

Katelyn Housler

MATH 301

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## Report 1: GoodDrinks Cola Sales

### I. Introduction

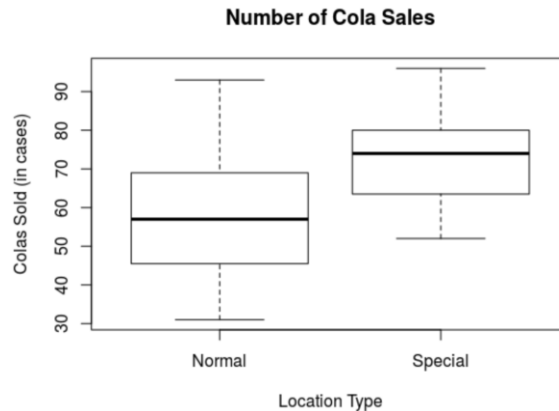
For this report, we are analyzing data from GoodDrinks Cola to find out whether their product sells better in supermarkets where it is currently placed or when it is placed on the end of the aisle. The company has collected samples of cola sales from 19 stores selling the cola in its regular place and cola sales from 19 stores selling the cola at the end of the aisle. Though the stores were randomly assigned to each placement method, we cannot be sure that the 38 GoodFoods stores that we selected for testing were chosen at random. We will assume that both samples are representative of the population of all cola sales and proceed with caution. Our main question is whether stores selling the cola in its normal place saw a higher level of product sales or if stores selling it on the ends of the aisle saw higher product sales.

### II. Data Exploration

We have a sample of 19 stores selling the cola in its normal shelf location and a sample of 19 stores selling the cola at the end of aisles.

| <b>Cola Location:</b>        | <b>Sample Size (n):</b> | <b>Mean</b> | <b>Standard Deviation</b> | <b>Minimum</b> | <b>Quartile 1</b> | <b>Median</b> | <b>Quartile 3</b> | <b>Maximum</b> |
|------------------------------|-------------------------|-------------|---------------------------|----------------|-------------------|---------------|-------------------|----------------|
| <b>Normal Shelf Location</b> | 19                      | 58.053      | 19.004                    | 31             | 45.5              | 57            | 69                | 93             |
| <b>End-of-Aisle Location</b> | 19                      | 74.737      | 11.836                    | 52             | 63.5              | 74            | 80                | 96             |

*We can further summarize our data by displaying it graphically:*



Looking at the boxplot, it appears that on average, cola sales (in cases) are higher for the special display location at the end of the aisle. To better determine whether there is a difference, we will use inference.

### III. Analysis

*We are interested in the mean cola sales (in cases) for each display type, so we will define:*

$\mu_1$  = mean cola sales (in cases) of all GoodDrinks Cola sold in a normal location

$\mu_2$  = mean cola sales (in cases) of all GoodDrinks Cola sold in a special location on the end of the aisle

*We are going to test the hypotheses:*

$$H_0: \mu_1 \geq \mu_2$$

$$H_a: \mu_1 < \mu_2$$

We have established that the type of cola display (normal or special end of aisle location) was assigned to the 38 sample GoodFoods stores at random, however, we do not know if the GoodFoods stores where the samples were drawn from were selected randomly. Therefore, when determining if we have two simple random samples, we will assume that both samples are representative of the population of all GoodDrinks cola sales (in cases) and will proceed with caution.

Since both samples are made up of 19 stores, we cannot consider either of them large samples as they would need to be made up of at least 20 stores to be large samples. As that is the

case, we must refer back to the boxplots we generated for each sample (see section II. Data Generation) and determine whether either of them contain outliers or a strong skew. Upon review of the graphs, it can be seen that neither sample contains outliers nor a strong skew as both appear to be distributed normally. After checking all of these conditions, we will now proceed and run a two-sample T-test.

#### **IV. Results**

*Conducting a two-sample T-test gives us the following results:*

$T = -2.8589$ , with  $p\text{-value} = 0.003822$

Since the  $p\text{-value} < 0.05$ , we reject the null hypothesis.

#### **V. Conclusion**

We have strong evidence that on average, the mean number of cola sales (in cases) for GoodDrinks cola displayed at the end of the aisle is greater than the mean number of cola sales (in cases) for GoodDrinks cola displayed in its normal location. From this statement, we can determine that on average, GoodDrinks cola sells better when it is displayed at the end of the aisle rather than in its normal location. This reinforces our initial impression that we made by looking at the two boxplots of each sample. The boxplot created by data from cola sold at the end of the aisle had a much higher median and minimum than the boxplot of cola sales for cola sold in the normal location. Based on this information, GoodDrinks should start displaying their cola at the end of the aisle in order to improve sales. Further tests should be conducted one week after the company changes all of its cola displays so they are located at the end of the aisle. This will ensure that the correct conclusion has been drawn from the initial experiment GoodDrinks conducted.