Cross Sell – Up Sell Recommendation Engine
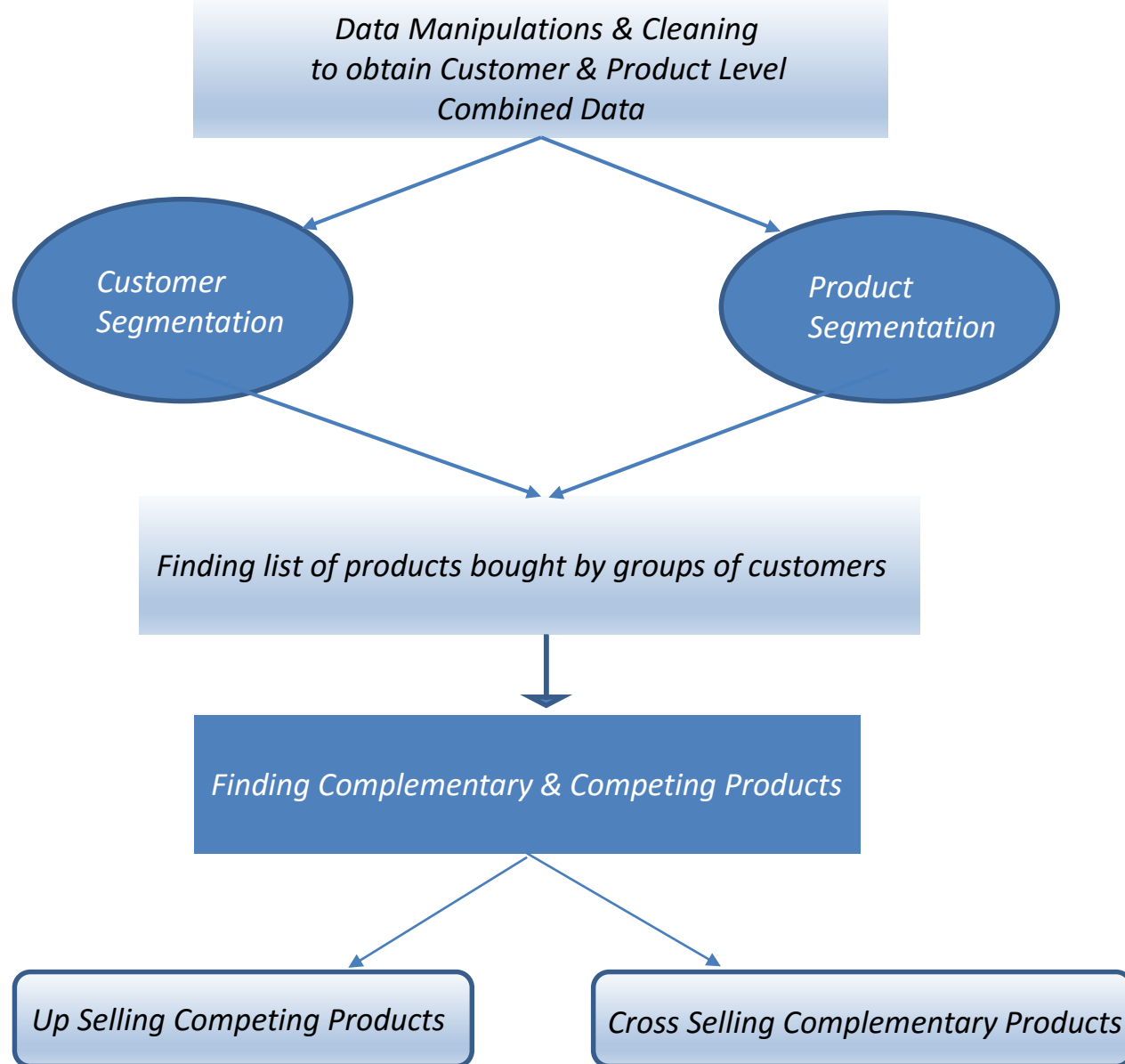
SUJATA DAS
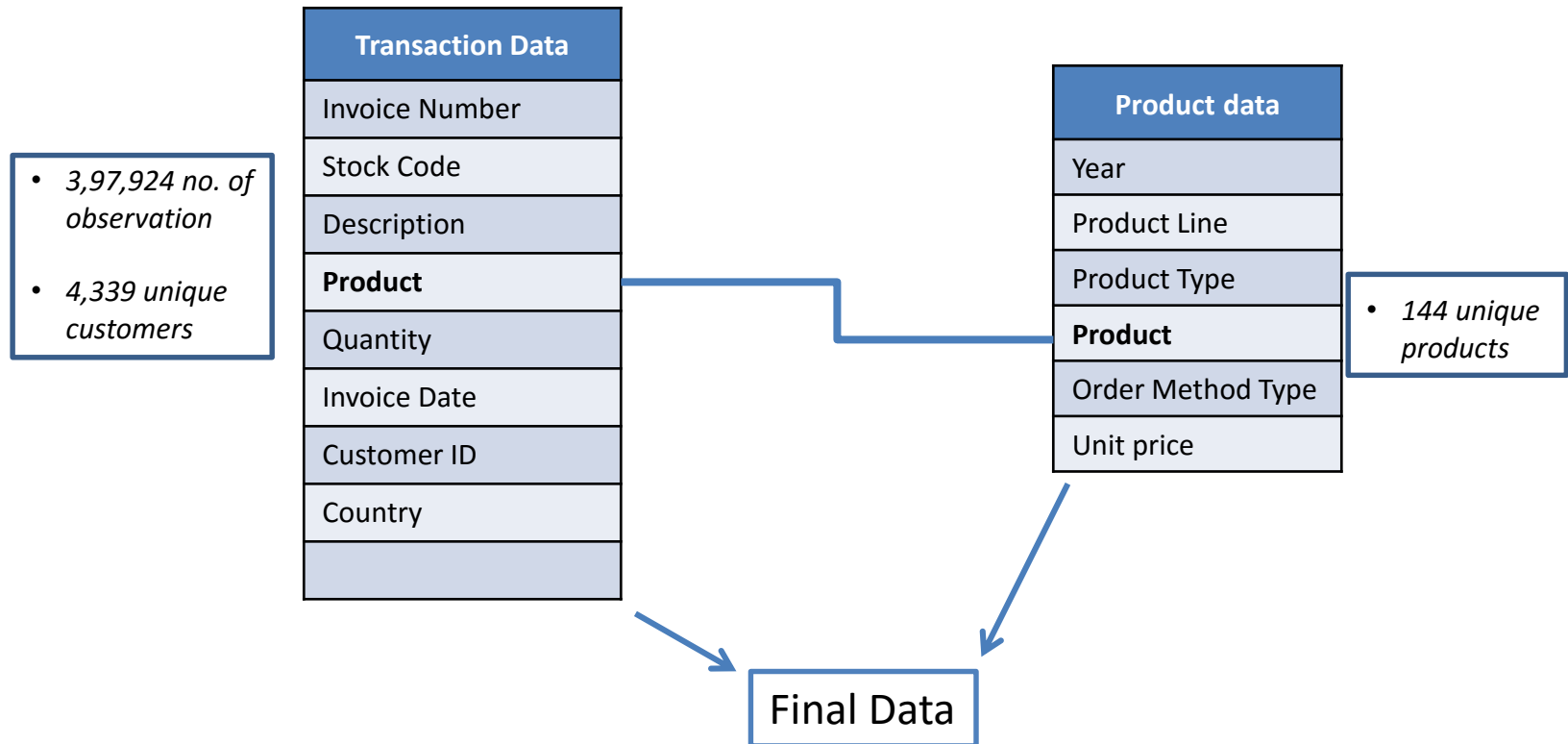**May-July, 2019**

Objective

Product Recommendation

Cross-Selling of Products

Up-Selling of Products

Approach

Data Manipulations & Cleaning
to obtain Customer & Product Level
Combined Data

Customer Segmentation

Product Segmentation

Finding list of products bought by groups of customers

Finding Complementary & Competing Products

Up Selling Competing Products

Cross Selling Complementary Products

Data

Transaction Data

Transaction Data
Invoice Number
Stock Code
Description
Product
Quantity
Invoice Date
Customer ID
Country

- *3,97,924 no. of observation*
- *4,339 unique customers*

Product data

Product data
Year
Product Line
Product Type
Product
Order Method Type
Unit price

- *144 unique products*

Final Data

Customer Segmentation

Similar Customer

Customer 1 — Purchased → Product 1

Customer 2 — Purchased → Product 2

Customer 3 — Purchased → Product 3

Purchased → Product 4

Cross table of Customer ID & Product

Correlation Matrix of Customer

Grouped Customers having at least 40% correlation

Unique Customers	Groups
4339	350

Complementary Product Groups

Purchased

Purchased

Purchased

Product 1

Product 2

Product 3

Product 4

Likely to be sold together
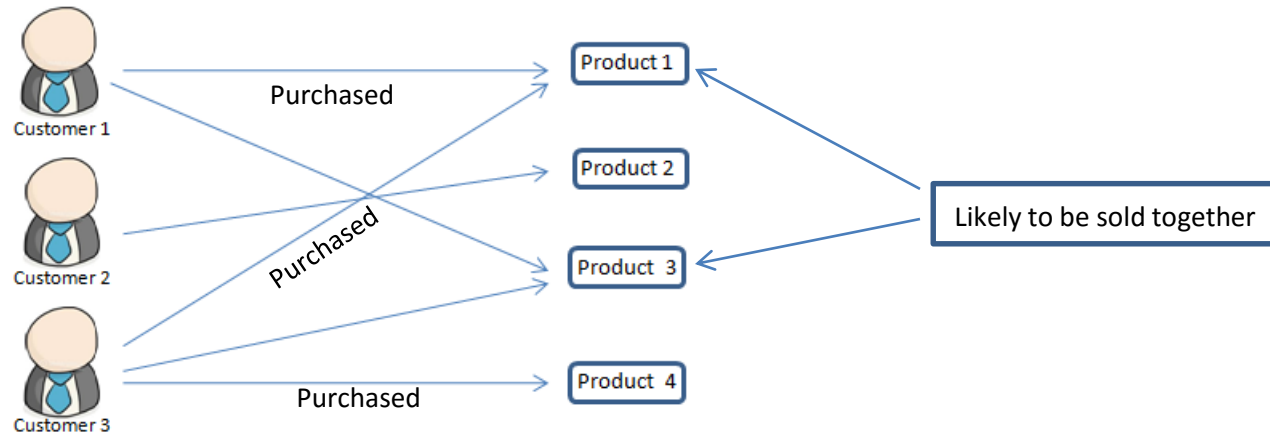
Cross table of Product & Customer ID

Correlation Matrix of Products

Grouped the products which sold together 40% times

➢**Outcome-**

Unique Products	Groups
144	20

Competitive Product Groups

P1
P2
P9
P3
P12
P5
P11
P4
P6
P8
P10
P7

K-Means Clustering based on product features

feature3

P10, P11, P12

P3, P4, P5, P8, P9

P1, P2, P3, P6, P7
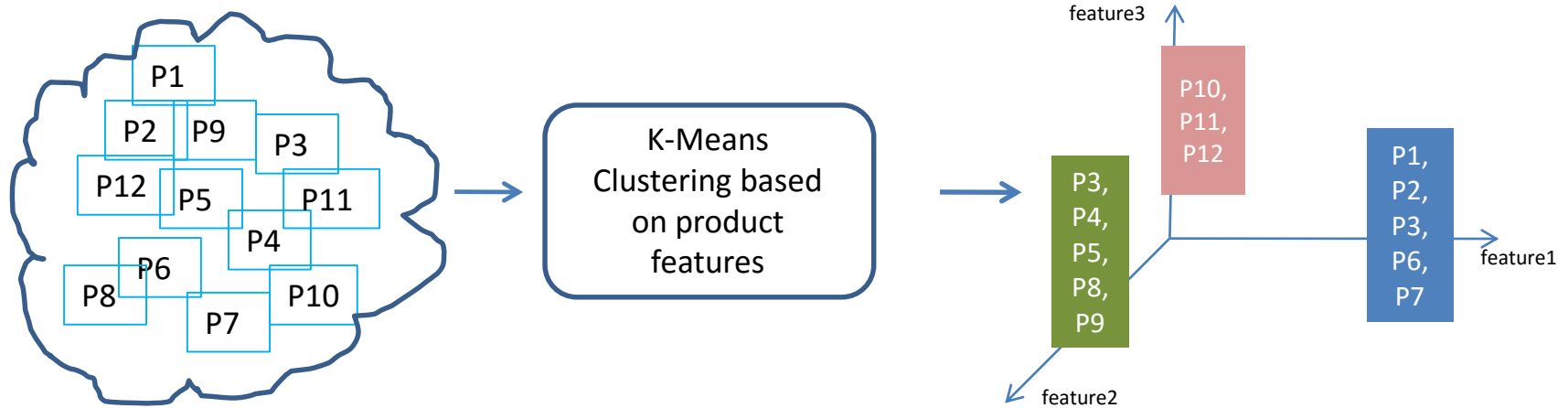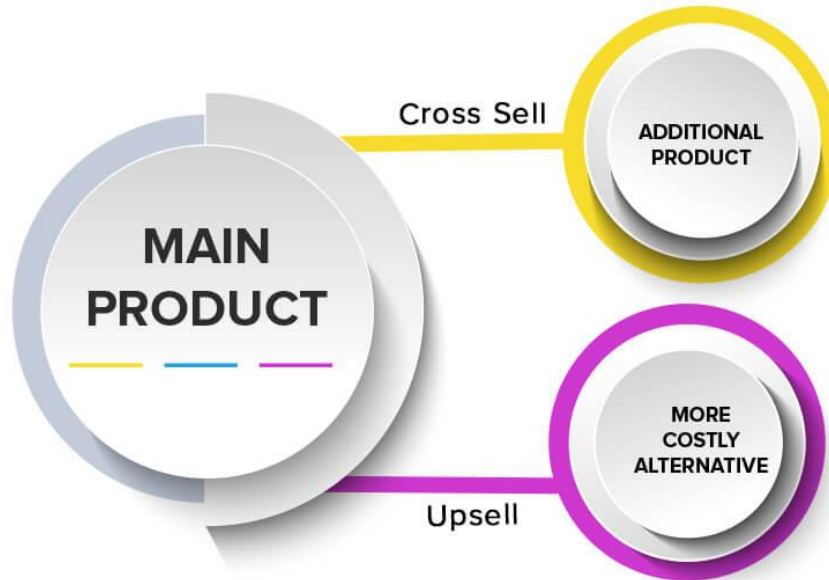
feature1

feature2

Table of Products and Product Features (product type', 'customer count', 'frequency', 'quantity' ,'unit price')

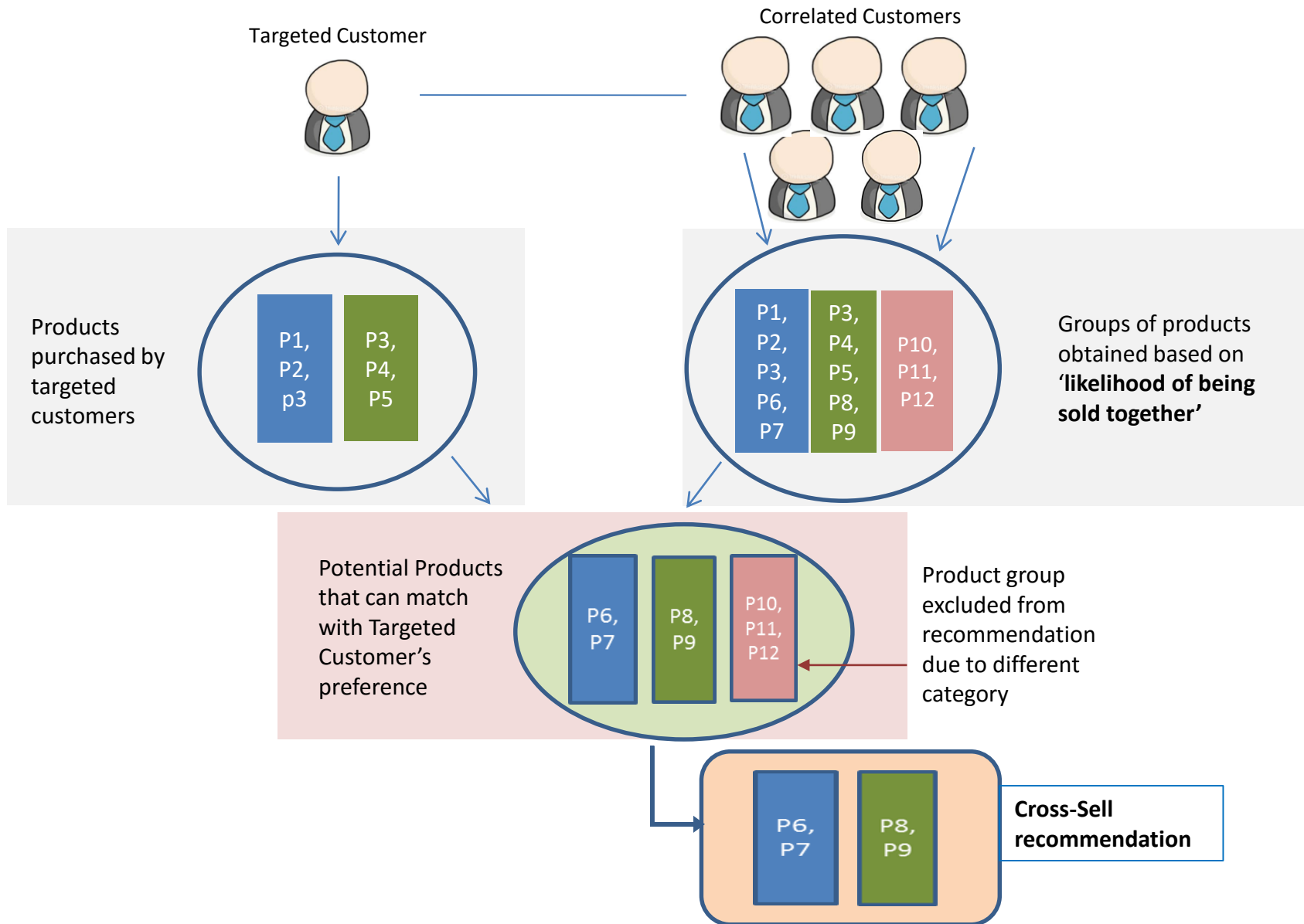*Grouped the products based on product features*

➢**Outcome-**

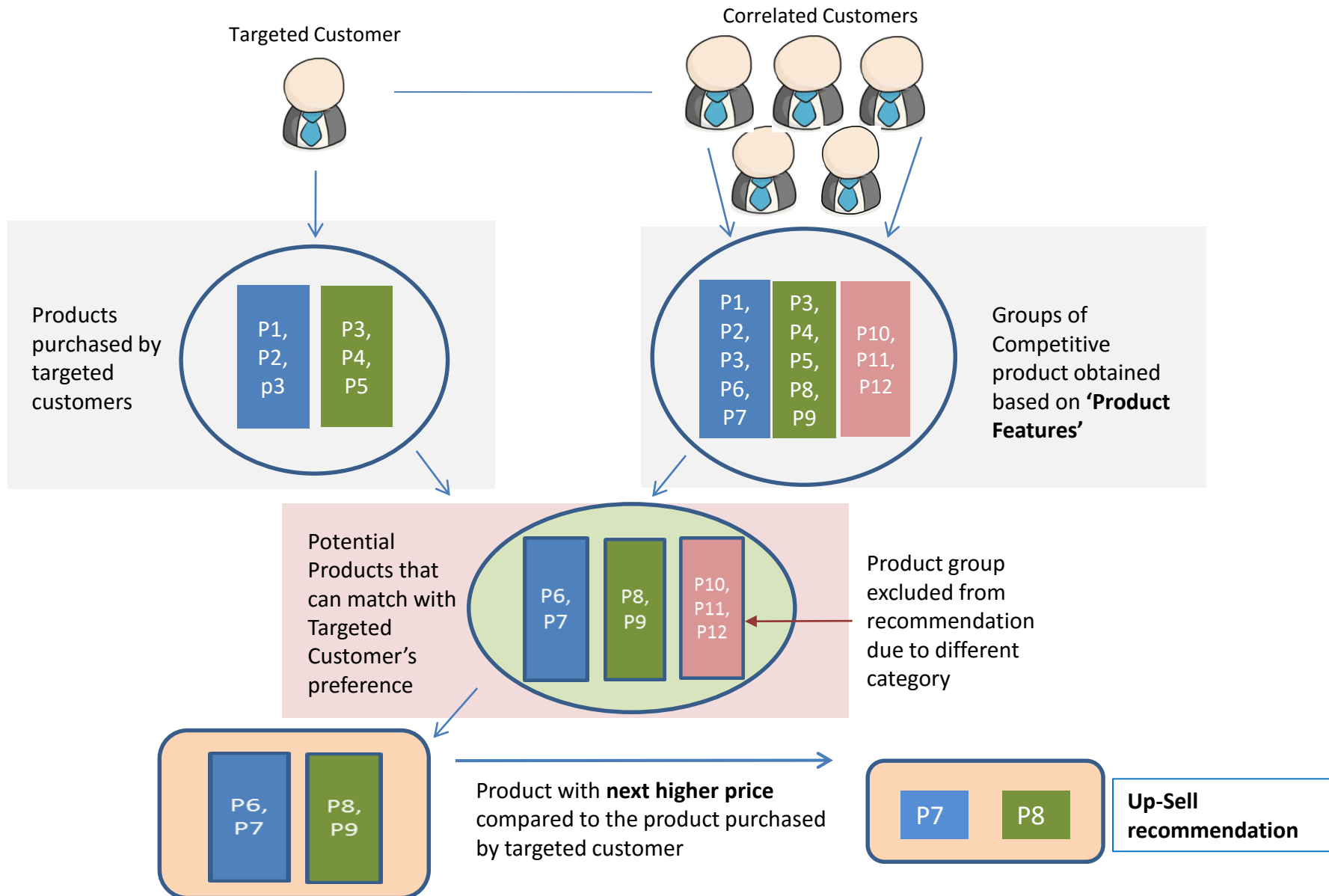| Unique Products	Groups
144	6

Cross-Sell and Up-Sell

Cross Sell

ADDITIONAL PRODUCT

MAIN PRODUCT

MORE COSTLY ALTERNATIVE

Upsell

Up Sell

Cross Sell

Competitive Products
Rs. 1500

Rs. 1200

Complementary Products

Cross-Sell

Targeted Customer

Correlated Customers

Products purchased by targeted customers

P1, P2, p3

P3, P4, P5

P1, P2, P3, P6, P7

P3, P4, P5, P8, P9

P10, P11, P12

Groups of products obtained based on 'likelihood of being sold together'

Potential Products that can match with Targeted Customer's preference

P6, P7

P8, P9

P10, P11, P12

Product group excluded from recommendation due to different category

P6, P7

P8, P9

Cross-Sell recommendation

Up-Sell

Targeted Customer

Correlated Customers

Products purchased by targeted customers

P1, P2, p3

P3, P4, P5

Groups of Competitive product obtained based on **'Product Features'**

P1, P2, P3, P6, P7

P3, P4, P5, P8, P9

P10, P11, P12

Potential Products that can match with Targeted Customer's preference

P6, P7

P8, P9

P10, P11, P12

Product group excluded from recommendation due to different category

P6, P7

P8, P9

Product with **next higher price** compared to the product purchased by targeted customer

P7

P8

Up-Sell recommendation

Cross-Sell and Up-Sell Outcome

Customer ID	Cross Sell	Up Sell
12348	Blue Steel Putter, Hailstorm Titanium Woods Set, TrailChef Single Flame, Course Pro Gloves	Star Lite, Glacier GPS Extreme, EverGlow Lamp, Hibernator Extreme
13049	Calamine Relief, Blue Steel Putter, Infinity, Bear Edge	Star Lite, Polar Ice, TX, Bear Survival Edge
14411	Hibernator Pillow, Pocket Gizmo, Granite Pulley, Hibernator Extreme	TrailChef Double Flame, Sky Pilot, BugShield Extreme
15942	Mountain Man Extreme, Star Gazer 2, Hibernator Extreme, Sun Shelter Stick	TrailChef Utensils, Canyon Mule Weekender Backpack, TrailChef Deluxe Cook Set
16250	Granite Climbing Helmet, Kodiak, Polar Sports, TrailChef Single Flame	Husky Rope 100, TrailChef Deluxe Cook Set, Trail Master
17859	Opera Vision, Bear Edge, Polar Extreme, Infinity	Husky Rope 100, Glacier GPS Extreme, TrailChef Deluxe Cook Set

Recommendations

Benefits	Suggestions
➢ *Cross-sell and Up-sell increase Sales and Revenue* ➢ *Improve the customer's satisfaction and engagement to the brand.* ➢ *Encourage the customers to use multiple products and prevent switching to competitor brand.*	➢ *Recommendation system can be used for campaigning purpose to individual customer.* ➢ *Can offer the cross-sell product at a discount price or combo with the main product (Market Basket Analysis)* ➢ *Complementary categories to be put together during assortment/ building planogram* ➢ *Recommendation engine to be implemented during real time shopping*

Q & A

Thank You