EXECUTIVE SUMMARY

Taco Bell has, for some time, been concerned about falling revenues in its stores. Other fast food franchises, including relative newcomers to the market such as Chipotle and Jimmy John's, have chipped away at Taco Bell's market share. Management has engaged BlueCut Analytics to conduct research into consumer preferences of differentiating factors in store products and services in an attempt to identify strategies for increasing store revenues.

BlueCut Analytics' research was accomplished by using an acknowledged tool known as Conjoint Analysis. This paper will provide an introduction to Conjoint Analysis, and explain how BlueCut used it fulfill its charge. Recommendations will be made for steps Taco Bell can consider in its attempts to increase store revenues and regain market share.

INTRODUCTION

Conjoint Analysis, one of many techniques known as Discrete Choice Analysis, is an analytic tool which enables the researcher to determine the relative value consumers place on various features, or levels, of a product or service. A major benefit of conjoint analysis is its ability to evaluate thousands, or even tens of thousands, of combinations of features and levels with a few hundred survey responses. Consider, for example, a digital camera. Differentiating features could include the price, the number of megapixels, the zoom capability, and the size of the display. If each of these four features has three levels (for example, 6x or 12x or 18x zoom), then there are 3^4, or 81, possible combinations of feature levels. Add four more features, each with three levels, and the number of combinations soars to 3^7, or 2,187! But conjoint analysis is a mathematical process which allows you to consider all 2,187 combinations with only 180 surveys. Conjoint analysis is a well-established technique which has proven to provide valuable insights into the relative value consumers place on various levels of a product's features.

We will begin our discussion by providing a brief explanation of the methodology used by BlueCut Analytics to conduct its research. We will then discuss those steps in detail, culminating in a discussion of what should – and should not – be done by Taco Bell about its falling market share.

METHODOLOGY

In conducting its research, BlueCut Analytics followed the methodology proposed by Dr. Zafar Iqbal of the Kellstaedt Graduate School of Management at DePaul University. There are five steps in Igbal's methodology:

1. Define the core product and identify relevant features and levels
2. Decide the nature of the stimuli and expected consumer judgment format
3. Choose and list relevant subset of product combinations
4. Obtain preferences data by developing and fielding a large-sample survey
5. Analyze data and interpret the output

The remainder of this paper will follow the same outline as the methodology.

CORE PRODUCT, DIFFERENTIATING FEATURES, AND LEVELS

In the "Core Product, Differentiating Features and Levels" step we identify

- the core product
- the differentiating features
- the possible levels of those features

The core product is the features of a product (or service) which all competiting products are presumed to possess. Consider again the digital camera example. An example of a core product feature would include the ability to store images on a memory card: all digital cameras do that.

A core product feature is non-differentiating and, as such, not worth further consideration. Differentiating features, on the other hand, are very important to us. An example of a differentiating feature for our digital camera would be the type of battery: penlight or special. Penlight batteries have the benefit of being cheaper and easy to find, whereas the special batteries have the benefit of longer battery life. Different consumers will assign different values, or utilities, to different types of batteries. These options are referred to as levels. Pricing is a differentiating feature included in most studies: our digital camera might be having pricing levels of one-, two-, or three-hundred dollars. Iqbal recommends 5-9 features, each with 3-4 levels. Each unique combination of features and their levels constitutes a profile.

Determination of differentiating features and their levels is not a trivial process: it is usually done by means of several focus groups. One need not spend too much time with focus groups: a minimum of four focus groups totaling about thirty hours should be sufficient, as experience has shown that the researcher will begin to hear the same things over and over after about thirty hours.

BlueCut Analytics conducted four focus group sessions during the week of July 23-27, 2012. Each focus group consisted of eight to ten volunteers representing a wide cross section of the target market. These consumer groups identified the seven differentiating features, each with three levels:

Differentiator	Level 1	Level 2	Level 3
Price	$5	$7.50	$10
Time from arrival to receiving food	0 - 1 minute	2 - 3 minutes	4 - 5 minutes
Healthy food claim	Fat free options	Low fat options	No claim made
Distance from office	Less than quarter mile	Quarter to half mile	Half mile to mile
Wi-fi service	Free wi-fi	Wi-fi with small fee	No wi-fi
Delivery option	Free delivery	Delivery with fee	No delivery
Order accuracy	100% of the time	95% of the time	90% of the time

STIMULI AND RESPONSE FORMATS

In the "Stimuli and Response Formats" step we determine how the various profiles (combinations of features and their levels) will be presented to the consumer, and the expected format of their responses. Profiles might be presented as the actual product, prototypes or simulations, pictures with text, pictures only, or text only. Different stimuli will be appropriate for different products. For example, consumers may have difficulty understanding a text description of a beverage: the real product would likely be the most desireable (albeit most expensive) stimuli. On the other hand, a textual description of the features and levels of our digital camera would probably suffice.

Instinctively we would usually prefer the actual product over a textual description of it. However, creating the actual product can be very expensive or even impractical. A prototype (where feasible) is usually much less expensive than the actual product, but still much more expensive than a textual description. Text is always cheaper. Moreover, experience has shown that the loss of accuracy between the actual product or a prototype vs. text is usually minimal. Therefore, it was decided to use a text description for Taco Bell's product and store attributes.

We must make a determination on the format of the response. If there are ten or fewer profiles, then they are usually ranked, whereas if there are more than ten profiles, they are usually rated (such as with a 1-7 Likert scale).

Finally, we determine the profile combinations to be presented to the consumer: we do so by making use of Orthogonal Experimental Design (OED). OED tells us how many and which profiles to present to the consumer. OED shows us how to create a coding sheet (see Appendix

A) which is used in conjuction with an Orthogonal Array (see Appendix B) to create the profiles presented in our survey (see Appendix C).

OBTAIN PREFERENCES DATA THROUGH LARGE-SAMPLE SURVEY

Next we obtain consumers' preferences data through the use of a large-sample survey. Surveys should be visually clean and uncluttered. Surveys should be tested before being distributed en masse. While surveys can be distributed on paper, they are usually distributed electonically anymore.

BlueCut sent surveys to 200 randomly selected consumers on August 6, 2012. Consumers were given one week to respond. Consumers were compensated with a $25 VISA gift card, which surely contributed to the 92% (*n*=184) response rate.

ANALYZE DATA AND INTERPRET RESULTS

Next we analyze and interpret the survey results. Conjoint analysis with ratings, such as we have used, can be analyzed using multiple regression in Excel, with the level as the independent variables and each response as the dependent variable (see Appendices D and E). The adjusted r-squared[1] value indicates the percentage of total variation explained by our model. This value is always between 0 and 1 inclusive, with zero indicating no relationship and one indicating a perfect fit. Our adjusted r-squared value of .242 is sufficient for our sample size. We also look for a p-value[2] of less than .05. We do, indeed, have a p-value of less than .05 so we can proceed with our analysis.

Next we take the coefficients from the regression analysis and standardize them on a zero-to-one scale, and determine the Total Product Utility (TPU) for each feature (see Appendix F). Those features with the highest TPU are of the most importance to our consumers. As we can see in the graph in Appedix G, Price is the most important differentiating feature to our customers, followed next by Distance.

The high value of the intercept – a higher value than any other feature – confirms that this is a very mature, highly competitive market.

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[1] Whereas r-squared is commonly used for simple linear regression, the adjusted r-squared is more appropriate for multiple regression.

[2] The p-value is shown in Excel 2010 as Significance F. The p-value indicates the probability of receiving a model this good or better had the data (responses) been purely random. Smaller is better. The commonly accepted minimum is .05.

Finally we can produce a graph of standardized coefficients to get a clear picture of the relative value consumers place on each level of each feature. (See Appendix H.)

We always hope to find a "sweet spot" in this graph; that is, some feature where the customer is willing to pay more for less. An example would be if customers were more enthused about a five minute wait time than a one minute wait time, perhaps assuming that "quality takes time". Unfortunately, there is no such spot in our analysis. Nevertheless, other recommendations can still be made.

RECOMMENDATIONS

It is no surprise that in the highly competitive market of fast food we should find that price is the most important factor for our consumers. One way for Taco Bell to increase store revenue is to raise its prices. Given that current customers spend, on average, five dollars for lunch, is it possible to raise prices by 20%? If we do so, we are asking the customer to give up .16 units of utility[3], so we must make other changes to compensate for this loss. One option is to build more stores: the difference between a "less than quarter mile walk" and "quarter mile to half mile walk" is .40 – .25, or .15 units. Likewise, free delivery has a value of .15 units. These are not quick options, and they are expensive.

A less expensive alternative is to focus on order accuracy. Our analysis shows that increasing order accuracy from 95% to 100% adds .12 units of utility. Having someone at the counter to check each order as it is passed to the front of the store can compensate for the drop in utility caused by the increase in prices. Another low cost change is to provide free wifi service, for an additional .07 units.

Taco Bell's current market share is estimated to be 49.9% (see Appendix I). Taco Bell should always anticipate a competitor response for any action taken. We believe that if Taco Bell will take measures to improve order accuracy from 95% to 100%, and add free wifi service that they can raise prices by 20% and still maintain market share (slight gain to 51.5%). Our competitors already have higher order accuracy and free wifi, so they would need to find other ways to react. We can, upon request, provide additional tools for measuring market share changes through "what if" analysis similar to what is shown in Appendix I.

[3] Appendix H shows us that the coefficient for $5.00 is .91, and coefficient for $7.50 is .51. So by interpolation, the coefficient for $6.00 would be $.51 + \frac{7.50-6.00}{7.50-5.00}(.91 - .51) = .75$. This price increase represents a drop in .16 units of utility for the consumer.

APPENDIX A – CODING SHEET

Differentiator	Level 1	Level 2	Level 3
Price	$5 $x_1 = 1, x_2 = 0$	$7.5 $x_1 = 0, x_2 = 1$	$10 $x_1 = 0, x_2 = 0$
Time from arrival to receiving food	1 minute $x_3 = 1, x_4 = 0$	3 minutes $x_3 = 0, x_4 = 1$	5 minutes $x_3 = 0, x_4 = 0$
Health Claim	Fat Free $x_5 = 1, x_6 = 0$	Low Fat $x_5 = 0, x_6 = 1$	None $x_5 = 0, x_6 = 0$
Distance from office	<1/4 mile $x_7 = 1, x_8 = 0$	1/4-1/2 mile $x_7 = 0, x_8 = 1$	1/2-1 mile $x_7 = 0, x_8 = 0$
Wi-Fi Service	Free Wi-Fi $x_9 = 1, x_{10} = 0$	Wi-Fi with small fee $x_9 = 0, x_{10} = 1$	No Wi-Fi $x_9 = 0, x_{10} = 0$
Delivery option	Free Delivery $x_{11} = 1, x_{12} = 0$	Delivery with fee $x_{11} = 0, x_{12} = 1$	No delivery $x_{11} = 0, x_{12} = 0$
Order accuracy	100% of the time $x_{13} = 1, x_{14} = 0$	95% of the time $x_{13} = 0, x_{14} = 1$	90% of the time $x_{13} = 0, x_{14} = 0$

- For each differentiator, there are three levels. Given *n*-levels, there will always be *n*-1 variables. So given three levels, we use only two variables.
- We will codify these levels as binary digits where 1 is yes and 0 is no.
- Two binary digits gives us four possible outcomes, but we don't use the fourth here.
- We always code what we anticipate to be the least desireable level (example: highest price) as the last level. Note that it will have a value of 0 in all digits for that differentator.

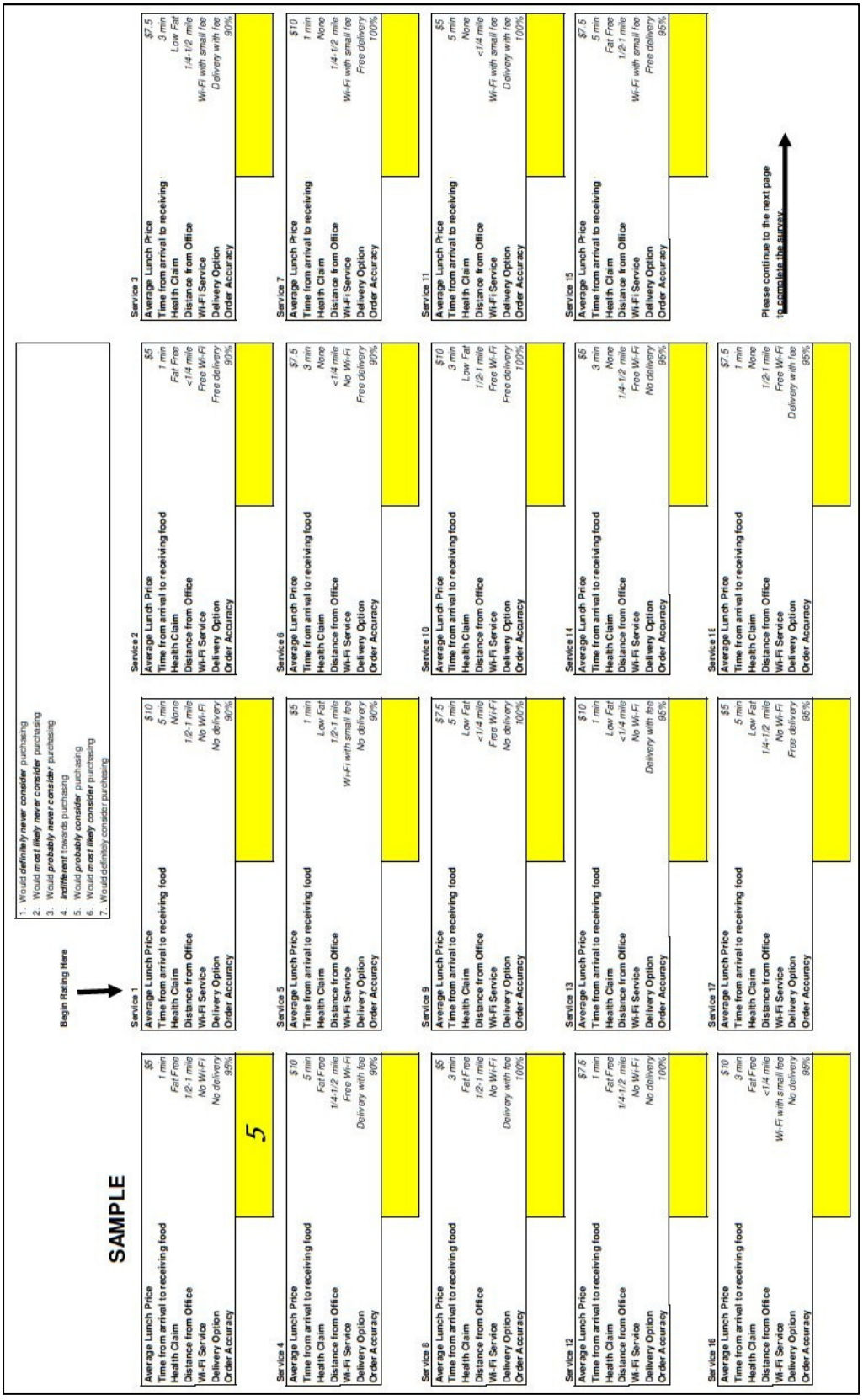
APPENDIX B – ORTHOGONAL ARRAY

The following orthogonal array is used when there are 7 features and 3 levels:

	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	0	1	0	1	0	1	0	1	0	1	0	1	0
3	0	1	0	1	0	1	0	1	0	1	0	1	0	1
4	0	0	0	0	1	0	0	1	1	0	0	1	0	0
5	1	0	1	0	0	1	0	0	0	1	0	0	0	0
6	0	1	0	1	0	0	1	0	0	0	1	0	0	0
7	0	0	1	0	0	0	0	1	0	1	1	0	1	0
8	1	0	0	1	1	0	0	0	0	0	0	1	1	0
9	0	1	0	0	0	1	1	0	1	0	0	0	1	0
10	0	0	0	1	0	1	0	0	1	0	1	0	1	0
11	1	0	0	0	0	0	1	0	0	1	0	1	1	0
12	0	1	1	0	1	0	0	1	0	0	0	0	1	0
13	0	0	1	0	0	1	1	0	0	0	0	1	0	1
14	1	0	0	1	0	0	0	1	1	0	0	0	0	1
15	0	1	0	0	1	0	0	0	0	1	1	0	0	1
16	0	0	0	1	1	0	1	0	0	1	0	0	0	1
17	1	0	0	0	0	1	0	1	0	0	1	0	0	1
18	0	1	1	0	0	0	0	0	1	0	0	1	0	1

- Each pair of x_i in the top row corresponds to a single differentiator. For example, x_1 and x_2 correspond to Price as indicated in the coding sheet found in Appendix A.
- Each row constitutes a single profile, or combination of product or service level.
- There are 18 rows, indicating that 18 profiles will be required. The complete profiles are shown in Appendix C.
- Other tables for other numbers of differentiators and levels can be found at http://www.york.ac.uk/depts/maths/tables/orthogonal.htm (retrieved September 21, 2012) and elsewhere on the internet.

APPENDIX C – SURVEY



APPENDIX D – MULTIPLE REGRESSION INPUT

Ratings	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	1	0	1	0	1	0	1	0	1	0	1	0	0	0
7	0	1	0	1	0	1	0	1	0	1	0	1	0	0
5	0	0	0	0	1	0	0	1	1	0	0	1	0	0
7	1	0	1	0	0	1	0	0	0	1	0	0	0	0
6	0	1	0	1	0	0	1	0	0	0	1	0	0	0
6	0	0	1	0	0	0	0	1	0	1	1	0	1	0
7	1	0	0	1	1	0	0	0	0	0	0	1	1	0
7	0	1	0	0	0	1	1	0	1	0	0	0	1	0
5	0	0	0	1	0	1	0	0	1	0	1	0	1	0
7	1	0	0	0	0	0	1	0	0	1	0	1	1	0
7	0	1	1	0	1	0	0	1	0	0	0	0	1	0
6	0	0	1	0	0	1	1	0	0	0	0	1	0	1
7	1	0	0	1	0	0	0	1	1	0	0	0	0	1
6	0	1	0	0	1	0	0	0	0	1	1	0	0	1
5	0	0	0	1	1	0	1	0	0	1	0	0	0	1
7	1	0	0	0	0	1	0	1	0	0	1	0	0	1
7	0	1	1	0	0	0	0	0	1	0	0	1	0	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	1	0	1	0	1	0	1	0	1	0	1	0	0	0
6	0	1	0	1	0	1	0	1	0	1	0	1	0	0
6	0	0	0	0	1	0	0	1	1	0	0	1	0	0
3	1	0	1	0	0	1	0	0	0	1	0	0	0	0
6	0	1	0	1	0	0	1	0	0	0	1	0	0	0
4	0	0	1	0	0	0	0	1	0	1	1	0	1	0
5	1	0	0	1	1	0	0	0	0	0	0	1	1	0
7	0	1	0	0	0	1	1	0	1	0	0	0	1	0
3	0	0	0	1	0	1	0	0	1	0	1	0	1	0
6	1	0	0	0	0	0	1	0	0	1	0	1	1	0
6	0	1	1	0	1	0	0	1	0	0	0	0	1	0
6	0	0	1	0	0	1	1	0	0	0	0	1	0	1
5	1	0	0	1	0	0	0	1	1	0	0	0	0	1
4	0	1	0	0	1	0	0	0	0	1	1	0	0	1
6	0	0	0	1	1	0	1	0	0	1	0	0	0	1
5	1	0	0	0	0	1	0	1	0	0	1	0	0	1
3	0	1	1	0	0	0	0	0	1	0	0	1	0	1
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	1	0	1	0	1	0	1	0	1	0	1	0	0	0
4	0	1	0	1	0	1	0	1	0	1	0	1	0	0
2	0	0	0	0	1	0	0	1	1	0	0	1	0	0
6	1	0	1	0	0	1	0	0	0	1	0	0	0	0
5	0	1	0	1	0	0	1	0	0	0	1	0	0	0
4	0	0	1	0	0	0	0	1	0	1	1	0	1	0
5	1	0	0	1	1	0	0	0	0	0	0	1	1	0
3	0	1	0	0	0	1	1	0	1	0	0	0	1	0
3	0	0	0	1	0	1	0	0	1	0	1	0	1	0
5	1	0	0	0	0	0	1	0	0	1	0	1	1	0
5	0	1	1	0	1	0	0	1	0	0	0	0	1	0
3	0	0	1	0	0	1	1	0	0	0	0	1	0	1
5	1	0	0	1	0	0	0	1	1	0	0	0	0	1
5	0	1	0	0	1	0	0	0	0	1	1	0	0	1
3	0	0	0	1	1	0	1	0	0	1	0	0	0	1
6	1	0	0	0	0	1	0	1	0	0	1	0	0	1
4	0	1	1	0	0	0	0	0	1	0	0	1	0	1

- This example shows the responses to three sets of eighteen profiles.
- Multiple regression is performed with the x_i as the independent variables and Ratings as the dependent variable.

APPENDIX E – MULTIPLE REGRESSION OUTPUT

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.601
R Square	0.361
Adjusted R Square	0.242
Standard Error	1.428
Observations	90

ANOVA

	df	*SS*	*MS*	*F*	*Signi-ficance F*
Regression	14	86.422	6.173	3.029	0.001
Residual	75	152.867	2.038		
Total	89	239.289			

	Coeff-icients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	2.267	0.583	3.889	0.000	1.106	3.428	1.106	3.428
x1	2.033	0.369	5.516	0.000	1.299	2.768	1.299	2.768
x2	1.133	0.369	3.075	0.003	0.399	1.868	0.399	1.868
x3	0.467	0.369	1.266	0.209	-0.268	1.201	-0.268	1.201
x4	0.300	0.369	0.814	0.418	-0.434	1.034	-0.434	1.034
x5	0.500	0.369	1.356	0.179	-0.234	1.234	-0.234	1.234
x6	0.267	0.369	0.723	0.472	-0.468	1.001	-0.468	1.001
x7	0.900	0.369	2.442	0.017	0.166	1.634	0.166	1.634
x8	0.567	0.369	1.537	0.128	-0.168	1.301	-0.168	1.301
x9	0.167	0.369	0.452	0.652	-0.568	0.901	-0.568	0.901
x10	0.100	0.369	0.271	0.787	-0.634	0.834	-0.634	0.834
x11	0.333	0.369	0.904	0.369	-0.401	1.068	-0.401	1.068
x12	0.033	0.369	0.090	0.928	-0.701	0.768	-0.701	0.768
x13	0.367	0.369	0.995	0.323	-0.368	1.101	-0.368	1.101
x14	0.100	0.369	0.271	0.787	-0.634	0.834	-0.634	0.834

- At this point we refer back to the coding sheet. x1 means "Price is $5" and x2 means "Price is $7.50". But x3 does not mean "Price is $10". x3 means "Wait time 1 minute". "Price is $10" is indicated by a zero in x1 and a zero in x2. In fact, the coefficient for the "Price is $10" – and for all of the "least desireable" levels – is zero.

APPENDIX F – DETERMINING TOTAL PRODUCT UTILITY (TPU)

Differentiator	Level	Coefficient	Standardized Coefficient	TPU	Standardized TPU
--	intercept	2.227	1.000		
Price	$5.00	2.033	0.913	0.913	0.427
	$7.50	1.133	0.509		
	$10.00	0.000	0.000		
Wait time	1 minute wait	0.467	0.210	0.210	0.098
	3 minute	0.300	0.135		
	5 minute wait	0.000	0.000		
Healthy Options	Fat free options	0.500	0.225	0.225	0.105
	Low fat options	0.267	0.120		
	No health claim	0.000	0.000		
Distance	Less than qtr mile	0.900	0.404	0.404	0.189
	Qtr to half mile	0.567	0.255		
	Half mile to mile	0.000	0.000		
Wifl	Free wifi	0.167	0.075	0.075	0.035
	Fee wifi	0.100	0.045		
	No wifi	0.000	0.000		
Delivery	Free delivery	0.333	0.150	0.150	0.070
	Fee delivery	0.033	0.015		
	No delivery	0.000	0.000		
Accuracy	100% accuracy	0.367	0.165	0.165	0.077
	95% accuracy	0.100	0.045		
	90% accuracy	0.000	0.000		
		0.000	Minimum	2.141	Super Range
		2.227	Maximum		
		2.227	Range		

- Coefficients are standardized from zero to one by the following formula:

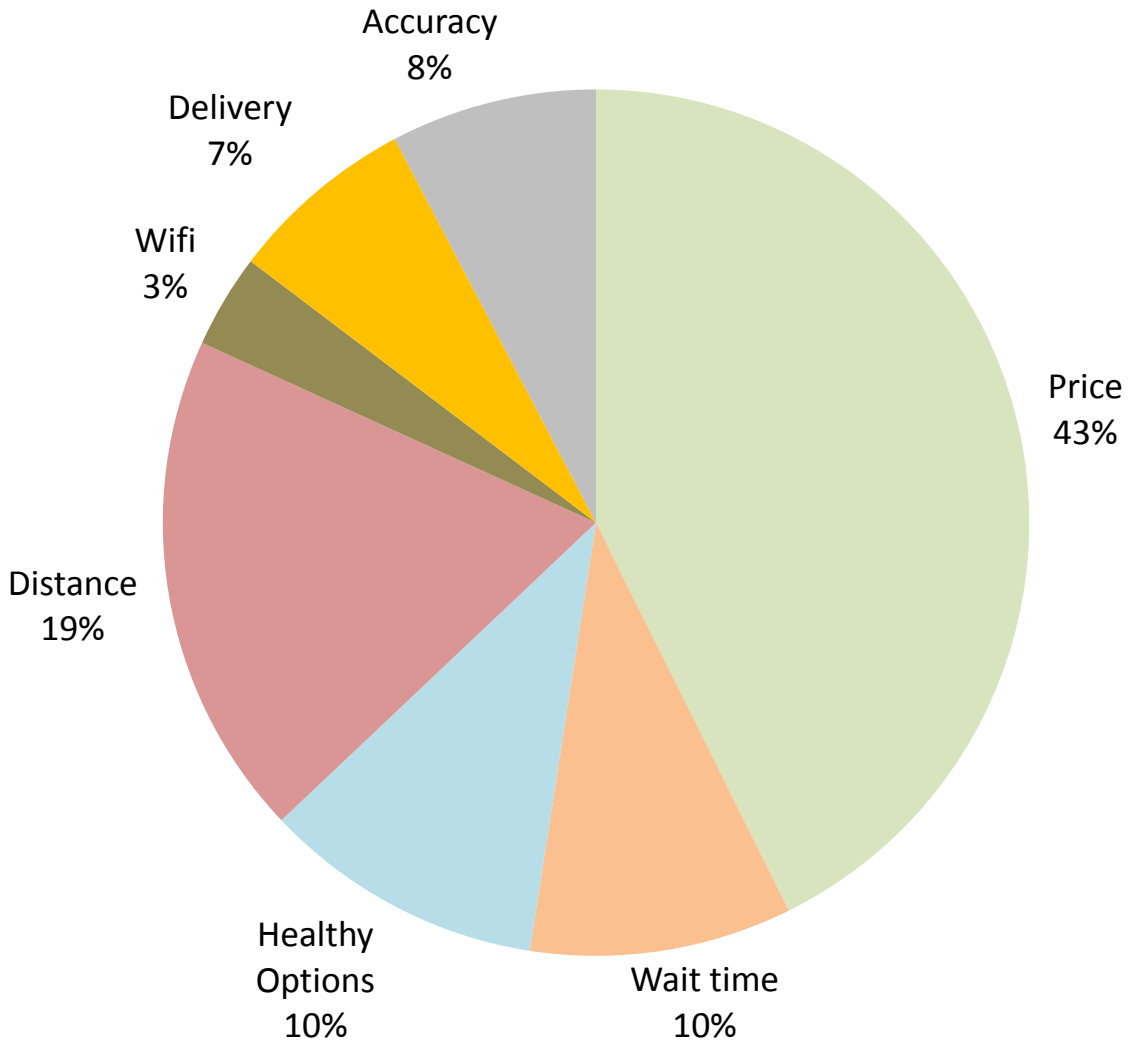
$$Standardized\ Coefficient = \frac{Coefficient - MinimumCoefficient}{MaximumCoefficient - MinimumCoefficient}$$

- The TPU of a feature is the range of the standardized coefficients for that feature.
- TPUs are standardized from zero to one by the following formula:

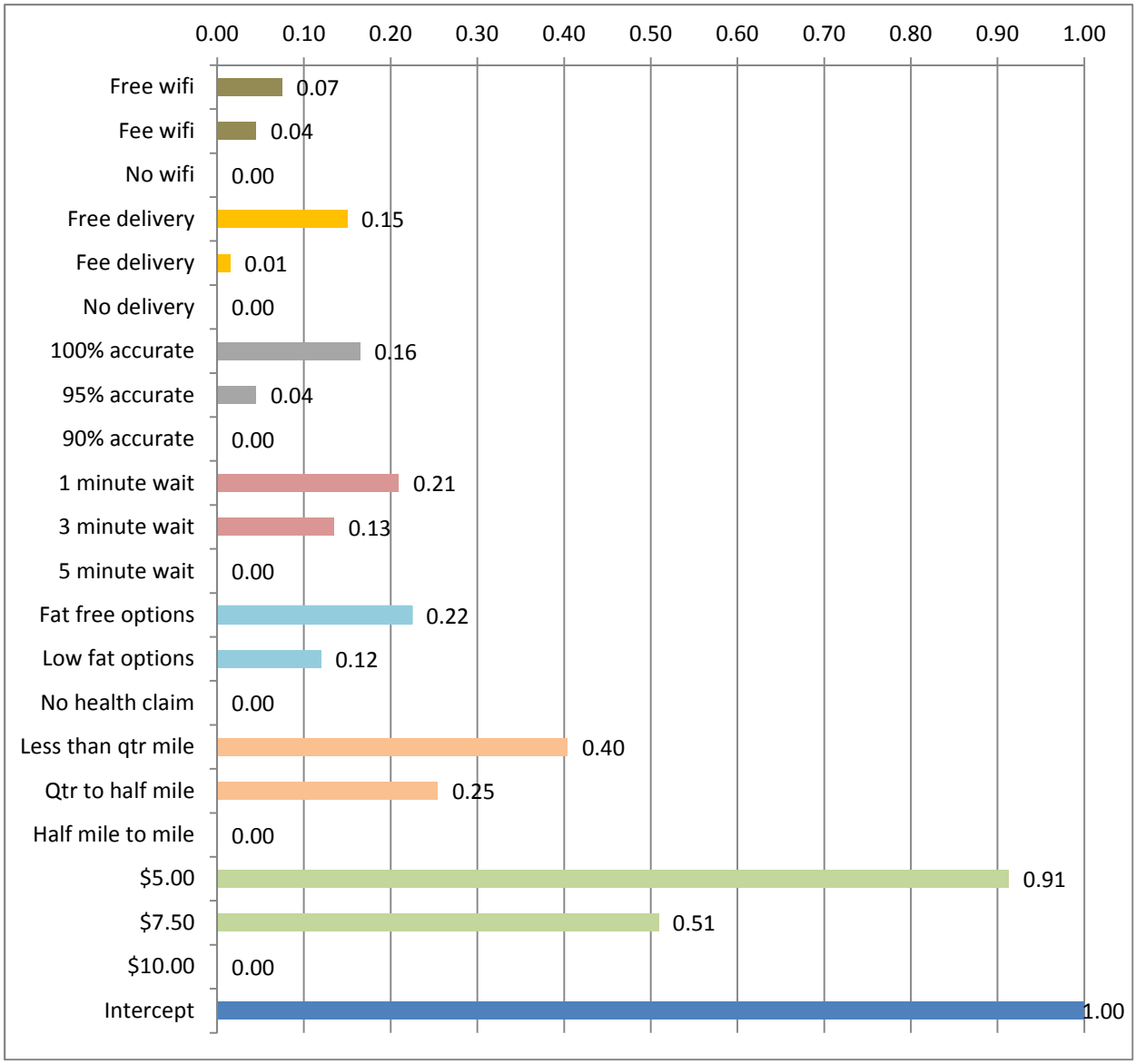
$$Standardized\ TPU = \frac{TPU - MinimumTPU}{MaximumTPU - MinimumTPU}$$

- Features with higher TPUs have higher importance.

APPENDIX G – RELATIVE FEATURE IMPORTANCE



APPENDIX H – GRAPH OF STANDARDIZED COEFFICIENTS



APPENDIX I – MARKET SHARE

Before	Taco Bell		Bert's Burritos		Tommy's Tacos	
Price	$5.00	0.913	$10.00	0.000	$7.50	0.509
Wait time	1 minute	0.210	5 minutes	0.000	3 minutes	0.135
Health claim	None	0.000	Low fat	0.225	None	0
Distance	.25 miles	0.404	.5 miles	0.255	1 mile	0
Wifi	None	0.000	Free	0.075	Free	0.075
Delivery	None	0.000	Free	0.150	Fee	0.015
Accuracy	95%	0.045	100%	0.165	100%	0.165
Utility		1.572		0.870		0.899
Market Share		49.9%		24.7%		25.4%

After	Taco Bell		Bert's Burritos		Tommy's Tacos	
Price	$6.00	0.750	$10.00	0.000	$7.50	0.509
Wait time	1 minute	0.210	5 minutes	0.000	3 minutes	0.135
Health claim	None	0.000	Low fat	0.225	None	0
Distance	.25 miles	0.404	.5 miles	0.255	1 mile	0
Wifi	Free	0.075	Free	0.075	Free	0.075
Delivery	None	0.000	Free	0.150	Fee	0.015
Accuracy	100%	0.165	100%	0.165	100%	0.165
Utility		1.604		0.870		0.899
Market Share		51.5%		24.7%		25.4%

- Changes include increasing average price from $5.00 to $6.00, improving order accuracy from 95% to 100%, and providing free wifi service.
- Market share (after) is calculate as $\frac{e^{1.604}}{e^{1.604}+e^{.870}+e^{.899}} = .515 = 51.5\%$