**MARK7600 Group Project – Headphones**

*by*

Ameya Jamgade

Mark Aw

Rahul Potluri

Tommy Zhu

Yan Yang

**Executive Summary**

This report provides an analysis and evaluation of the headphones market to deliver a market share estimate for the Beats®, Bose®, and Sennheiser® brands of headphones.

This analysis draws attention to the fact that the U.S. earphones & headphones market is poised to be about $5 Billion by year 2020 [‘Earphones and Headphones Market Analysis by Product’ by Grandview Research] therefore making it lucrative for all brands in the market to achieve maximum share. Method of analysis includes utilizing discrete choice to formulate a survey and requesting respondents to make a decision from the given set of options. Market shares of all brands the group is estimated in was determined by calculating utility estimates of each brands. All calculations can be found in the appendices.

Results of the data analyzed show that Bose® was overwhelming choice with cumulative average of 44% of respondents choosing this brand. Beats® and Sennheiser®® were in 2nd and 3rd positions with a market share of 22% and 16% respectively for all product combinations. Approximately 19% of population chose ‘none of the these’ option when asked to select a $250 headphone.

**Background and problem statement**

Headphones are a pair of small listening devices that are designed to be worn on or around the head over a user's ears. The global earphones and headphones market size is poised for high growth over the forecast period owing to recent technological advancements in these devices and improved design. The U.S. earphones & headphones market is poised to be about $5 Billion by year 2020 [‘Earphones and Headphones Market Analysis by Product’ by Grandview Research].

The global earphones and headphones market is highly competitive and fragmented. Major players include Beats®, Bose®, and Sennheiser®®. All these companies are trying to create successful products with right combination and sell them at the right price in order to gain maximum market share.

The goal of the project is come up with the share of each brand and identifying how combination of products features of these brands should perform in the market. We will use statistics to determine what customers really value in a product and the quantitative extent to which each attribute influences a customer’s decision. This will help companies come up with the optimal levels of various attributes in their future products to achieve maximum possible market share. We will deliver a market share estimate of earphone market share for the brands we are interested in.

**Design**

The team felt that the ideal method would be where respondents are shown different variations of headphones and they are asked to select the one they would be most likely to purchase. This would help create a market share of different brands of headphones instead of using a system where respondents are asked to rank different products. Hence to do this market modeling simulation, a discrete choice conjoint study would be most appropriate.

Further advantages of a discrete choice model are.

1. It is a more realistic exercise for respondents to indicate the headphone they would purchase rather than ranking since this is what they actually do in the marketplace.
2. In a discrete choice analysis respondent can be given the option to select ‘none of the products’, thus indicating that they do not find any of the headphones appealing. This cannot be possible in a choice based conjoint model.

The first step in a discrete choice analysis requires the selection of a number of factors describing the product. The group thought that attributes such as Type of headphones, Price, Connectivity and Brand would encompass all aspects about headphones. The team then came up with levels given below that best help define the earphones market.

| **Type** | **Price** | **Connectivity** | **Brand** |
| --- | --- | --- | --- |
| **In-ear earphones** | **50** | **Wired** | **Beats®** |
| **In-ear earphones with mic** | **150** | **Bluetooth** | **Bose®** |
| **On/over ear light headphones** | **250** |  | **Sennheiser®®** |
| **Full sized headphones** |  |  |  |

The team used SAS software to help determine some reasonable design sizes. We get the following values for D-efficiency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Design Number | D-Efficiency | A-Efficiency | G-Efficiency | Average Prediction Std Error |
| 1 | 99.3251 | 98.6607 | 96.2496 | 0.5774 |

Based on the above values, the team decided that 48 would be a reasonable size for conducting the discrete choice analysis. By using the SAS code, we optimally sorted our existing 48 headphones design into 3 blocks of size 16. The entire set of SAS results are present in appendix. The team decided on using Qualtrics software as a method to survey respondents. As per the requirements of design, 3 surveys of 16 questions each were created.   
  
The team was hopeful that it can get a sample size of n > 25 for each of its 3 surveys and was successful in doing so. It is important in any survey to get responses from candidates belonging to a diverse demography. To keep track that the surveys are taken by respondents belonging to various demography, questions about Age and Occupation were also included in the survey.

**Analysis and Results**



The cumulative average market shares of all permutations of earphones for Beats® was 22%, Bose® at 44%, Sennheiser®® at 16%, leaving 19% for none of the brands.

From the simulated market share Excel spreadsheet, we found that the three types of earphones (in-ear, in-ear w/ mic, and over-ears) were relatively similar; however, the more features introduced into the earphones at each price point (i.e. adding a mic, or an over-ear housing) resulted in market share gains for each brand (Beats, Bose, Sennheiser®). When price decreased, from $250 to $150 to $50, market share increased (i.e. Beats in-ear earphones increased from 17% to 21% to 24% as the price decreased, keeping connectivity constant).

When we add an extra feature to connectivity like Bluetooth, at every price point market share increased by 1%-2%. For example, here, keeping price constant at $250 and type of earphone constant at in-ear models, we can see that adding Bluetooth connectivity we increase market share for all brands and take market share from those that would have chosen none of the brands.

In general, our research findings show us that adding features like a mic or an over-ear headphone increased market share of all brands from the base in-ear model by 1%-2%. An additional feature to connectivity like Bluetooth increased market share of all brands from the base wired model. Decreasing price points from $250 to $150 to $50 had the most effect in market share by 3%-6%. From the difference in ranges, we would say that price has the most importance followed by connectivity (Bluetooth or wired) and earphone type (basic in-ear, in-ear w/ mic., over-ear housing).

Overall, market share between the brands did not differ by the cumulative average by much between the various 72 product permutations. This shows us that market share and mind share of these earphones are pretty consistent in our study sample. However, with the lowest market share holder, Sennheiser®, there were lower ranges of market share expansion when price points decreased, or when type features (mics, over-ear housing) and connectivity features (Bluetooth) were added to the earphones.

The study shows us that the brand with the highest simulated market share would enjoy greater take-rates and gains in market share than brands with low market share. For example, the average market share of Bose® at a $250 price point increased by 3% when a Bluetooth connectivity was introduced while Sennheiser®® at the same $250 price point increased by 1% when a Bluetooth connectivity was also introduced.

This attenuation in effect of market share improvements when more features are introduced shows how important it is to strive to maintain a larger market share to achieve higher take-rates from the population that would otherwise choose none of the brands.

**Limitations**

**1.** **Lack of target respondents**

Since headphone is not a daily necessity, its target customer should be a limited population. For example, a typical customer of Beats® or Bose® would be a rich, young and fashion male/female who is very much into sports or music. However, we can’t find too many such respondents doing our survey due to our network.

**2. Limit of the number of attributes**

The problem is that as the number of attributes increase the number of combinations of products increase exponentially, which would impose burden to respondents and degrade the accuracy of their choice. So we have to trade across different attributes and select no more than 4.

**3. Low personal income level**  
A majority of respondents of our 3 surveys consisted of students. Students would statically have lower income levels that other age groups and hence would not be too much inclined to purchase expensive headphones. This might skew our results.

**4. Age group**  
  
The primary age group of respondents to our survey is 18-30 years. Hence this survey would not be a totally accurate representation of decisions made by other age groups when compared to real population statistics of USA.

**Summary, conclusions, and recommendations**The project was able to successfully design a discrete choice model of headphones and survey respondents on diverse demographics. By asking respondents to choose one option from a combination of different features of headphones namely brand, type, price and connectivity, the team was able to determine utility for each component. The team used the utility values to create a simulator that can be used to determine market share of each brand for any combination of attributes.  
  
In conclusion the group was able to classify market share of each brand using the results obtained from Qualtrics and determine what customers really value in a product and the quantitative extent to which each attribute influences a customer’s decision through a simulator. The group also identify how combination of products features of these brands should perform in the market. This will help companies come up with the optimal levels of various attributes in their future products to achieve maximum possible market share.

It is recommended:

All 3 brands to consider adding extra feature in headphones at same price point to increase market share.

* Decrease in price of headphones would make all 3 brands attractive to consumers who were previously interested in none of these brands thereby improving market share of all 3 brands.
* Bose® to continue with its existing marketing strategy and preserve its brand image by maintaining consistent quality levels.
* Beats® to seek different avenues to improve its market share either by introducing better quality products which would improve its brand image or by offering products at a lower price that would attract budget customers.
* Sennheiser® has poor utilities for its products. The team recommends it to do a thorough analysis of its products to determine areas of improvement. This can be done either by revising existing products or formulating new products. By implementing these strategies effectively after thorough research, Sennheiser® should be able to improve its existing market share.