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Overview of MANOVA and GLM

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## Summary

1. Background.

The purpose of this project is to perform various techniques of MANOVA and GLM in order to further understand the ability to assess differences across one or more nonmetric independent variables for a set of metric dependent variables. It provides a means for determining the extent to which group of respondents differ in term of the dependent measures. During the MANOVA and GLM analysis we will use one independent variable (X5 Distribution System) and three independent variables. X19 Satisfaction, X20 Likelihood of Recommending and X21 Likelihood of Future Purchase. The task is to identify whether any differences exit between these two systems across all or a subset of these purchase outcomes.

The variables on the HBAT\_200(1).sas7bdat are presented in the table below:

* •  ‘x5 Distribution System’
* •  ‘x19 Satisfaction’
* •  ‘x20 Likelihood of Recommending’
* •  ‘x21 Likelihood of Future Purchase’

The analysis will first look at the overall Statistical Analysis to get rid of any assumptions and figure where our data is being driving. Then we will move over to a One-Way ANOVA. The next section provides a high-level synopsis of details that are presented in the remainder of this document. Additionally, the information was analyze using the programming language SAS.

1. Executive Summary

This document presents an analysis of MANOVA and GLM Analysis that were obtained from the HBAT\_200(1).sas7bdat datasets. This measures how significant the dependent variable Region is truly a categorical variable and if actually plays a role in the overall analysis.

1. Analysis
   1. Summary Statistics

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**Figure1.** Summary Statistics

A summary statistic provides a summary of the group profiles on each of the purchase outcomes across the groups(from X5 Distribution Systems). Figure 1. Shows in this case the direct distribution is represented by the value “1” whereas the indirect distribution is represented by the value “0.” Therefore, our summary reveals that the direct distribution channel has the higher mean score for each of the purchase outcomes. However, now that we are aware of the difference, a great analysis must then examine these differences and assess the extent to which these differences are significant; i.e. collectively or individually.

* 1. One-way ANOVA

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Figure 2. Multivariate measures for Testing Homoscedasticity of X5.

In our first approach for MANOVA we start up by looking at the univariate test (Levene’S TEST) for all three variables that are nonsignificant. The significance must be greater than .05. Then, we must assess the dependent variables collectively by testing the equality of the entire variance-covariance matrices between the groups. Looking at Figure 2. We see that the assumption of homoscedasticity is met for each individual variable separately and the three variables collectively.

Additionally, we can use a boxplot to examine any extreme points across the groups. When we examine these extreme points, we can look at points too extreme to consider an exclusion. As mentioned in previous reports. There are instances where extreme points can skew our data and take away from the broad image we are trying to discover. These boxplots can be seen in Figure 3.

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Figure 3.BoxPlots of purchase outcomes Measures (x19, x20 and x21) for groups of X5

Summary

The MANOVA (multivariate analysis of variance) is a type of multivariate analysis used to analyze data that involves more than one dependent variable at a time. MANOVA allows us to test hypotheses regarding the effect of one or more independent variables on two or more dependent variables. In theory, this method of analysis allows for an analyst to test out multiple hypothesis, at once. Additionally, the discovery of potential outlier in the data could shine some light in previous assumptions. Lastly, MANOVA looks at variables that have far greater influence from a single dependent variable. This type of discovery could potentially, lead a company in the right direction to influence their customers.