analyses commonly performed as part of the client work Market Edge Associates does in trade marketing and consumer pricing. It can / should be used whenever the user is conducting an “outside in” analysis to identify the general structure of a category or to identify the drivers of performance from trade promotions.

There are five types of analyses that should be enabled with this tool. All of these analyses leverage the same basic raw data (weekly syndicated / POS data).

1. Event level analysis

- *Identifying Promotion Activities* - The major and most involved analysis in the tool is to identify discrete promotion activities based on weekly POS or syndicated data. This involves both identifying when promotion activity is occurring and aggregating weeks into discrete promotion periods. The result of this analysis is a data table of individual promotions, with both performance metrics and causal attributes of each event.
- *Co-Promotion Analysis* – Evaluating the performance effects from promotion for two products that are often promoted together. Building on the base table of individual promotions, this analysis is just a specific representation of the data based on the user selection of two products.

2. Base volume analysis

- Simple graphical time series plot of one measure (*Base Volume*) indexed to a rolling 26-week average.

3. Consumer pricing diagnostics

- *Brand Ladder Analysis* – Graphical plot of consumer pricing at the brand level for multiple brands in a selected category. For each brand, the graph will plot the average *Everyday Price*, the average *Promoted Price*, and the *Average Shelf Price* for the user-defined time period. Summary data would be displayed in a table below the graph (e.g., total volume, Category \$ Market Share, % Volume Promoted).
- *Price Pack Curve Analysis* - Graphical plot of consumer pricing at the pack size level for a single brand. This analysis requires the user to define the size for each product included in the analysis. For each size, the graph will display the average *Everyday Price*, the average *Promoted Price*, and the option of displaying *Average Shelf Price* for the requested time period.

4. Elasticity Analysis – There are two types of elasticity analyses that could be automated:

- *Promoted Price elasticity* – For a selected product (single selection) and customer (multi-select), derive the elasticity based on the weekly change in



volume vs. change in price, including the graphical plot of the data, the fitted line (the slope of which is the elasticity) and the associated R squared value. This analysis should also allow the user to exclude designated outlier data points from the fitted line / regression and resulting elasticity value derivation.

- *Cross-Product elasticity* – Similar to the Promoted Price elasticity, this analysis is based on the weekly change in volume across products vs. the change in price gap between those products. The analysis is conducted on two products that are designated by the user to be competitive, for a selection (multi-select) of customers.
- 5. *Cross-Customer Analysis* – This analysis will show graphically the change in volume and lift when a selected product (single select) is promoted exclusive of a competitive customer vs. simultaneously with that customer.

End user computing

Users will run this tool as a client application in single instances. Users will operate in both Windows and Mac OS environments. Windows users will have Microsoft Office, either 2007 or 2010 versions. Mac OS users will have MS Office for Mac 2011.

II. Initial Set Up

Across all analyses, there are three dimensions to the data: product, customer, and time.

Before running any specific analysis, the user must go through the following steps:

1. Load the syndicated data to be analyzed
2. Set Scope of Analysis across Time, Product and Customer
3. For each of the following dimensions, enter additional reference data in the Reference Tables that will be generated by the tool:
 - Time
 - Product, including mapping competitors
 - Customer

Step 1: Load Syndicated data

The user starts by inputting syndicated data that may be based on Nielsen, IRI or Point of Sale (POS) data. The syndicated data should contain weekly total and promotional volume statistics for selected product/customer combinations. The syndicated data should also be able to be entered into the tool in “raw” form (as received from the different sources such as Nielsen, IRI, NPD etc.) and then transformed into a standard representation as defined in the table below. For examples of what “raw” data would look like, please refer to the answer key.

Below is a list of the metrics that the tool should accept from the syndicated data, and whether their inclusion is mandatory or simply recommended. A metric that is labeled as required means that if the uploaded data does not include data for that metric the tool will **not** upload the data and will instead spit out a relevant error message (e.g. Tool can not run because Total sales (\$) data is not populated). A metric that is labeled as optional means that the data will upload whether or not the metric is populated. It is important to



note that if certain optional metrics are not populated, some of the analyses will not be able to be run.

Information type	Metric/ Measure	Format	Required?
Descriptive information	Product name	Text	Yes
	Account name	Text	Yes
	Week ending	Date	Yes
Volume information	Total sales (\$)	Number	Yes
	Non-promoted sales (\$)	Number	Optional
	Promoted sales (\$)	Number	Yes
	Total volume sold (Units)	Number	Yes
	Base volume (Units)	Number	Yes
	Incremental volume (Units)	Number	Yes
	Promoted volume sold (Units)	Number	Yes
	Non-promoted volume sold (Units)	Number	Yes
	Total volume sold (EQ units)	Number	Optional
	Promoted volume sold (EQ units)	Number	Optional
	Non-promoted volume sold (EQ units)	Number	Optional
Pricing information	Non-promoted price	Number	Yes*
	Promoted price	Number	Yes*
Promotion execution information	% ACV Wtd Distribution	Percentage	Optional
	% ACV Any Promo	Percentage	Optional
	% ACV TPR only	Percentage	Optional
	% ACV Feature only	Percentage	Optional
	% ACV Display only	Percentage	Optional
	% ACV F&D	Percentage	Optional
Category Sales	Category total \$ sales	Number	Optional
	Category EQ volume	Number	Optional

*Could be populated or derived if not loaded by user:

- If populated from the data, then leave the populated value
- If blank, then do the following calculations:

▪ **Non-promoted price:**

$$\frac{\text{Non - promoted sales (\$)}}{\text{Non - promoted volume sold (Units)'}} \quad \text{where}$$

$$\text{Non-promoted sales (\$)} = \text{Total sales (\$)} - \text{Promoted sales (\$)}$$

$$\text{Non-promoted volume sold (Units)} = \text{Total volume sold (Units)} - \text{Promoted volume sold (Units)}$$

▪ **Promoted price:**

$$\frac{\text{Promoted sales (\$)}}{\text{Promoted volume sold (Units)}}$$



Step 2: Set Scope of Analysis

User should select the following:

- Products they want to include in the analysis from a drop down menu or pick list. The potential products should be generated based on what data was included in the raw syndicated data.
- Customers they want to include in the analysis from a drop down menu or pick list. The potential customers should be generated based on what data was included in the raw syndicated data.
- To define the time period of the analysis, users should enter a start and end date in the mm/dd/yyyy format.

Defining the scope of data to include in the analysis is often helpful to improve performance. Many times the raw data is collected for large parts of a client's portfolio and the exclusion of the unneeded data is time intensive. Through this requirement we are leveraging the tool to segment the raw data while still eliminating the unneeded data from the computational intensive functionality performed later.

Step 3: Complete Reference data

Once the syndicated data is loaded and the user has set the scope of the analysis, three reference tables will be generated by the tool: Time, Product and Customer. In each of these tables, the user has the option to input additional reference data. Any additional reference data the user inputs in the tables will be used to in the event table.

Tool Dimension	Definitions needed (columns headers)	Format
Time	Week Ending*	Date
	Holiday	Free Text
	Week Relative to Holiday	Free Text
	Non-Trade Marketing Campaign	Binary- Yes/No
	Non-Trade Marketing Campaign Name	Free Text
	Seasonality 1	Free Text
	Seasonality 2	Free Text
Product	Product Name*	Text
	Business Unit	Free Text
	Brand	Free Text
	Category	Pick List
	Own Product	Binary- Yes/No
Customer	Account Name*	Text
	Parent	Free Text
	Hierarchy	Pick List- Chain/Non-Chain/Exclude
	Merchandising Type	Pick List- EDLP/ Hi-Lo
	Channel Type	Pick List- Mass / Grocery / Dollar / Drug / Club / Specialty / Convenience
	Region	Free Text



*These values are pulled from the syndicated raw data and will have already been auto populated in the Reference Tables. All other definitions are optional, so the analysis will still be able to run without the columns populated. It is important to note that if some of these dimensions are not user-populated, some of the other analysis (outside of the event table) will not be able to be run.

Mapping Competitor Products

If the user populates the Own Product column in the Product table, then a separate table will be generated to allow for the user to map competitor products. Once the product reference data has been completed, a table will be generated that gives a list (display in Column 1) of all products defined by the user as Own Product = “No”, where each product is a separate row. For each of these competitor products, the user should be able to select Own Products from a list auto populated by the products in which the Own Product column was defined as “Yes” (display in column 2). This competitor mapping will allow the user to do additional competitor analyses (e.g. it will inform the exclusivity columns in the event table)

III. Event Level Analysis

User Defined Thresholds

There are three basic tasks the user must do prior to the tool running the event level analysis:

1. Define Promotion Thresholds
2. Define Tactic Type Thresholds
3. Define Exclusivity Thresholds

1 Define Promotion Thresholds

The first task is to define the criteria that constitute a week being “on promotion”. There are four potential criteria that can be used with syndicated data to measure whether a week is on promotion:

- **% Price discount**

- By week:

$$\% \text{ Price Discount} = \frac{(\text{Weekly Everyday Price} - \text{Promoted Price})}{\text{Everyday Price}}, \text{ where}$$

$$\text{Everyday Price} = \frac{\text{Non - promoted sales (\$)}}{\text{Non - promoted volume sold (Units)}}$$

$$\text{Promoted Price} = \frac{\text{Promoted sales (\$)}}{\text{Promoted volume sold (Units)}}$$

- While the syndicated data includes the value “Non-promoted price” (equivalent to Everyday Price), the *Weekly Everyday Price* used to calculate the weekly % Discount will **NOT** use this value. Instead, we



need to derive a *Weekly Everyday Price* value for each week following the steps below:

1. For each week, calculate the % Volume Promoted

$$\% \text{ Volume Promoted} = \frac{\text{Promoted volume sold (Units)}}{\text{Total volume sold (Units)}}$$
 2. The *Weekly Everyday Price* will be calculated as follows:
 - If % Volume Promoted < 20%, then Weekly Everyday Price = Non-promoted sales (\$) / Non-promoted volume sold (Units)
 - If % Volume Promoted ≥ 20%, then the Weekly Everyday Price is taken from the first week prior for that customer & product combination where the % Volume Promoted is less than 20%
 - If the % Volume Promoted ≥ 20% AND the week is the first week of data for that customer and product combination, then the Weekly Everyday Price is taken from the first week after for that customer & product combination where the % Volume Promoted is less than 20%
- Users should enter the threshold as a real number value between 0-100%
 - **% Volume promoted**
 - By Week,

$$\% \text{ Volume promoted} = \frac{\text{Promoted volume sold (Units)}}{\text{Total volume sold (Units)}}$$
 - Users should enter the threshold as a real number value between 0-100%
 - **Lift %**
 - By Week,

$$\text{Lift \%} = \frac{\text{Incremental volume (Units)}}{\text{Base volume (Units)}}$$
 - Users should enter a real number value between 0-100%
 - **% ACV Any Promo**
 - Not calculated, will be a direct comparison with the measure % ACV Any Promo
 - Users should enter an integer value 0-100%

The user should be allowed to specify multiple criteria to be simultaneously applied. The criteria should be an “OR” condition—if any of the specified criteria are met for the given week, then that week is considered to have promotional activity. We believe the user flow for this should be to first select the criteria to be used in the analysis, then to define the threshold values for only the chosen criteria.

Important: Upon entering the analysis, the user must select which method to use in identifying weeks of promotions. The tool will then conduct the analysis and display the results. It is likely that the user will iterate with the data during this time as they adjust the settings to obtain a reasonable set of promotion results (e.g., they may start



with a lift threshold of 100%, see that only a few events are identified, try 60% for threshold, see that there are now 12 events). Therefore, the tool must make it simple and speedy for the user to iterate numerous times—entering in different promotion threshold values and pulling an event table.

2 Defining an Tactic Type Thresholds

The tactic type for the event is assigned based on comparing different %ACV values against user defined thresholds. These threshold values could be set as universal values, differentiated by product, differentiated by customer, or differentiated at the intersection of product and customer. The user must (required) first enter a universal threshold value for each tactic type:

- Feature and Display
- Feature Only
- Display Only
- TPR Only

These values are to be used across all products and customers *unless* the user further designates an exception/override value as needed. Users can override the “universal” values in two steps:

1. *Select product exceptions.* The user may select products that require threshold values different than the universal values. They should make these selections through a multi-select pick list and then enter the corresponding new thresholds in columns to the right of each selected product (one column for each tactic type).
2. *Choose whether to make additional exceptions to customers.* Users may choose to further customize the values by customer. The user should indicate they wish to over-ride values by customer. They will then be given a grid with all products in rows and the tactic type values as columns. The customer should be selected from a drop down box at the top. The tactic type values automatically populate using the entered universal and product exception values as appropriate. Users may then edit individual cells or copy and paste values across rows and columns as necessary. The user should be able to “Save Changes” and then select a new customer from the drop down box and repeat as necessary.

Tactic Type can be defined by week by comparing %ACV types to the user-inputted %ACV thresholds in the following hierarchal order:

- If %ACV *F&D* > entered threshold, then the tactic type is “Feature and Display”, if not, look at %ACV Display Only
- If %ACV *Display Only* > entered threshold, tactic type is “Display Only”, if not, look at %ACV Feature Only
- If %ACV *Feature Only* > entered threshold, tactic type is “Feature Only”, if not, look at %ACV TPR Only
- If %ACV *TPR Only* > entered threshold, tactic type is “TPR Only”, if not, tactic type is “Unknown”



3 Defining an Exclusivity Threshold

For an event to be labeled “Exclusive”, it must be on promotion without any competing products concurrently on promotion. However, it is often the case that two (or more) promotions may minimally overlap, making it unclear whether they should be characterized as running concurrently or exclusively. To this end, the user must enter what percent of the time (*Duration (Weeks)*) a event must run *without competition* to be labeled “Exclusive” (the threshold value) as part of the set-up to the event analysis. This should be entered as a real number % between 0 and 100.

How the Tool should Identify Promotion Activities

After the user defines the promotion thresholds, the tactic type thresholds and exclusivity thresholds, the tool can run the event table analysis.

Defining discrete promotion events

A trade promotion event is defined as a set of consecutive weeks (for a given product and customer) deemed on promotion (given the user defined promotion thresholds) with a common promoted price point. Once the weeks of promotion have been established with the user defined promotion thresholds, the tool must transform the weekly promotion data into discrete events based on the following logic:

- If there is only one consecutive week of promotional activity for a specific product/customer combination, then it should be considered as its own promotional event.
- If there are more than one consecutive weeks of promotional activity for a product/customer combination, the tool should decide if/how to separate those weeks of promotion by looking at the % change in *Promoted Price* across those weeks:
 - 1 Calculate the change in promoted price points from week to week in the consecutive group of weeks. Beginning in the second consecutive week,

$$\% \text{ Change in Promoted Price} = \frac{(\text{Promoted Price}_n - \text{Promoted Price}_{n-1})}{\text{Promoted Price}_n}$$
 - 2 If the (% change in Promoted Price > 5%) OR (% change in Promoted Price < -5%), then that week and the week prior should be considered different promotional events
 If the $-5\% \leq (\% \text{ change in Promoted Price}) \leq 5\%$, then that week and the week prior should be considered part of the same promotional event.
 - 3 Calculate the Promoted Price for each discrete promotional event

$$\text{Promoted Price} = \frac{\sum \text{Promoted sales } (\$) \text{ across all weeks in promotion}}{\sum \text{Promoted volume sold (Units) across all weeks in promotion}}$$
 - 4 Before finalizing the weeks associated with a promotion, a second iteration that will compare the % change in promoted price between consecutive events should occur. This time, the comparison is of the Promoted Price of two consecutive promotions (NOT the weekly values).



- If the (% change in Promoted Price > 5%) OR (% change in Promoted Price < -5%), then those events should be remain separate and no additional transformations should take place.
- If the $-5\% \leq (\% \text{ change in Promoted Price}) \leq 5\%$, then that week and the week prior should be considered part of the same promotional event, then those promotional events should be (re-) aggregated into one single event.

Output: Event Table

After the tool aggregates weeks of promotion into discrete promotional events, the tool will populate the final event table. The event table *must* be easily viewed in Excel and be “pivot ready” to enable more in depth, project specific analysis. For the event table, each row will be a single discrete event, whereas each metric will be a column.

Below is a summary of what metrics will be contained in the event table and their respective calculations.

Metric	Calculations
Product	Same as Weekly Data
Product Brand	Lookup from product reference data
Own Product	Lookup from product reference data
Customer	Lookup from “Account name” in customer reference data
Parent	Lookup from customer reference data
Hierarchy	Lookup from customer reference data
Channel	Lookup from customer reference data
Merchandising Type	Lookup from customer reference data
Region	Lookup from customer reference data
Event Start (Week Ending)	First Week of the Promotion
Event End (Week Ending)	Last week of the Promotion
Duration (Weeks)	Event End (Week Ending) – Event Start (Week Ending) + 1
Fund Year	Year from the Event Start (Week Ending) date
Holiday	Lookup from time reference data
Relative Week to Holiday	Lookup Event Start (Week Ending) date from time reference data
Seasonality 1	Lookup Event Start (Week Ending) date from time reference data
Seasonality 2	Lookup Event Start (Week Ending) date from time reference data
Co-Marketing	Lookup Event Start (Week Ending) date from “Non-Trade Marketing Campaign” in time reference data
Co-Marketing Name	Lookup Event Start (Week Ending) date from “Non-Trade Marketing Campaign Name” in time reference data
Total \$ Sales	Σ (Total \$ Sales) across all weeks in the promotion
Total \$ Promo Sales	Σ (Total Promoted Sales (\$)) across all weeks in the promotion



Total Promoted Volume (Units)	Σ (Total Promoted Volume (Units)) across all weeks in the promotion
Total Volume (Units)	Σ (Total Volume sold (Units)) across all weeks in the promotion
Base Volume (Units)	Σ (Base Volume (Units)) across all weeks in the promotion
Incremental Volume (Units)	Σ (Incremental Volume (Units)) across all weeks in the promotion
% Lift	$\frac{\Sigma \text{Incremental volume (Units) across all weeks in promotion}}{\Sigma \text{Base volume (Units) across all weeks in promotion}}$
% Volume Promoted	$\frac{\Sigma \text{Total promoted volume (Units) across all weeks in promotion}}{\Sigma \text{Total volume sold (Units) across all weeks in promotion}}$
Everyday Price	Weekly Everyday Price, taken from the first week of promotion
Promoted Price	$\frac{\Sigma \text{Total promoted sales (\$) across all weeks in promotion}}{\Sigma \text{Total promoted volume (Units) across all weeks in promotion}}$
% Price Discount	(Everyday Price – Promoted Price)/Everyday Price
Tactic Type	<p>If all weeks are the same Tactic Type, then the promotion is defined as that Tactic Type</p> <p>Otherwise:</p> <p>If one of the weeks in promotion = F&D, then promotion is F&D Tactic Type</p> <p>If no F&D, then if one of the weeks in promotion = Display Only, then promotion is Display Only Tactic Type</p> <p>If no Display Only, then if one of the weeks in promotion = Feature Only, then promotion is Feature Only Tactic Type</p> <p>If no Feature Only, then if one of the weeks in promotion = TPR Only, then promotion is TPR Only Tactic Type</p> <p>Otherwise, Unknown</p>
% ACV F&D	Max value from across all weeks of the promotion
% ACV Display Only	Max value from across all weeks of the promotion
% ACV Feature Only	Max value from across all weeks of the promotion
% ACV TPR Only	Max value from across all weeks of the promotion
% ACV Any Promo	Max value from across all weeks of the promotion
% ACV Wtd. Dist.	Max value from across all weeks of the promotion
Exclusivity to Competitor/ Exclusivity to [Insert Product Name]	<ol style="list-style-type: none"> 1. Lookup if the Product has any competitors mapped in Competitor Mapping 2. If the product does not have any competitors mapped, the value should be “No Competitor” 3. If the product has only one competitor, then this is the only column that should be inserted. 4. If the product has more than one competitor, create a column for each competitor labeled: “Exclusivity to [Insert Product Name]”. E.g. If Product 1 is “Own Product” and it has 3 competitors (Product 2, Product 3,



- Product 4), then four columns should be created—
Exclusivity to Competitor, Exclusivity to Product 2,
Exclusivity to Product 3, and Exclusivity to Product 4
5. Each row should be labeled “Exclusive” or “Non-Exclusive” by the following calculations-

If there is only one competitor and only the Exclusivity to Competitor Column OR If it’s the Exclusivity to [Insert Product Name] column:

- For each event: Promotion should be evaluated for overlapping time to the competitor product by comparing Promotion Start (week ending) and Promotion End (week ending) dates across events.
- Where any overlap is occurring across events, then the % of the duration of the promotion event that is overlapped with the competitor product should be compared against the user defined threshold
 - If calculated % overlap > (1 – Threshold), then the promotion is “Non-exclusive”
 - Else, the promotion is “Exclusive”

For example, if the user inputs 60%, then for every event, the promoted product must have no competing products on promotion at least 60% of the duration to be “Exclusive”.

If there is more than one competitor, then the Exclusivity to Competitor column will be calculated as follows:

If **ANY** of the Exclusivity to [Insert Product Name] is “Non-Exclusive”, then label the Exclusivity to Competitor column as “Non-Exclusive”. Otherwise, Exclusive

Category Total \$ Sales	Σ (Category Total \$ Sales) across all weeks in the promotion, for that Product & Customer combination
Category Volume EQ	Σ (Category Volume EQ) across all weeks in the promotion, for that Product & Customer combination
Derived Spend on Price Discount	Total Volume for the Promotion*(Everyday Price-Promoted Price)

Note: %ACV is metric that is unique to syndicated data. It is a generic term that can describe different measures depending on the context. In this tool, ACV values are used related to promotional merchandising activities, but all labels should be fully displayed to avoid user confusion



Co-Promotion Analysis

The user should start the Co-Promotion Analysis by clicking a button at the bottom of the event table. The Co-Promotion Analysis will then use inputs and the event table data to display the difference in lift when two products from the same company are promoted together vs. individually.

The user should first input the following:

- *Customer(s)*: Multi-select pick-list automatically populated from Customer Reference Data
- *Product*: Select two products from pick-list(s) that is auto populated from Product Reference Data where the column Own Product = “Yes”. The first product picked will be referred to as “Product 1”, the second, “Product 2”.
- *Start Date/End Date*: The start date and end date entered in the initial set up should automatically populate (see Step 2: Set Scope of Analysis, pg. 4). However, the user may edit these dates in mm/dd/yyyy format in order to analyze a subset of the data initially entered into the tool.
- *Co-Promotion Threshold*: Similar to exclusivity, users should choose what percent of the time (*Duration (weeks)*) the primary product must overlap with a secondary product to be considered co-promoted. This should be entered as a real number % between 0 and 100. For example, if the user inputs 50%, then for every promotion event, promoted product 1 must be on promotion at least (\geq) 50% of the duration of promoted product 2 for the two products to be considered co-promoted.

Next, the Primary Product’s promotional events should be labeled as follows:

- If the overlap in duration of an event with the Secondary Product \geq to the entered threshold *and the event belongs to the same customer*, then that event should be labeled *Co-Promoted*
- If the overlap in duration of an event with the Secondary Product $<$ the threshold *and the event belongs to the same customer*, then that event should be labeled *No Co-Promotion*

After the user selection, the tool will run the Co-Promotion analysis. The tool will first filter through the Event Table and pull all the events that belong to the selected customer(s), product(s) and fall within the start/end date. The tool will then run two analyses on these events:

1. Use Product 1 as the Primary Product and label each of Product 1’s promotions as “Co-Promoted” or “Not Co-Promoted” based on the user defined Co-Promotion Threshold
 - If the overlap in duration of Product 1’s event with Product 2’s event \geq to the entered threshold *and the event belongs to the same customer*, then that event should be labeled *Co-Promoted*
 - If the overlap in duration of Product 1’s event with Product 2’s event \leq the threshold *and the event belongs to the same customer*, then that event should be labeled *Not Co-Promoted*



2. Use Product 2 as the Primary Product and label each of Product 2's promotions as "Co-Promoted" or "Not Co-Promoted" based on the user defined Co-Promotion threshold
 - If the overlap in duration of Product 2's event with Product 1's event \geq to the entered threshold *and the event belongs to the same customer*, then that event should be labeled *Co-Promoted*
 - If the overlap in duration of Product 2's event with Product 1's event \leq the threshold *and the event belongs to the same customer*, then that event should be labeled *Not Co-Promoted*

The tool will then produce two tables and give the following metrics by customer for Co-Promoted and Not Co-Promoted Events: 1) Total Volume, 2) Lift % and 3) Count of Events

Table 1: Product 1 is Primary, Product 2 is Secondary

	Co-Promoted			Isolated		
	Total Volume	Lift %	# of Events	Total Volume	Lift %	# of Events
Customer A	A	C	E	G	I	K
Customer B	A	C	E	G	I	K
Total	B	D	F	H	J	L

- A. Σ (Total Volume for Product 1 Promotions that are labeled as Co-Promoted) by Customer
- B. Σ (Total Volume for Product 1 Promotions that are labeled as Co-Promoted) across Customers
- C. Σ (Total Incremental Volume for Product 1 Promotions that are labeled as Co-Promoted) by Customer / Σ (Total Base Volume for Product 1 Promotions that are labeled as Co-Promoted) by Customer
- D. Σ (Total Incremental Volume for Product 1 Promotions that are labeled as Co-Promoted) across Customers / Σ (Total Base Volume for Product 1 Promotions that are labeled as Co-Promoted) across Customers
- E. Count the total number of Product 1 Promotions that are labeled as Co-Promoted
- F. Σ (Total number of Product 1 Promotions labeled as Co-Promoted) across Customers
- G. Σ (Total Volume for Product 1 Promotions that are labeled as Not Co-Promoted) by Customer
- H. Σ (Total Volume for Product 1 Promotions that are labeled as Not Co-Promoted) across Customers
- I. Σ (Total Incremental Volume for Product 1 Promotions that are labeled as Not Co-Promoted) by Customer / Σ (Total Base Volume for Product 1 Promotions that are labeled as Not Co-Promoted) by Customer
- J. Σ (Total Incremental Volume for Product 1 Promotions that are labeled as Not Co-Promoted) across Customers / Σ (Total Base Volume for Product 1 Promotions that are labeled as Not Co-Promoted) across Customers
- K. Count the total number of Product 1 Promotions that are labeled as Not Co-Promoted
- L. Σ (Total number of Product 1 Promotions labeled as Not Co-Promoted) across Customers



Table 2: Product 2 is Primary, Product 1 is Secondary

	Co-Promoted			Isolated		
	Total Volume	Lift %	# of Events	Total Volume	Lift %	# of Events
Customer A	M	O	Q	S	U	W
Customer B	M	O	Q	S	U	W
Total	N	P	R	T	V	X

- M. Σ (Total Volume for Product 2 Promotions that are labeled as Co-Promoted) by Customer
- N. Σ (Total Volume for Product 2 Promotions that are labeled as Co-Promoted) across Customers
- O. Σ (Total Incremental Volume for Product 2 Promotions that are labeled as Co-Promoted) by Customer / Σ (Total Base Volume for Product 2 Promotions that are labeled as Co-Promoted) by Customer
- P. Σ (Total Incremental Volume for Product 2 Promotions that are labeled as Co-Promoted) across Customers / Σ (Total Base Volume for Product 2 Promotions that are labeled as Co-Promoted) across Customers
- Q. Count the total number of Product 2 Promotions that are labeled as Co-Promoted
- R. Σ (Total number of Product 2 Promotions labeled as Co-Promoted) across Customers
- S. Σ (Total Volume for Product 2 Promotions that are labeled as Not Co-Promoted) by Customer
- T. Σ (Total Volume for Product 2 Promotions that are labeled as Not Co-Promoted) across Customers
- U. Σ (Total Incremental Volume for Product 2 Promotions that are labeled as Not Co-Promoted) by Customer / Σ (Total Base Volume for Product 2 Promotions that are labeled as Not Co-Promoted) by Customer
- V. Σ (Total Incremental Volume for Product 2 Promotions that are labeled as Not Co-Promoted) across Customers / Σ (Total Base Volume for Product 2 Promotions that are labeled as Not Co-Promoted) across Customers
- W. Count the total number of Product 2 Promotions that are labeled as Not Co-Promoted
- X. Σ (Total number of Product 1 Promotions labeled as Not Co-Promoted) across Customers

IV. Base Volume Analysis

The Base Volume Analysis will display a time series graph of weekly base volumes of user selected customer/product combinations. This analysis can be run on the formatted raw syndicated data.

The user should first input the following:

- *Customer(s)*: Multi-select pick-list automatically populated from Customer Reference Data
- *Product*: Single select pick-list automatically populated from Product Reference Data



Next, the tool should calculate a 26-week rolling average of *Base Volume* values for each week from the syndicated data. This calculation should be done for each specific product/customer combination.

For each week x from week 1 through week n , where n =the final week:

- For weeks 1 through 13, the *26 Week Average* is calculated by taking the average of *Base Volume* values for the first 26 weeks
- For week 14 through 13 weeks prior to the last week ($n-13$), the *26 Week Average* is calculated by taking the average of *Base Volume* values from week $(x-13)$ through week $(x+13)$
- For the last 13 weeks of the product customer combination, the *26 Week Average* is calculated by taking the average of base volumes of the final 26 weeks

The *Index* should be calculated as weekly *Base Volume* / *26 Week Average* by customer and product combinations for that week. If the user selects multiple customers, then the tool will need to aggregate the index values by calculating a weighted average using the *Base Volume* values for each customer: $[\sum(\text{Base Volume} \times \text{Index})]/[\sum \text{Base Volume}]$

The tool should then output the following:

- *Time-Series Chart*: plot of *Index* (y-values) by *Week Ending* (x-values) for the selected product.
- *Data Table*: Should consist of two columns- the left column should contain *Week Ending* values and the right column should contain the corresponding *Index* values.

V. Consumer Pricing Diagnostics

Both of these analyses can be run using the formatted raw syndicated data

Brand Ladder

The Brand Ladder analysis will have three components: user inputs, graphical output, and a summary table. Both the graphical output and summary table will draw from the formatted syndicated data as filtered through the user inputs.

The user should first enter four inputs:

- *Category*: Single select pick-list automatically generated from product reference data
- *Brands*: Multi-select pick-list automatically generated from product reference data and filtered by the Category selection
- *Customer*: Single select pick-list automatically generated from customer reference data
- *EQ Case Equivalent*: Manually entered as free text, e.g., “Serving”. Will be used to label the y-axis of the chart (\$/Serving)
- *Start Date/End Date*: The start date and end date entered in the initial set up should automatically populate (see Step 2: Set Scope of Analysis, pg. 4).



For each Brand the user selects, the tool will aggregate product data to calculate the required brand-based metrics for the output. For the user selected customer and weeks, the tool will sum each group of products that has been mapped to the respective user selected brands:

- Promoted Sales (\$) for the Brand
= Σ *Promoted Sales (\$) for all products in Brand, by customer, across all weeks*
- Promoted Volume (EQ units) for the Brand
= Σ *Promoted Volume (EQ Units) for all products in Brand, by customer, across all weeks*
- Non-Promoted Sales (\$) for the Brand
= Σ *Non-Promoted Sales (\$) for all products in Brand, by customer, across all weeks*
- Non-Promoted Volume (EQ units) for the Brand
= Σ *Non-Promoted Volume (EQ Units) for all products in Brand, by customer, across all weeks*
- Total Sales (\$) for the Brand
= Σ *Total Sales (\$) for all products in Brand, by customer, across all weeks*
- Total Volume (EQ Units) for the Brand
= Σ *Total Volume (EQ Units) for all products in Brand, by customer, across all weeks*
- Total Category \$ Sales
= Σ *(Total Category Sales (\$) for each week in the time scope) across all products in the Category and all customers*

The y-axis will be prices, \$/EQ Case Equivalent and the x-axis will list the brands the user had selected. The chart will be a High-Low Stock chart with the following values:

- Promoted Price
= *Promoted Sales (\$) for the Brand / Promoted Volume (EQ Units) for the Brand*
- Everyday Price
= *Non-Promoted Sales (\$) for the Brand / Non-Promoted Volume (EQ Units) for the Brand*
- Average Shelf Price
= *Total Sales (\$) for the Brand / Total Volume (EQ Units) for the Brand*

Graph Format

- Each Price point should have a marker
- Brands should be in increasing order of *Everyday Price* from left to right.
- The order of the legend should be *Everyday Price*, *Average Shelf Price*, then *Promoted Price*.

In addition to the graph, the tool will automatically create a table that contains the following auto populated metrics for the selected brand/customer combination:

- Total Volume (units)
= Σ *(Total Volume (Units) for each week in the time scope) across all products mapped to the Brand, by Customer*



- % Volume Promoted

$$= \frac{\sum (\text{Total Promoted volume sold (Units) for each week in the time scope})}{\sum (\text{Total Volume (Units) for each week in the time scope})}$$
across all products mapped to the Brand, by Customer
- Category Market \$ Share

$$= \frac{\sum (\text{Total Sales ($) for each week in the time scope})}{\sum (\text{Total Category Sales ($) for each week in the time scope})}$$
across all products in the Category and all customers
 If no data, then this part of the table should be left blank and other metrics should still calculate

Price Pack

The price pack analysis will allow the user to view the level of discounting as pack size increases across products.

The user should first input the following:

- *Brand*: Single select pick-list automatically populated from product reference data. Once the consumer chooses a brand, the tool should auto populate the products previously mapped to that brand in a table below.
- *Product List*: Users should be able to edit /add the auto populated product names as necessary to more accurately reflect pack details/ differentiate between different products.
- *Pack Size*: In the product table, the user enters integer value for each displayed product to indicate the size of the product relative to the others. E.g.,

Product	Pack Size
Product 1	1
Product 2	2
Product 3	4

- *EQ Volume per Unit*: User should enter an integer value for what the proportion of EQ Volume is to Unit for the Products
- *Normalized Unit*: User should enter free text that will then be used to label the graph (e.g. Servings, lbs)
- *Customer*: Single select pick-list automatically generated from customer reference data
- *Start Date/End Date*: The start date and end date entered in the initial set up should automatically populate (see [Step 2: Set Scope of Analysis](#), pg. 4).
- *View ASP*: The user selects Yes or No from a pick list. If “Yes” selected, then the tool should include *Average Shelf Price* in the graph, if “No”, don’t include ASP line in the graph.

For each Product, the tool will calculate the following metrics:

- Promoted Price



$$= (\Sigma \text{ Promoted Sales } (\$) \text{ for the Product across all weeks for the customer} / \Sigma \text{ Promoted volume sold (EQ Units) for the Product across all weeks for the customer}) / \text{Pack Size for the Product}$$

- Everyday Price

$$= (\Sigma \text{ Non-Promoted Sales } (\$) \text{ for the Product across all weeks for the customer} / \Sigma \text{ Non-Promoted volume sold (EQ Units) for the Product across all weeks for the customer}) / \text{Pack Size for the Product}$$
- Average Shelf Price

$$= (\Sigma \text{ Total Sales } (\$) \text{ for the Product across all weeks for the customer} / \Sigma \text{ Total volume sold (EQ Units) for the Product across all weeks for the customer}) / \text{Pack Size for the Product}$$

Graph Format

- Line graph that displays Promoted Price, Everyday Price and Average Shelf Price (depending on user selection). Each line will be the Price point across all pack sizes
- Y-values are \$/Normalized Unit (e.g. \$/Servings)
- X-values are “Pack Size Normalized Unit” (e.g. 1 Serving, 2 Servings, 4 Servings)

In addition to the graph, the tool will automatically create a table that contains the following metrics for each of the products:

- Volume (EQ Units)

$$= \Sigma \text{ Total Volume (EQ Units) for the Product across all weeks selected, by customer}$$
- % Volume Promoted

$$= \Sigma \text{ Promoted Volume (Units) for the Product across all weeks selected} / \Sigma \text{ Total Volume (Units) for the Product across all weeks selected, by customer}$$

VI. Elasticity Analysis

This analysis can be run using the formatted raw syndicated data.

Promoted Price Elasticity

The promoted price elasticity analysis will allow the user to understand how a change in price affects the volume of a user-selected product.

To run this analysis user should first input the following:

- *Product*: Single-select pick-list automatically populated from product reference data
- *Customer(s)*: Multi-select pick-list automatically generated from customer reference data
- *Start Date/End Date*: The start date and end date entered in the initial set up should automatically populate (see [Step 2: Set Scope of Analysis](#), pg. 4).
- *View Type*: User should select to view the change in volume as either a % *Volume Share* or an *Absolute Volume Change (%)*



The tool will run the promoted price elasticity by customer, and then aggregate the weekly x,y points on the same scatterplot.

1. For each customer and product combination, the tool will run the analysis separately
2. For a specific customer and product combination, the tool will first filter the weekly data to include only the weeks where $-5\% \leq \text{Average Shelf Price (ASP) change from the previous week} \leq 5\%$

$$\text{ASP} = \text{Total sales (\$)} / \text{Total volume sold (Units)}$$

$$\text{ASP Change} = (\text{ASP}_n - \text{ASP}_{n-1}) / \text{ASP}_n$$
3. For each week where the $-5\% \leq \text{ASP Change} \leq 5\%$, the tool will calculate the volume change, either through % Volume Change or % Volume Share Change (depending on user selection) for the same weeks.
 - a. % Volume Change = Volume Change from one week to the other = $(\text{Total Volume (Units)}_n - \text{Total Volume (Units)}_{n-1}) / \text{Total Volume (Units)}_n$
 - b. % Volume Share Change = $(\% \text{ Volume Share}_n - \% \text{ Volume Share}_{n-1}) / \% \text{ Volume Share}_n$

$$\text{Weekly \% Volume Share} = \text{Weekly Total Volume (Units)} / \text{Weekly Total Category Volume (Units)}$$

$$\text{Weekly Total Category Volume (Units)} = \sum \text{Category Volume across all customers and products in the category for that week}$$
4. The two columns that will be graphed in a scatterplot will be:
 Y-axis: % Volume Change or % Volume Share Change (depending on user selection)
 X-axis: % Price Change = ASP Change

Graph Format:

- *If Absolute Volume Change (%):* Tool should create a scatterplot that uses % Volume Change as the y-axis and % ASP Price Change for the x-axis. This chart will also include a fitted line. The slope from the fitted line is the product's promoted price elasticity, and should automatically populate in it's own output labeled "Elasticity:" in the top right, with the R squared value displayed and labeled directly underneath.
- *If % Volume Share:* Tool should create a scatterplot that uses % Volume Share as the y-axis and % ASP Price Change for the x-axis. This chart should also include a fitted line. The slope from the fitted line is the product's promoted price elasticity, and should automatically populate in it's own output labeled "Elasticity:" in the top right, with the R squared value displayed and labeled directly underneath.

Cross-Product Elasticity

This analysis will allow the user to understand how a change in a price gap between two products affects the volume of those products.



To run this analysis user should first input the following:

1. *Competitor Analysis*: User single-selects from a list of the possible own product vs. competitor product combinations automatically populated from competitor mapping table. E.g.,

Competitor Product	“Own Product”	Competitor Analysis
Product 1	Product 4	Product 4 vs. Product 1
Product 2	Product 5	Product 5 vs. Product 2
Product 3	Product 6	Product 6 vs. Product 3

2. *Customer*: Multi-select pick-list automatically generated from customer reference data
3. *Start Date/End Date*: The start date and end date entered in the initial set up should automatically populate (see Step 2: Set Scope of Analysis, pg. 4).

The tool will run the cross-product price elasticity by customer, and then aggregate the weekly x,y points on the same scatterplot.

1. For each customer and competitor analysis combination, the tool will run the analysis separately
2. For a specific customer and competitor analysis combination, the tool will calculate a % Price Change and a % Volume Share Change
3. The weekly % Price Change is calculated as a % change in price gap from week to week
 - a. Calculate the Everyday Price Gap between the two products

$$\text{Price Gap} = \text{Own Product Everyday Price} - \text{Competitor Product Everyday Price}$$

$$\text{Everyday Price} = \text{Non-promoted sales (\$)} / \text{Total non-promoted volume (Units)}$$
 - b. Calculate the difference in price gap from week to week

$$\text{Difference in Price Gap} = \text{Price Gap}_n - \text{Price Gap}_{n-1}$$
 - c. Calculate the % Price Change (which will be values on the x-axis)

$$\% \text{ Price Change for the week} = \text{Difference in Price Gap for that Week} / \text{Own Product Average Non-Promoted Price}$$

$$\text{Own Product Average Non-Promoted Price} = \Sigma \text{Non-promoted sales (\$)} / \Sigma \text{Non-promoted volume sold (Units), by customer}$$
 - d. These values are the x-values for the scatterplot graph
4. The weekly % Volume Share change is calculated as a % change in volume share for “Own Product” from week to week
 - a.
$$\text{Weekly Volume Share} = \text{Own Product Total volume sold (Units)} / (\text{Own Product Total volume sold (Units)} + \text{Competitor Total volume sold (Units)}), \text{ by week}$$
 - b.
$$\% \text{ Volume Share Change} = (\text{Weekly Volume Share}_n - \text{Weekly Volume Share}_{n-1}) / \text{Weekly Volume Share}_n$$
 - c. These values are the y-values for the scatterplot graph



Graph Format:

- Tool should create a scatterplot that uses % Volume Share as the y-axis and % Price Change for the x-axis
- Chart will include a fitted line, where the slope from the fitted line is the Own Product's cross-product elasticity, and should automatically populate in its' own output labeled "Elasticity" in the top right
- The R^2 value should be displayed and label directly underneath the Elasticity value

VII. Cross-Customer Analysis

This analysis will be run using the syndicated data before it's transformed into discrete event promotions.

To run this analysis users will first input the following selections:

- *Cannibalized Customer*: User single-selects a customer from pick list automatically generated from customer reference data
- *Competitor Customer*: User single-selects additional customer from pick list automatically generated from customer reference data
- *Product*: Single-select pick-list automatically generated from customer reference data
- *Start Date/End Date*: The start date and end date entered in the initial set up should automatically populate (see Step 2: Set Scope of Analysis, pg. 4).

The tool will filter all weeks for only the Cannibalized Customer and Product combination into one of the following groups, based on specific criteria:

- Both Customers Promoted
If the week has a % *Volume Promoted* $\geq 20\%$ for BOTH the Cannibalized Customer and Competitor Customer during that week for that product
- Only (display name of Cannibalized Customer) Promoted
If the week has a % *Volume Promoted* $\geq 20\%$ for ONLY the Cannibalized Customer during that week for that product
- Only (display name of Competitor Customer) Promoted
If the week has a % *Volume Promoted* value $\geq 20\%$ for ONLY the Competitor Customer during that week for that product
- Neither Customer Promoted
If the week has a % *Volume Promoted* value $\geq 20\%$ for NEITHER the Cannibalized Customer nor the Competitor Customer during that week for that product

The tool will calculate the following metrics for each of the four groups:

- Total volume (Units)
= \sum Total volume (Units) across all weeks in the group for the Cannibalized Customer
- Incremental Volume



- $= \sum \text{Incremental volume (Units) across all weeks in the group for the Cannibalized Customer}$
- Base Volume
 - $= \sum \text{Base volume (Units) across all weeks in the group for the Cannibalized Customer}$
- Lift %
 - $= \sum \text{Incremental volume (Units) across all weeks in the group for the Cannibalized Customer} / \sum \text{Base volume (Units) across all weeks in the group for the Cannibalized Customer}$

The tool will output two graphs based on the above metrics:

1. Volume Chart: Flag Chart that plots \sum Total volume (Units) for each group in the following order:
 - Both Customers Promoted
 - Only (display cannibalized customer's name) promoted
 - Only (display competitor customer's name)
 - Neither Promoted
 - Labels for Total Volume (Units) at the inside of the chart for each group
 - Graph title format:
 - (display cannibalized customer's name)
 - (display product name) Volume
2. Lift % Chart: Flag Chart that plots Lift % in the following order:
 - Both Customers Promoted
 - Only (display cannibalized customer's name) promoted
 - Labels for Lift (%) at the inside of the chart for each of the two groups
 - Graph title format:
 - (display cannibalized customer's name)
 - (display product name) Lift (%)