Evaluation of consumer Preferences for "High in Antioxidants" labeled tree nuts

Before: Pecans – The marketing begins with consumer preferences

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Oxidation

- Process of oxidation
  - Free radicals
  - Negative effects for our body
    - Premature Aging
    - Cancer
    - Heart Diseases

Diet and nutrition

- Consumers and their diet
  - Aware of health
  - Looking for functional foods

- Functional foods: Foods that provides potentially positive effects beyond basic nutrition.
  - Apples
  - Berries
  - Onions
  - Tomatoes
  - Greens
  - Tree-nuts

Tree-nuts (Functional food)

- Tree nuts have become an important part of a persons diet
- Example of tree nuts.
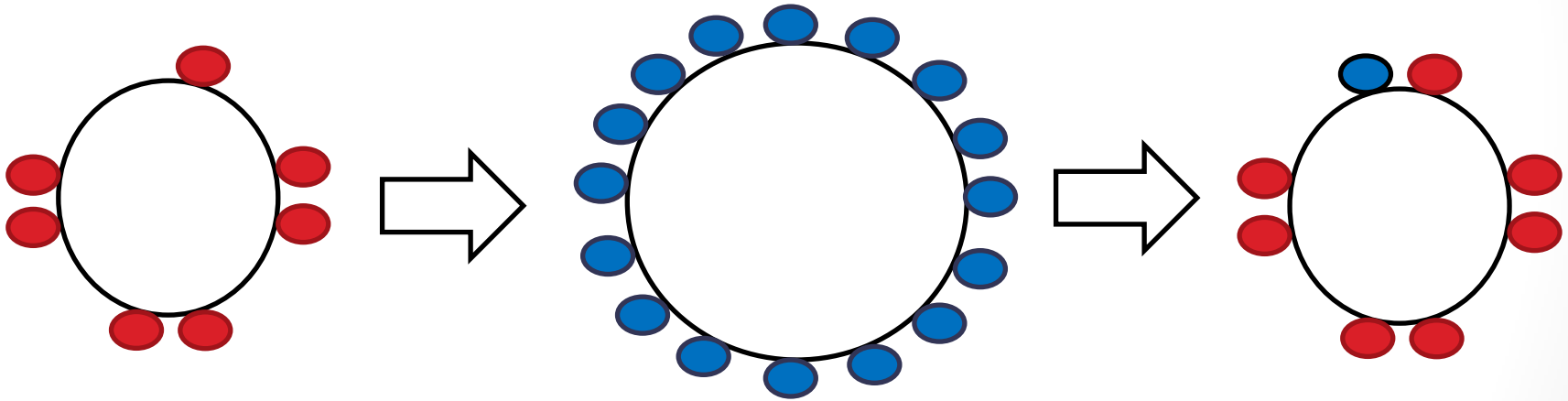 - Almonds
  - Pecans
  - Walnuts
  - Pistachios

- Functional components of the tree-nuts
  - Monounsaturated fatty acids
  - Antioxidants

Antioxidants

- Antioxidants
  - Natural substances that neutralize the free radicals and convert them again in healthy and benign molecules.

Antioxidants

Tree nuts are good sources of Antioxidants.

Nutrient Antioxidants: A,C, E and selenium

Non-Nutrient Antioxidants: Phytochemicals (Phenolic)

	RDA	Almond	Pecan	Walnut	Pistachio
Vitamin A	900 µg/day	0	1.28	0.43	11.9
Vitamin C	90 mg/day	0	0.47	0.55	2.13
Vitamin E	15 mg/day	11.22	1.7	1.22	1.94
Selenium	55 µg/day	1.06	1.62	2.08	2.98
Phenolic acid *	900 µmol of TE/g)	44.54	179.4	135.41	79.83

* Have stronger antioxidants compared with nutrient antioxidant

Consumers and Labeling

- Contribute to informed purchasing decisions
- Labeling could be confusing when using technical and numerical information.
- To avoid the nutrients or to consume a specific nutrient
- Reason why consumer do not read a nutrition label
  - Lack of time
  - Size of the package
  - Lack of understanding

- Front Labeling

Problem Statement

1. Domestic consumption of pecans have remained stagnant when compared to other tree nuts.

2. There is a lack of information regarding the attributes of tree nut products that are important to consumers.

Objectives

- To understand consumer preferences for tree-nut products

  - To analyze the influence of labeling the package with "High in Antioxidants" in consumer preferences

  - To test the tradeoffs that U.S. consumers make when purchasing tree nuts with varying characteristics -Tree nut it self, Price, Types of packages, Labeling the front package with "High in Antioxidants", Labeling the package with "Heart Healthy" and Origin

Methodology

- **Conjoint Analysis**
  - Conjoint Analysis is a market research approach. Used to measure and understand the importance value that consumers give to certain attributes of a product. (Maximize Utility)

  - To Answer why consumers choose one product over another

  - It is widely used when a product needs to be developed, priced or advertised

- Types of conjoint analysis methodologies:
  - Full-Profile Conjoint Analysis
  - Adaptive Conjoint Analysis
  - Max-Diff Conjoint Analysis
  - **Choice-Based/Discrete-Choice Conjoint Analysis**

Marketing Tool

Choice Based Conjoint (CBC) Analysis

<u>General Idea</u>

- Consumers are asked to make a purchasing choice between alternative products which are defined by several attributes (tree-nut, price, package, Antioxidants, Heart Healthy and origin)

- Each attribute is varied at several levels

- Econometric model estimates the utility function depending on product attributes

- Preferences and willingness-to-pay estimates may be assessed from the model

Design of the CBC Experiment

Attributes	Levels
Tree nut	• Almonds • Pecans • Walnuts • Pistachios
Price	• $ 4.99 per 0.5 Lb. • $ 5.99 per 0.5 Lb. • $ 6.99 per 0.5 Lb. • $ 7.99 per 0.5 Lb.
Package	• Resealable Bag • Paperboard Can • Single Serve Packages • Plastic Container
High in Antioxidants	• Yes • No
Heart Healthy	• Yes • No
Origin	• U.S Product • Imported

Experimental Design

Pecans	Almonds	Pistachios	Walnuts
$7.99	$5.99	$4.99	$6.99
Paperboard can	Single Serve	Plastic Container	Resealable bag
High in Antioxidant	-	High in Antioxidants	-
Heart Healthy	Heart Healthy	-	-
U.S Product	Imported	Imported	U.S Product

- SAS Software
  - Random assignment of attribute levels to create product profiles
  - Random assignment to create different product profiles for each choice set

Survey Instrument

Choice Set No. 1

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Pecans	**Almonds**	**Pistachios**	**Walnuts**	
$7.99 Paperboard can	$5.99 Single serve Packages	$4.99 Plastic Container	$6.99 Resealable bag	None of these products
High in Antioxidants **Heart Healthy** **U.S product**	**Heart Healthy** Imported	**High in Antioxidants** Imported	**U.S Product**	

Conditional Logit Model

- Multi attribute utility

$$U_{ji} = \beta x_{ij} + \varepsilon_{ij}$$

- Probability of choice

$$P_{ij} = \frac{exp\,(\beta x_{ij})}{\sum_{K=1}^{J} \exp(\beta x_{ik})}$$

- Dummy Variables

$$y_i = \begin{cases} 1 & \textit{if the alternative was chosen} \\ 0 & \textit{Otherwise} \end{cases}$$

Main Effects Model

- Utility = β_1 (None) + β_2 (Price) + β_3 (Pecans) + β_4 (Walnuts) + β_5 (Pist) + β_6 (Bag) + β_7 (Can) + β_8 (Single Serve) + β_9 (Antioxidants) + β_{10} (Heart Healthy) + β_{11} (US Product)

- Omitted attribute levels:
  - Almonds
  - Plastic Container Package
  - No Antioxidant
  - No Heart Healthy
  - Imported

Main Effects Model

```
+--------+-------------+----------------+--------+--------+
|Variable| Coefficient | Standard Error |b/St.Er.|P[|Z|>z]|
+--------+-------------+----------------+--------+--------+
  NONE    |    -2.40681512        .12920392     -18.628     .0000
  PRICE   |     -.22913194        .01623184     -14.116     .0000
  PECANS  |     -.40889832        .05096924      -8.022     .0000
  WALNUTS |     -.45350100        .05279924      -8.589     .0000
  PIST    |      .21614211        .04396580       4.916     .0000
  BAG     |      .21732236        .04777323       4.549     .0000
  CAN     |     -.03260333        .04991517       -.653     .5136
  SINGLE  |     -.23238270        .05277614      -4.403     .0000
  ANTI    |      .17979147        .03550857       5.063     .0000
  HH      |      .16307503        .03605144       4.523     .0000
  USPROD  |      .27374463        .03611400       7.580     .0000
```

Conclusions

- Labeling the package with "High in Antioxidants" has a positive influence in consumer preferences

- Almonds are preferred over walnuts and pecans. However, pistachios are preferred over almonds.

- The most preferred type of package is a resealable bag

- Single Serve packages are the least preferred type of package for consumers

- Consumers prefer a tree nut product that is labeled as "Heart Healthy"

- A tree nut produced in USA over and imported tree nut is more preferred for consumers

Thank you!