Stat 301

Waste Management Analysis

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Introduction

Solid waste collection and management regulations have changed drastically since its initial regulation in the 1070’s. Taxes have been levied and bills passed to actively capture the impact of waste storage and mitigate the impacts of open site storage. Increased emphasis on the importance of recycling reusable materials and redirecting waste to recycling was leveraged into policy. In 1997, the State of Minnesota instituted a tax on waste tonnage. Within this analysis, we will focus on a few variables we thought may have an impact on lowering landfill waste, with a focus on tonnage taxation.

Questions and Hypothesis

In 1997, a tax was levied on trash hauling of 17% commercial and 9.75% residential based on cost related to tonnage. The intention of this tax was to reduce the amount of trash in landfills. This tax begs the question, was average landfill tonnage greater in 1991-1997 than in 1998-2017, specifically in the Metropolitan Area. Additionally, since larger populations create more and waste and capturing and diverting waste to recycling is a key rationale for the tax we want to know if Hennepin County’s, the largest county in Minnesota, post-tax landfill mean waste percentage less than the population (MN Metro area) post-tax mean landfill waste Percentage? Finally, due to the waste management tax we wanted to analyze the onsite waste tonnage before and after the tax to see if the amount of onsite waste (non-hauled waste burned on location) increased to avoid additional taxes.

We will be working with “Wastedata2” using the variables Year, County, WTE and landfill. Additionally, created some variables based off the raw data to understand the difference between pre-tax and post-tax waste distribution. One variable will be labeled (Tax\_Group) as a “factor” to separate the groups of years. We also created variables for the percentage of Landfill and Onsite waste, respectively named (WTE\_Landfill\_Percentage) and (Onsite\_Percentage) type “dbl.” “WTE” data is included in the total landfill waste percentage since this material would contribute to the landfill if it wasn’t burned for energy.

**Question 1: Was there a decrease in mean landfill percent of total waste post tax?**

HO: Mu(Pre-Tax)=Mu(Post-Tax)

Ha: Mu(Pre-Tax)>Mu(Post-Tax)

**Question 1.5: Was Hennepin County’s change greater than the Metro as a whole?**

HO: Mu(Hennepin)=Mu(Metro)

Ha: Mu(Hennepin)>Mu(Metro)

**Question 2: Was there an increase in on-site disposal post tax?**

HO: Mu(on-site pre-tax) = Mu(on-site post-tax)

Ha: Mu(on-site pre-tax)<Mu(on-site post-tax)

Methods

Given this information, can we identify a correlation between the 1997 Waste Management tax and the reduction in total percentage of landfill waste? The Null hypothesis will assume that the 1997 tax has no effect on the total landfill percentage in the Metropolitan Area. Alternatively, the 1997 tax significantly decreased total landfill percentage in the Metropolitan Area. To Analyze the pre-tax and post-tax year groups by “WTE\_Landfill\_percentage” we used an Independent T-test. We also ran this test with “Onsite\_percentage” data to identify opposing changes. To further analyze Hennepin county’s post-tax mean landfill percentage against the population’s mean (MN Metro counties) we ran a Welch Two Sample t-test. In addition, we wanted to see if there were patterns between counties by their tendency to generate onsite waste vs landfill waste. We used a hierarchical cluster analysis to classify these tendencies.

Conclusion

Sources cited

<https://www.revisor.mn.gov/statutes/cite/16A.531>