Assignment 1: Product Optimization

Contents

Question#1

As per the assignment ask, expectation is to perform the compensatory rule with the logit adjustment. In this part, we have compute and reported the Brand C (our candidate) share, cost, margin and expected profit per person under the "proposed market scenario" as mentioned in the screenshot below:

- Price: $30, $10, $5
- Time Insulated: 0.5 hrs, 1 hr, 3 hrs
- Capacity: 12 oz, 20 oz, 32 oz
- Cleanability: Difficult (7 min), Fair (5 min), Easy (2 min)
- Containment: Slosh resistant, Spill resistant, Leak resistant
- Brand: A, B, C

Assume the following as the "proposed market scenario", i.e. the scenario with the current competitors and our proposed candidate.

Incumbents
1: $30, 3 hrs, 20 oz, Clean Easy, Leak Resistant, Brand A
2: $10, 1 hrs, 20 oz, Clean Fair, Spill Resistant, Brand B

Our proposed candidate
3: $ 30, 1 hrs, 20 oz, Clean Easy, Leak Resistant, Brand C

Assume the following cost structure:

- Time Insulated: 0.5 hrs costs $0.5, 1 hr costs $1, 3 hrs costs $3
- Capacity: 12 oz costs $1.00, 20 oz costs $2.6, 32 oz costs $2.8
- Cleanability: Difficult (7 min) costs $1, Fair (5 min) costs $2.2, Easy (2 min) costs $3.0
- Containment: Slosh resistant costs $0.5, Spill resistant costs $0.8, Leak resistant costs $1

Based on the question's ask, below screenshot shows the Candidate #45 which corresponds to our proposed candidate in the above "proposed market scenario". In the attached excel sheet, candidate#45 is in row 46.

	A	B	C	D	E	F	G	H	I
1	Price	Time Insulated	Capacity	Cleanability	Containment	Share	Cost	Margin	Expected Profit per Person
44	$30	1 hrs	20 oz	Easy (2 min)	Slosh resistant	0.5169	7.1	22.9	11.84
45	$30	1 hrs	20 oz	Easy (2 min)	Spill resistant	0.5176	7.4	22.6	11.7
46	$30	1 hrs	20 oz	Easy (2 min)	Leak resistant	0.5182	7.6	22.4	11.61
47	$30	1 hrs	32 oz	Difficult (7 min)	Slosh resistant	0.5182	5.3	24.7	12.8

From the analysis of the data and using the compensatory rule with logit adjustment, I have also calculated the Average Candidate Share, Average Cost, Average Margin, Average Expected Profit per Person

```
In [15]: print(f'Average Candidate Share:',AvgCandidateShare)
         print(f'Average Cost:',AvgCost)
         print(f'Average Margin:',AvgMargin)
         print(f'Average Expected Profit per Person:',AvgExpectedProfitPerPerson)

         Average Candidate Share: 0.5193407407407408
         Average Cost: 6.466666666666665
         Average Margin: 8.533333333333331
         Average Expected Profit per Person: 4.428230452674898
```

Therefore, I can conclude that the **Average Expected Profit per Person** is **4.43.**

Question#2

Using the discreate optimization technique, after considering each of the three levels for all five attributes and enumerated all the possible combinations in the lexical order that is given in above "proposed market scenario" keeping price is the left most attribute with slowest chaining attribute. Attached excel has details for each customer calculation.

As request, for the two-product candidate#106 & 230, which is row# 107 & 231 respectively in the attached excel. Below screenshot shows their expected share, cost, margin and expected profit per person.

	A	B	C	D	E	F	G	H	I
1	Price	Time Insulated	Capacity	Cleanability	Containment	Expected Share	Cost	Margin	Expected Profit per Person
107	$10	0.5 hrs	32 oz	Clean Easy	Slosh resistant	0.7551	6.8	3.2	2.42
231	$5	3 hrs	20 oz	Clean Fair	Spill resistant	0.7513	8.6	-3.6	-2.7

Question#3

As per the question ask, below screenshot shows the optimal product and list the values of each of the product attribute.

```
In [26]: # Print the best product details
         print("Best Product:")
         print(f"Price: {best_product[0]}")
         print(f"Time Insulated: {best_product[1]}")
         print(f"Capacity: {best_product[2]}")
         print(f"Cleanability: {best_product[3]}")
         print(f"Containment: {best_product[4]}")
         print(f"Expected Share: {best_product[5]}")
         print(f"Cost: {best_product[6]}")
         print(f"Margin: {best_product[7]}")
         print(f"Expected Profit per Person: {best_product[8]}")
         print("\nCSV file 'candidate_data_algorithmic_approach_with_best_product.csv' created successfully.")

         Best Product:
         Price: $30
         Time Insulated: 0.5 hrs
         Capacity: 12 oz
         Cleanability: Difficult (7 min)
         Containment: Slosh resistant
         Expected Share: 0.7608
         Cost: 3.00
         Margin: 27.00
         Expected Profit per Person: 20.54

         CSV file 'candidate_data_algorithmic_approach_with_best_product.csv' created successfully.
```

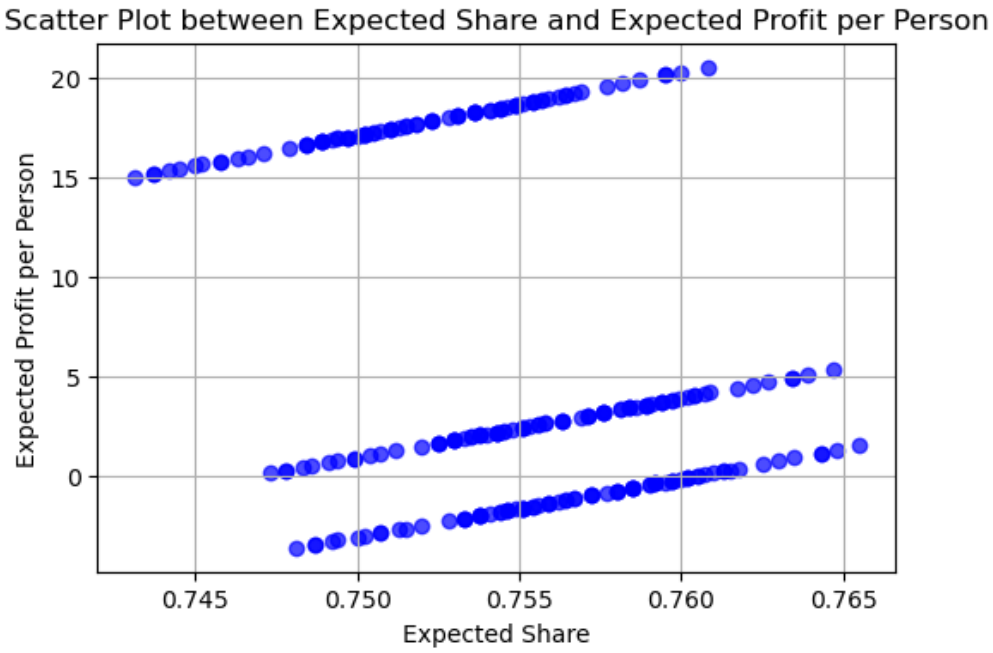
Question#4.1

Considering the pure algorithmic analytical approach, the best product is the one that we identified as part of Question#3. But as asked in the question, the **Business Rational** to launch product with the highest expected share instead of EPPP is, opting to introduce a product projected to attain the utmost market share holds considerable strategic value for achieving market dominance and heightened visibility. A superior market share not only signifies widespread customer approval but also has the potential to draw in a larger consumer base. This approach proves advantageous, particularly when the company's objective is **swift market penetration and the establishment of a robust and influential brand presence**. Below screenshot shows the product attribute of the product having highest market share.

```
In [125]: print("Product with highest market Share")
          print(maxExpectedShareAttributes)
```

```
Product with highest market Share
Price                                    $5
Time Insulated                     0.5 hrs
Capacity                             12 oz
Cleanability                Difficult (7 min)
Containment                   Slosh resistant
Cost                                    3.0
Expected Share                       0.7655
Margin                                  2.0
Expected Profit per Person              1.53
Name: 162, dtype: object
```

As per the asked and hint suggested in the question, the scatter plot between the EPPP vs Expected Share is as shown in below screenshot.



Question#4.2

As asked in the question, the **Business Rational** to launch product with the maximum margin instead of EPPP is, opting to introduce a product with the utmost margin proves advantageous when the company's central emphasis lies on maximizing profitability per unit sold. A substantial margin not only fosters enhanced financial sustainability of the company but also affords increased flexibility. This strategic choice becomes particularly apt when the company's primary goal is to **prioritize profitability**, valuing it over the pursuit of sheer market share. Below screenshot shows the product attribute of the product having maximum margin.

```
In [126]: print("Product with maximum margin")
          print(maxMarginAttributes)
```

```
Product with maximum margin
Price                                $30
Time Insulated                   0.5 hrs
Capacity                           12 oz
Cleanability                Difficult (7 min)
Containment                  Slosh resistant
Cost                                3.0
Expected Share                   0.7608
Margin                             27.0
Expected Profit per Person         20.54
Name: 0, dtype: object
```

Question#4.3

As asked in the question, the **Business Rational** to launch product with the lowest cost instead of EPPP is, by introducing the product with minimal cost/expense presents a company's financially prudent strategy, particularly appealing in markets with a heightened sensitivity to pricing. It facilitates company's competitive pricing approach, potentially leading to increased sales volume. Such an approach is well-suited for scenarios where the objective is **to attract a segment of the market with a strong emphasis on cost consciousness**. Below screenshot shows the product attribute of the product having lowest cost.

```
In [127]: print("Product with minimum cost")
          print(minCostAttributes)
```

```
Product with minimum cost
Price                                $30
Time Insulated                   0.5 hrs
Capacity                           12 oz
Cleanability                Difficult (7 min)
Containment                  Slosh resistant
Cost                                3.0
Expected Share                   0.7608
Margin                             27.0
Expected Profit per Person         20.54
Name: 0, dtype: object
```

Question#4.4

As asked in the question, the **Business Rational** to launch product with the maximum revenue instead of EPPP is the company adopts a strategy that involves achieving a balanced alignment among variables like price, market share, and cost. The objective is to meticulously adjust these elements, ultimately reaching **ambitious revenue generation targets**. Below screenshot shows the product attribute of the product having maximum revenue.

```
In [128]: print("Product with maximum revenue")
          print(maxRevenueAttributes)
```

```
Product with maximum revenue
Price                                $30
Time Insulated                  0.5 hrs
Capacity                         12 oz
Cleanability                Difficult (7 min)
Containment                   Slosh resistant
Cost                                3.0
Expected Share                   0.7608
Margin                             27.0
Expected Profit per Person         20.54
Revenue Per Person                22.824
Name: 0, dtype: object
```

Appendix

Candidate data algorithmic approach with best product	candidate_data_algorithmic_approach_with_
Candidate data 243 combinations	candidate_data_243_combinations.csv
Candidate data algorithmic approach	candidate_data_algorithmic_approach.csv