Project 2: Kiwi Bubble Case Analysis Report

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3 Logit model without segmentation

	product	own.elasticity	cross.elasticity
1	KB	4.257847	0.9054743
2	KR	4.131270	1.0199225
3	MB	4.069547	0.9601564

KB has the highest elasticity but the lowest cross-elasticity, meaning that even though customers of KB are the most price sensitive, they do not switch to KR or MB as likely as expected. This is the signal of KB customers being a special group—even if they do not buy KB, they do not buy other products either. By contrast, even though KR does not represent the highest own-elasticity, it has the highest cross-elasticity, meaning that KR customers are the greatest rate of customers switching to other products when KR raises its price; whereas it represents only the second largest own-elasticity, demonstrating that the total customers lost at price increase are not the greatest among the three products, therefore the rate of original KR customers choosing to buy nothing when the price goes up is the lowest. This reveals that KR lacks the ability to keep die-hard customers who would even rather buy nothing when the price increases, instead of switching to other products. This reassures the concept that mentioned in the case, that Kiwi Regular may not be the most attractive combination of features, but Kiwi Bubble may be. However, the concern is how can we maintain the consumers of Kiwi Bubble since they are very price sensitive.

Before segmentation, the optimal prices for KR and KB are both at $1.16, given the MB price at $1.43, and the maximum profit would be 393.4082.

4 Logit model with segmentation

4.1 Kmeans Selection

We have tried several different clusters to see what are the patterns under consumer segmentation, and we find that the segmentation is much better when the number of clusters is larger, and finally we select 10 as centers.

As shown below, with smaller numbers of clusters such as 2 and 4, the segments are not divided well in terms of preference on three products and price sensitivities.

When the centers change from 2 to 10, we can see that the according segments are more separated among each other for their unique preferences and price sensitivities. For example, when there are 11 segments, apparently, the three products are more popular in segments 4 and 9 when comparing to segments such as 1 and 3.

Furthermore, we have tried larger numbers of clusters such as 12 and 15, however, the results do not turn out to be better in terms of consumer segmentation. In conclusion, we use 10 as the number of clusters.

centers = 2

	segment	intercept.KB	intercept.KR	intercept.MB	price.coef	share
1	1	4.044336	4.340585	4.209052	-3.615491	0.3617021
2	2	4.062756	4.366433	4.115583	-3.737853	0.4984802
3	3	5.117430	4.509340	4.544963	-4.062526	0.1398176

centers = 4

	segment	intercept.KB	intercept.KR	intercept.MB	price.coef	share
1	1	4.335498	4.674025	4.111057	-3.682239	0.1580547
2	2	4.085952	4.316191	4.577172	-3.798219	0.2127660
3	3	3.864525	4.347728	4.017122	-3.600028	0.3829787
4	4	4.149431	3.947833	3.948372	-3.774973	0.1063830
5	5	5.117430	4.509340	4.544963	-4.062526	0.1398176

centers = 10

	segment	intercept.KB	intercept.KR	intercept.MB	price.coef	share
1	1	3.0017626	3.916981	2.7620620	-2.951180	0.14589666
2	2	3.0878338	4.006679	3.1802458	-2.826519	0.06686930
3	3	2.3336806	3.112574	2.9252012	-2.896447	0.11854103
4	4	8.2287472	6.680553	8.1223860	-6.788933	0.07294833
5	5	4.7911334	4.456635	5.6901102	-4.606762	0.08814590
6	6	0.8341597	1.673929	0.4294365	-1.233209	0.08814590
7	7	7.0950794	8.325625	7.4949559	-6.299830	0.01215805
8	8	6.6556359	6.515320	6.4858148	-5.043962	0.05775076
9	9	7.6063946	6.661934	7.4775392	-5.897474	0.11550152
10	10	3.9972969	3.958938	3.8837551	-3.715366	0.09422492
11	11	5.1174301	4.509340	4.5449628	-4.062526	0.13981763

4.2 Changes of Elasticities

without segmentation:

	product	own.elasticity	cross.elasticity
1	KB	4.257847	0.9054743
2	KR	4.131270	1.0199225
3	MB	4.069547	0.9601564

with segmentation:

	KB	KR	MB
KB	4.6022904	0.9126683	1.1401974
KR	0.7612263	3.4581060	0.7876185
MB	1.0517182	0.8710325	4.4675530

Taking customer segmentation into account, we discover that the own-elasticity of KB is even greater than before segmentation. Since own-elasticity calculated based on customer segmentation considers customer demographic information, including shopping behavior, it should be more precise and comprehensive than the own elasticity calculated without proper segmentation. This further consolidates the notion brought up before that customers of KB are highly price sensitive. So is the case for MB. But for KR, the post-segmentation own-elasticity is lower than before. This can be explained by the cross-elasticity analysis illustrated below.

levels of substituted relationship

	KR	MB
KB	weak	strong
KR	-	weak

According to the cross-elasticity of MB over our products, we can say that Kiwi Bubble is closer substitutes of Mango Bubble compared with Kiwi Regular. The cross-elasticity of MB over KB, 1.0517182, is higher than 0.8710325, that of MB over KR, which means when the price of MB gets higher the consumers are more likely to switch to KB rather than KR.
As for our own products, the cross-elasticity of KB over KR is lower than the cross-elasticity of KR over KB. We can interpret that KR isn't a strong substitute of KB since as a response to the increasing price of KB, customers would switch to MB or buy nothing rather than buy KR.

4.3 Segments Positioning

	segment	intercept.KB	intercept.KR	intercept.MB	price.coef	share
1	1	3.0017626	3.916981	2.7620620	-2.951180	0.14589666
2	2	3.0878338	4.006679	3.1802458	-2.826519	0.06686930
3	3	2.3336806	3.112574	2.9252012	-2.896447	0.11854103
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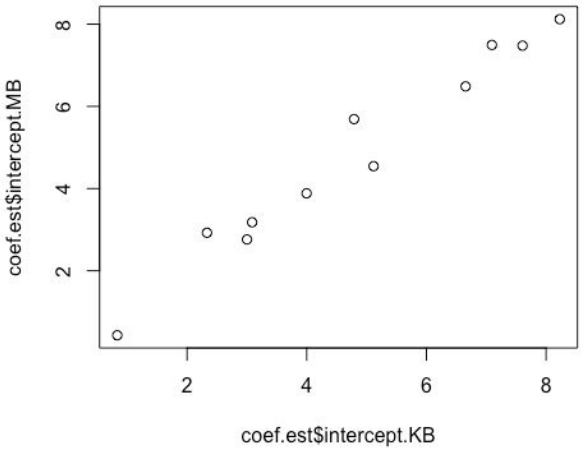
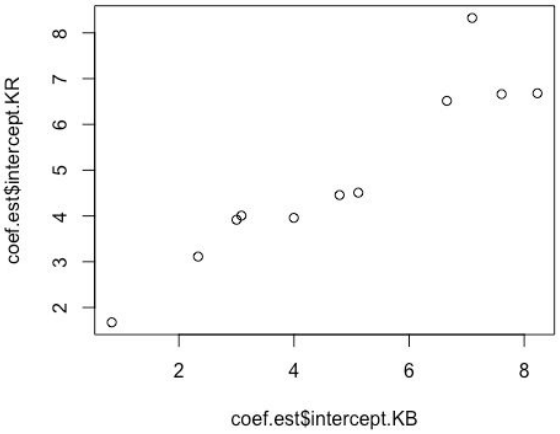


The segmentation coefficient table can explain the substitute effects observed in the cross-elasticity analysis. Based on the assumption that intercepts reflect customer preference towards certain products, we plot the correlation between the intercept of KB and the intercept of MB. The correlation is evident, demonstrating that people showing more interest in KB also show more interest in MB. This is a strong signal of MB being a substitute for KB.



We also plot the correlation between KB and KR, which is less significant than that between KB and KR, revealing that KB and KR are not close substitutes as KB and MB.

Based on analysis above, we should put KB at segments which have high KB baseline preference (intercept KB) and comparative lower MB baseline preference (intercept MB) than that of KB. Meantime, we also find that people who have lower preferences on three products and lower sensitivities have highest preference on KR, which benefits our positioning strategy of KB and KR.

To conclude, we would position KB on sensitive segments: 4, 8, 9, 10, 11, and KR on less-sensitive segments 1, 2, 3, 6(7).

4.4 Segments Positioning

Not launch:

If we don't launch Kiwi Bubbles, the optimal price for Kiwi Regular is $1.06 (here we use the same demand function as above, only we set KB price to an extremely high value so that the demand for KB would be zero). And under this situation, the profits of Kiwi and Mango are $285.59 and $105.48, respectively.

```
> unique(pricespace[profitnoKB_agg==max(profitnoKB_agg),2])
[1] 1.06
> max(profitnoKB_agg)
[1] 285.592
> profit_MB_noKB
  probMB
105.4767
```

Launch:
If we decided to launch Kiwi Bubbles, the optimal prices for Kiwi Bubbles and Kiwi Regular are $1.13 and $1.20, respectively. And the profits of Kiwi and Mango are $395.61 and $86.57, respectively.

```
> pricespace[profitmat_agg==max(profitmat_agg)]
[1] 1.13 1.20
> max(profitmat_agg)
[1] 395.6119
> profit_MB_KB
  probMB
86.57259
```

4.5 Strategic Importance of Launching Kiwi Bubbles

```
> marketshare_prewar_noKB
     probKB   probKR    probMB
[1,]      0 0.385339 0.1429972
> marketshare_prewar_KB
        probKB    probKR     probMB
[1,] 0.3322224 0.2661596 0.09308881
```

This model can justify the decision of launching KB since by launching the product: 1) We can position our products to the segments to gain more market share and further compete with Mango. 2) gain more profit. 3) We can control the pricing advantage with two products against Mango with one.

5 Understanding strategic responses

KR&KB

	KB	KR	MB	Profit (KB+KR)
Round 0	1.13	1.20	1.43	395.61
Round 1	0.99	1.10	0.95	-
Round 2	0.98	1.09	0.91	-
Final	0.98	1.09	0.91	257.14

Round1:
Given the optimal price of KB and KR we set from the previous section(KB: $1.13, KR: $1.20), we can generate the new optimal price of Mango Bubble is $0.95, which is lower than the original one $1.43.
As the reaction to Mango's new price, the responding prices of our products are $0.99 for KB and $1.10 for KR.

Round2:
Repeating previous steps we can finally get that $0.91 is the price for MB that they don't have further incentive to set a different price. At this time, our optimal prices are $0.98 for KB and $1.09 for KR. This set of prices are the new "equilibrium price" and where the "pricing war" converges. And the profit of Kiwi would be 257.14, that of Mango 145.17.

KR Only

	KR	MB	Profit (KR)
Round 0	1.06	1.43	285.59
Round 1	0.98	0.99	194.60
Round 2	0.98	0.97	189.36
Final	0.98	0.97	189.36

Without KB & without reaction:
Profit of Mango: 105
Profit of Kiwi: 285

Without KB & with pricing war:
Profit of Mango: 186
Profit of Kiwi: 189

With KB & without pricing war:
Profit of Mango: 86
Profit of Kiwi: 395

With KB & with pricing war:
Profit of Mango: 145
Profit of Kiwi: 257

In all the scenarios listed above, in a business context, Mango will start a pricing war as a rational player. So the best option for us in any aspect is to launch Kiwi Bubble, by doing which, we can maintain and enlarge our acceptance and competence in aspects of market share and profitability.