



Northwind Database

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Overview

- ▶ **The Situation:** Northwind has created a database to keep track of key business metrics, such as employee details, order details, customer details, supplier details, etc.
- ▶ **The Task:** Generate analytical insights to improve business performance and improve profits.
- ▶ **The Solution:** Perform hypothesis testing on key business questions to gather analytical insights.

Methodology

- ▶ **Hypothesis Testing** – Used to test claims about a data parameter in order to determine what business decision should be made.
- ▶ **Welch's t-test** – Compares the means of 2 samples to determine if they are different from each other.
- ▶ **ANOVA** – Analyzes the differences between group means in a sample.
- ▶ **Cohen's d** – Provides the magnitude of the difference between samples.

Question # 1: Discount Impact

Does discount amount have a statistically significant effect on the quantity of a product in an order? If so, at what level(s) of discount?

- ▶ Yes, having a discount between 5%-25% increases the quantity ordered by 26%.
- ▶ Similar impact is seen across all discount levels.
- ▶ However, there is only a small difference between the quantity ordered with a discount vs. without a discount, so be cautious to not over discount.

Question #2: Employee Performance

Do USA employees generate significantly higher revenue than UK employees?

- ▶ On average, the 5 employees in the USA have generated over 200% more revenue than the 4 employees in the UK.
- ▶ This is a large difference, which could be largely due to the US employees receiving nearly 3x as many orders as the UK employees.

Question #3: Regional Profits

Is there a statistically significant difference in the revenue generated from each region?

- ▶ Most regions do not have a significant difference in the amount of revenue generated.
- ▶ However, both North America and Western Europe produce significantly higher revenues than either South America or Southern Europe.
- ▶ There is a greater difference in the revenues between North America/Western Europe and Southern Europe compared to North America/Western Europe and South America.

Question #4: Food Refrigeration

Are there statistically larger quantities ordered of non-refrigerated food compared to refrigerated food?

- ▶ No, there is no difference in the quantity of refrigerated and non-refrigerated food ordered.

Conclusions

- ▶ Consider utilizing discounts as they can increase the quantity purchased. However, be careful not to over-discount, which could lead to profit losses.
- ▶ Focus employee resources on USA employees as they are generating a much larger profit than UK employees, largely due to the significant increase in number of orders.
- ▶ Continue to spread resources and marketing efforts proportionally across all markets. However, there is opportunity to focus more on North America and Western Europe over South America and Southern Europe to generate a greater profit.
- ▶ Continue with current investments in both refrigerated and non-refrigerated food.

Further Hypothesis To Research

- ▶ Are shipping costs significantly different for each shipping company?
- ▶ Do consumers purchase domestically produced products significantly more frequently than they purchase imported products?
- ▶ Is there a statistically significant difference in the quantity ordered of each different product type?
- ▶ On average, do USA employees generate significantly greater profits per order than UK employees?