

## Project#5

### New Product Development for Philips Coffee Maker



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**Date: 4 December 2014**

#### **Honor Pledge:**

*We pledge on our honor that we have not given or received any unauthorized assistance on this assignment.*

## Executive Summary

Philips wishes to launch a new coffee maker that better caters to consumer expectations and would increase its market share in the coffee maker category. Data from a conjoint analysis study was used to identify two segments of consumers who prefer different types of coffee makers: Segment 1, the majority segment, comprises 75% of the market and constitutes office users whose ideal product is a 15-cup capacity coffee maker priced at \$59, with an auto-grinder, but no water filter. Segment 2 consumers, on the other hand, are home users who require a smaller coffee maker priced at \$79, without auto-grinder or filter. Philips should target segment 1 because of large market size and higher brand preference among consumers. With this new product, Philips could emerge as the market leader in the coffee maker market with an overall market share of 51.8% and target segment market share of 68.8%.

## Introduction and Background

New product development is crucial for the survival of firms in today's competitive business environments. Design teams, especially in consumer goods companies, regularly go through product development processes to innovate and extend their product life cycles. Philips, a consumer electronics company that manufactures a range of electronic goods covering entertainment, personal care, cooking and household lighting, has a smaller market share in the Coffee maker category compared to Cuisinart and Krups and intends to develop a new coffee maker product to increase market penetration. To achieve this, Philips intends to invest in research to understand consumer preferences and develop a product that increases its market share and mitigates the risk of failure.

The objective of this project is to help Philips understand the ideal attributes of a coffee maker that appeal to consumers, develop an optimal product, evaluate its market potential and the impact on existing products.

## Data and Methodology

The data for this product was obtained using a survey asking respondents to make choices among a given set of products. Five product attributes were used in the study – Brand, Carafe Capacity, Price, Water Filter and Auto-Grinder (*Please refer to Table 1 in Appendix for the attribute levels*). These attributes were selected on the basis of extensive discussions with Philips product managers, pretests, and in-depth interviews with consumers. Using the five product attributes and their levels, product profiles were constructed based on a fractional factorial design. These profiles were divided into eight blocks, each of which consisted of three alternatives. Respondents were divided into two groups, and each group received different choice sets based on the same 16 product profiles. Each respondent had to choose an alternative from a choice set of three product profiles, and to repeat the same choice task in a total of eight choice sets. The choice decisions for the 185 respondents resulted in 1480 observations.

Glimmix was used to execute a Mixture Multinomial Logit Model to identify different segments of consumers with different attribute preferences (*Refer to Table 2 in Appendix for the model equation*). Based on these consumer preferences and market share simulation, an optimal product was suggested.

## Key Findings

The results of the Mixture Multinomial Logit Model are summarized below (*Refer to Table 3 in Appendix for the model findings*).

- There are two segments in the coffee maker market that differ in the relative importance of the five product attributes. Segment 1 is almost three times the size of segment 2. Philips is the most preferred brand among segment 1 consumers, followed by Cuisinart and Krups. The odds of choosing a Philips coffee maker are 19.5% higher than choosing the average coffee maker.
- Consumers in segment 1 prefer coffee makers with a carafe capacity of 15 cups. The odds of choosing a coffee maker with 15 cups capacity is 65.8% more than the average.

- Having an auto-grinder increases the odds of segment 1 consumers choosing a product over the average coffee maker by 206%. However, these consumers prefer coffee makers without filters.
- Segment 1 consumers are price sensitive and are 20.9% more likely to purchase a coffee maker priced at \$59 than the average.
- Segment 2 consumers have strong preference towards coffee makers with smaller carafe capacity. These consumers are 51.1% more likely to choose a coffee maker with 5 cups capacity over the average coffee maker.
- Segment 2 consumers do not care much about the coffee maker's brand, but perceive price as an indicator of quality and have a strong preference towards medium priced coffee makers. They are 76.8% more likely to choose coffee maker priced at \$79 over the average.
- Segment 2 consumers prefer but don't require a water filter. They do not require an auto-grinder.

## Conclusions and Recommendations

- Philips has good brand equity in both segments, and is evidently the most preferred brand in segment 1. But it has lost out on market share as its current product does not directly meet its consumers' requirements. Philips can improve its position by launching a new product by understanding the different needs of its consumers belonging to different segments and also by analyzing the current leading products offered by its competitors, Krups and Cuisinart.
- Segment 1 consumers comprise 75% of the market and prefer a cheaper coffee maker with large carafe capacity and auto-grinder, while the remaining consumers belong to segment 2 and prefer a medium-priced product with smaller capacity and no auto-grinder. It is not required to include a water filter in the product for both segments; however segment 2 consumers do prefer it.
- Segment 1 consumers are office coffee drinkers and require a bigger product for their office break room/cafeteria. Their ideal product has greater carafe capacity so they can brew coffee for a larger group at once. Segment 2 consumers, on the contrary, seem to be avid coffee enthusiasts and are home users of the coffee maker who require a compact design that fits in their kitchen.
- The current product offered by Krups with 10 cup capacity priced at \$79 but no filter or grinder, is ideally suited for segment 2 consumers, fetching it a high market share of 44.4%. However this segment is just 25% of the total market, and hence offers little potential for overall growth.
- In contrast, Cuisinart is the only brand that currently offers an auto-grinder, and enjoys a high market share of 66% in segment 1. Hence it is certainly worthwhile for Philips to emulate this design aspect in its new product.
- In view of the above factors, we recommend that Philips should target segment 1 to launch its new coffee maker, not only because it is the preferred brand among these consumers but also comprises a huge chunk of the market.
- The optimal product that Philips should launch for segment 1 is a 15 cup capacity coffee maker with an auto-grinder priced at \$59. It is not required to include a water filter in the design. Also, neither Krups nor Cuisinart currently offers such a product.
- With this product, Philips can potentially emerge as the market leader with an increase in the brand's overall market share from 11% to 51.8%. Specifically in segment 1, Philips' market share would increase to 68.8%, while knocking over the current leader (Cuisinart) to the second position at 23.3% (*Refer to Table 4 in Appendix for market share calculations*).
- Furthermore, if Krups and Cuisinart also introduce this new product in segment 1 (in place of its current poor performers), Philips still remains the market leader in the segment with market share of 34%. In the future, if Philips launches an additional product specifically catering to segment 2 (10 cup capacity coffee maker for \$79 with no filter or grinder), it will be able to capture 33.6% market share in that segment, and raise its overall market share to 59.6% (*Refer to Tables 5-6 in Appendix for market share calculations for these scenarios*).

## Appendix

**Table 1: Product Attributes and Levels**

<i>Attribute Level</i>	<i>Brand</i>	<i>Carafe Capacity</i>	<i>Price (\$)</i>	<i>Water Filter</i>	<i>Auto-Grinder</i>
1	Philips	5 cups	59	Yes	Yes
2	Krups	10 cups	79	No	No
3	Cuisinart	15 cups	99		

**Table 2: Functional Form of Mixture Multinomial Logit Model**

Utility/attractiveness of a product profile  $j$ ,  $j = 1, \dots, J$ ,

$$U_j = b_1 X_{j,1} + \dots + b_P X_{j,P} = \sum_{p=1}^P b_p X_{j,p}$$

Then, probability of choosing product profile  $j$  by respondent  $i$ ,

$$P(Y_{i,j} = 1 / X, s) = \frac{\exp\left(\sum_{p=1}^P b_{p,s} X_{j,p}\right)}{\sum_{j=1}^J \exp\left(\sum_{p=1}^P b_{p,s} X_{j,p}\right)}$$

The unconditional distribution of  $Y_i$  can be obtained using the conditional distribution  $P(Y_i / X, s)$ :

$$P(Y_i) = \sum_{s=1}^S \pi_s \prod_{j=1}^J P(Y_{i,j} = 1 / X, s)$$

where  $\pi_s$  = prob.of belonging to segments.

**Table 3: Model Results**

<b>SEGMENT 1</b>					
<b>VARIABLE</b>	<b>Estimate</b>	<b>exp(b)</b>	<b>Std. Error</b>	<b>T-Value</b>	<b>P-Value</b>
Philips-1	0.178	1.195	0.076	2.358	0.019
Krups-1	-0.194	0.824	0.100	-1.951	0.051
Capacity5-1	-0.173	0.841	0.066	-2.615	0.009
Capacity10-1	-0.322	0.725	0.082	-3.909	0.000
Price59-1	0.190	1.209	0.086	2.200	0.028
Price79-1	-0.277	0.758	0.102	-2.702	0.007
Filter-1	-0.855	0.425	0.126	-6.775	0.000
Grinder-1	1.119	3.062	0.103	10.832	0.000
<b>Segment Size</b>	<b>0.741</b>				

SEGMENT 2					
VARIABLE	Estimate	exp(b)	Std. Error	T-Value	P-Value
Philips-1	0.127	1.135	0.153	0.832	0.405
Krups-1	0.032	1.032	0.152	0.209	0.834
Capacity5-1	0.414	1.512	0.136	3.033	0.002
Capacity10-1	0.271	1.311	0.127	2.138	0.033
Price59-1	0.213	1.237	0.114	1.858	0.063
Price79-1	0.572	1.771	0.239	2.392	0.017
Filter-1	0.107	1.113	0.239	0.447	0.655
Grinder-1	-0.698	0.498	0.143	-4.870	0.000
Segment Size	0.259				

**Table 4: Market Share Predictions for new Philips product**

SEGMENT 1	duct 1 (Krups)		Product 2 (Krups)		Product 3 (Cuisinart)		Product 4 (Cuisinart)		Product 5 (Philips)	
VARIABLE	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X
Philips-1	0	0.000	0	0.000	-1	-0.178	-1	-0.178	1	0.178
Krups-1	1	-0.194	1	-0.194	-1	0.194	-1	0.194	0	0.000
Capacity5-1	1	-0.173	0	0.000	0	0.000	-1	0.173	-1	0.173
Capacity10-1	0	0.000	1	-0.322	1	-0.322	-1	0.322	-1	0.322
Price59-1	1	0.190	0	0.000	-1	-0.190	0	0.000	1	0.190
Price79-1	0	0.000	1	-0.277	-1	0.277	1	-0.277	0	0.000
Filter-1	-1	0.855	-1	0.855	-1	0.855	-1	0.855	-1	0.855
Grinder-1	-1	-1.119	-1	-1.119	1	1.119	-1	-1.119	1	1.119
exp(b*X)		0.643		0.348		5.780		0.970		17.057
Probability/Market Share		0.026		0.014		0.233		0.039		0.688
		0.074		0.040		0.661		0.111		0.114
SEGMENT 2	duct 1 (Krups)		Product 2 (Krups)		Product 3 (Cuisinart)		Product 4 (Cuisinart)		Product 5 (Philips)	
VARIABLE	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X
Philips-1	0	0.000	0	0.000	-1	-0.127	-1	-0.127	1	0.127
Krups-1	1	0.032	1	0.032	-1	-0.032	-1	-0.032	0	0.000
Capacity5-1	1	0.414	0	0.000	0	0.000	-1	-0.414	-1	-0.414
Capacity10-1	0	0.000	1	0.271	1	0.271	-1	-0.271	-1	-0.271
Price59-1	1	0.213	0	0.000	-1	-0.213	0	0.000	1	0.213
Price79-1	0	0.000	1	0.572	-1	-0.572	1	0.572	0	0.000
Filter-1	-1	-0.107	-1	-0.107	-1	-0.107	-1	-0.107	-1	-0.107
Grinder-1	-1	0.698	-1	0.698	1	-0.698	-1	0.698	1	-0.698
exp(b*X)		3.487		4.327		0.228		1.377		0.317
Probability/Market Share		0.358		0.444		0.023		0.141		0.033
		0.335		0.415		0.022		0.132		0.096
Overall Probability/Share		0.112		0.126		0.179		0.066		0.518
		0.141		0.137		0.495		0.116		0.110

Please note: Current market shares are indicated in red.

**Table 5: Market Share Calculations for Scenario 1**  
**(Philips, Krups and Cuisinart launch same new product in segment 1)**

SEGMENT 1	Product 1 (Krups)		Product 2 (Krups)		Product 3 (Cuisinart)		Product 4 (Cuisinart)		Product 5 (Philips)	
VARIABLE	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X
Philips-1	0	0.000	0	0.000	-1	-0.178	-1	-0.178	1	0.178
Krups-1	1	-0.194	1	-0.194	-1	0.194	-1	0.194	0	0.000
Capacity5-1	1	-0.173	-1	0.173	0	0.000	-1	0.173	-1	0.173
Capacity10-1	0	0.000	-1	0.322	1	-0.322	-1	0.322	-1	0.322
Price59-1	1	0.190	1	0.190	-1	-0.190	1	0.190	1	0.190
Price79-1	0	0.000	0	0.000	-1	0.277	0	0.000	0	0.000
Filter-1	-1	0.855	-1	0.855	-1	0.855	-1	0.855	-1	0.855
Grinder-1	-1	-1.119	1	1.119	1	1.119	1	1.119	1	1.119
exp(b*X)		0.643		11.751		5.780		14.496		17.057
Probability/Market Share		0.013		0.236		0.116		0.292		0.343

**Table 6: Market Share Calculations for Scenario 2**  
**(Philips launches two different products for segments 1 & 2)**

SEGMENT 1	Product 1 (Krups)		Product 2 (Krups)		Product 3 (Cuisinart)		Product 4 (Cuisinart)		Product 5 (Philips)	
VARIABLE	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X
Philips-1	0	0.000	0	0.000	-1	-0.178	-1	-0.178	1	0.178
Krups-1	1	-0.194	1	-0.194	-1	0.194	-1	0.194	0	0.000
Capacity5-1	1	-0.173	0	0.000	0	0.000	-1	0.173	-1	0.173
Capacity10-1	0	0.000	1	-0.322	1	-0.322	-1	0.322	-1	0.322
Price59-1	1	0.190	0	0.000	-1	-0.190	0	0.000	1	0.190
Price79-1	0	0.000	1	-0.277	-1	0.277	1	-0.277	0	0.000
Filter-1	-1	0.855	-1	0.855	-1	0.855	-1	0.855	-1	0.855
Grinder-1	-1	-1.119	-1	-1.119	1	1.119	-1	-1.119	1	1.119
exp(b*X)		0.643		0.348		5.780		0.970		17.057
Probability/Market Share		0.026		0.014		0.233		0.039		0.688

  

SEGMENT 2	Product 1 (Krups)		Product 2 (Krups)		Product 3 (Cuisinart)		Product 4 (Cuisinart)		Product 6 (Philips)	
VARIABLE	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X	X-VALUES	b*X
Philips-1	0	0.000	0	0.000	-1	-0.127	-1	-0.127	1	0.127
Krups-1	1	0.032	1	0.032	-1	-0.032	-1	-0.032	0	0.000
Capacity5-1	1	0.414	0	0.000	0	0.000	-1	-0.414	0	0.000
Capacity10-1	0	0.000	1	0.271	1	0.271	-1	-0.271	1	0.271
Price59-1	1	0.213	0	0.000	-1	-0.213	0	0.000	0	0.000
Price79-1	0	0.000	1	0.572	-1	-0.572	1	0.572	1	0.572
Filter-1	-1	-0.107	-1	-0.107	-1	-0.107	-1	-0.107	-1	-0.107
Grinder-1	-1	0.698	-1	0.698	1	-0.698	-1	0.698	-1	0.698
exp(b*X)		3.487		4.327		0.228		1.377		4.760
Probability/Market Share		0.246		0.305		0.016		0.097		0.336
Overall Probability/Share		0.083		0.090		0.177		0.054		0.596