

M statistics



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MAT 300: STATISTICS M&M PROJECT PAPER ALEXANDREA WINT PROFESSOR AZAD, VARGHA June 3, 2012 Purpose of Report The purpose of this project is to find the information for a quality control manager of Masterfoods plant. The manager wants to know about the proportion of candies and if they are the same or different. If there is any difference that exists then the manager wants to know why there is a difference in such cases. A study was conducted and results were obtained and based on these statistical results we will try to gain information about the quality of Masterfoods plant.

Part1: Sampling Method Sampling method is used to draw the random sample from the population of candies from different bags is known as the simple random sampling without replacement. 36 bags were drawn from the population of different color of candies and after drawing the 36 samples; the numbers of different candies are calculated. For sample in bag one how many are blue candies, how many are red candies, how many are yellow candies etc. There are six different colors in each bag. So the record is made after collecting the sample. Part 2: Method, Analysis, Results

In this section we have made attempts to find the descriptive statistics related to the number of candies or proportion of candies in the bag. The mean number of candies per bag is approximately equaled to 55. This means that we are expecting 55 candies with a standard deviation of 2.1 in each bag and out of these we also expecting that the proportion of different colors of candies should be equal for each bag. The sample proportion for blue candies is .1916, for orange candies is 0.18, for green candies is 0.1815, for yellow candies is 0.663, for red candies is 0.136 and for brown candies is 0.1446. For this results we have sampled 36 bags which contains 1978

candies overall. Part 3: Method, Analysis, Results For this part the 95% confidence intervals are obtained for each color of candies and also the mean number of candies. The following results are obtained from the analysis: * 95% confident that the population proportion for blue candies will lies between 0. 1743 and 0. 20895. * 95% confident that the population proportion for orange candies will lies between 0. 1631 and 0. 969 * 95% confident that the population proportion for green candies will lies between 0. 16451 and 0. 19848 * 95% confident that the population proportion for yellow candies will lies between 0. 14992 and 0. 18274 * 95% confident that the population proportion for red candies will lies between 0. 12089, 0. 1511 * 95% confident that the population proportion for brown candies will lies between 0. 12909, 0. 16009. In addition to this we can say that 438 candies should be sampled to obtain a 95% CI of the proportion of blue candies with a 4% margin of error if the known proportion of blue candies is 0. 4. Part 4: Method, Analysis, Results This portion explains the hypothesis testing for population proportion for different types/colors of candies. Each candy was tested against their standard proportion, which was then fixed by the organization and we have obtained the results using the Z test for proportion. We can conclude below results based on the analysis of data: * The true proportion of blue candies is not equal to 0. 24 at 5% level of significance. * The true proportion of orange candies is not equal to 0. 0 at 5% level of significance. * The true proportion of green candies is not equal to 0. 16 at 5% level of significance. * The true proportion of yellow candies is not equal to 0. 14 at 5% level of significance. * The true proportion of red candies is equal to 0. 13 at 5% level of significance. * The true proportion of brown candies is equal to 0. 13 at 5% level of significance. * The population

mean for each bag is more than 54 candies and standard deviation for number of candies per bag 1. 69oz bag is more than 1. at 5% level of significance Part 5: Method, Analysis, Results In this portion a check for whether there is any significant difference in the population proportion of red and brown candies was done. For this we have tested the hypothesis at 5% level of significance. From the results which we obtained we can conclude that we fail to reject the null hypothesis H_0 because we don't have enough evidence to support the claim that the population proportions of red and brown are equal at 5% level of significance. Quality Control:

It is obvious that there are 4 candy proportions that do not meet the requirement of set proportion; only red colored and brown colored candies met the specified requirement of proportion. So we want to check why there is a difference in the quality of the output. So some of the reason for this difference can be classified as: * The machine(s) is/are not working properly, is there any difference in the output of one machine? * There is a possibility that due to different workers at the different shifts the variation arises. There is any assignable or random cause occurs or in simple words we can say that machines are producing the same colored candies at regular intervals. Conclusion We can conclude from the above results that there quality of output is not at the point where the plant would like it to be, because the standard which are fixed in advance did not work best with the output which we have obtained. The four-population proportion for color blue, orange, green and yellow does not meet the set requirements.