



# Northwind Traders *Business Insights*

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Northwind Traders (“Northwind”)  
October 16, 2019

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# Background and Methodology

# Background



Northwind would like Aronson Consulting to review their data to determine possible insights and trends to help them understand and grow their business

Northwind has asked Aronson Consulting to provide insights and recommendations on the following questions:

1. *Does the discount amount have a statistically significant effect on the quantity of a product in an order? If so, at what level(s) of discount?*
2. *Does the region of Northwind's suppliers have a statistically significant effect on the unit price of products?*
3. *Does the region customers live in have a statistically significant effect on the amount of money they spend on their orders?*
4. *Is the quantity sold for produce products and dairy products statistically different?*

# Methodology

- Aronson Consulting obtained and reviewed the **Northwind database** from Northwind including information on **Suppliers, Employees, Customers, Products and Orders**
- After **cleaning and exploring the data**, Aronson Consulting **applied hypothesis tests** to determine statistical significance for each question Northwind requested insights and recommendations on
- To **determine statistical significance**, Aronson Consulting looked at the following values:
  - **P-value (or probability value)** = a number between 0-1 that helps determine the significance of results. A small p-value (typically  $\leq 0.05$ ) indicates strong evidence there is a relationship between the tested items
  - **Effect Size** = quantifies the size of the difference between the tested items. For our purposes both the Cohen's d and Omega Squared tests were used:

Rule of Thumb		
Effect	Cohen's d	Omega Squared
Small	0.2	0.01
Medium	0.5	0.06
Large	0.8	0.14

- **Power** = a number between 0-1 that provides the likelihood the hypothesis test detected an effect when there is an effect to be detected. A power close to 1 means that there is a very low likelihood

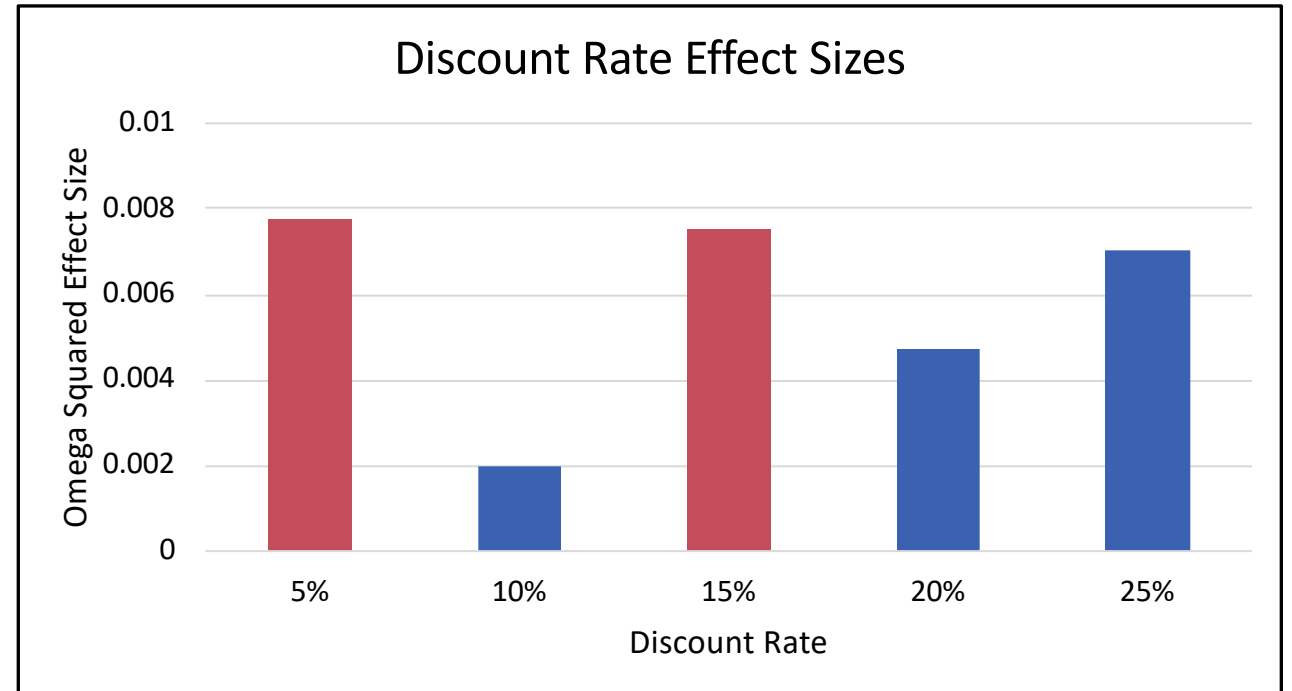
# Findings and Recommendations

# Question 1

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

Discount Rate has a large effect on the quantity of a product in an order*:	
P-value	0.0
Cohen's d Effect Size	1.5
Power	1.0

\*values are rounded

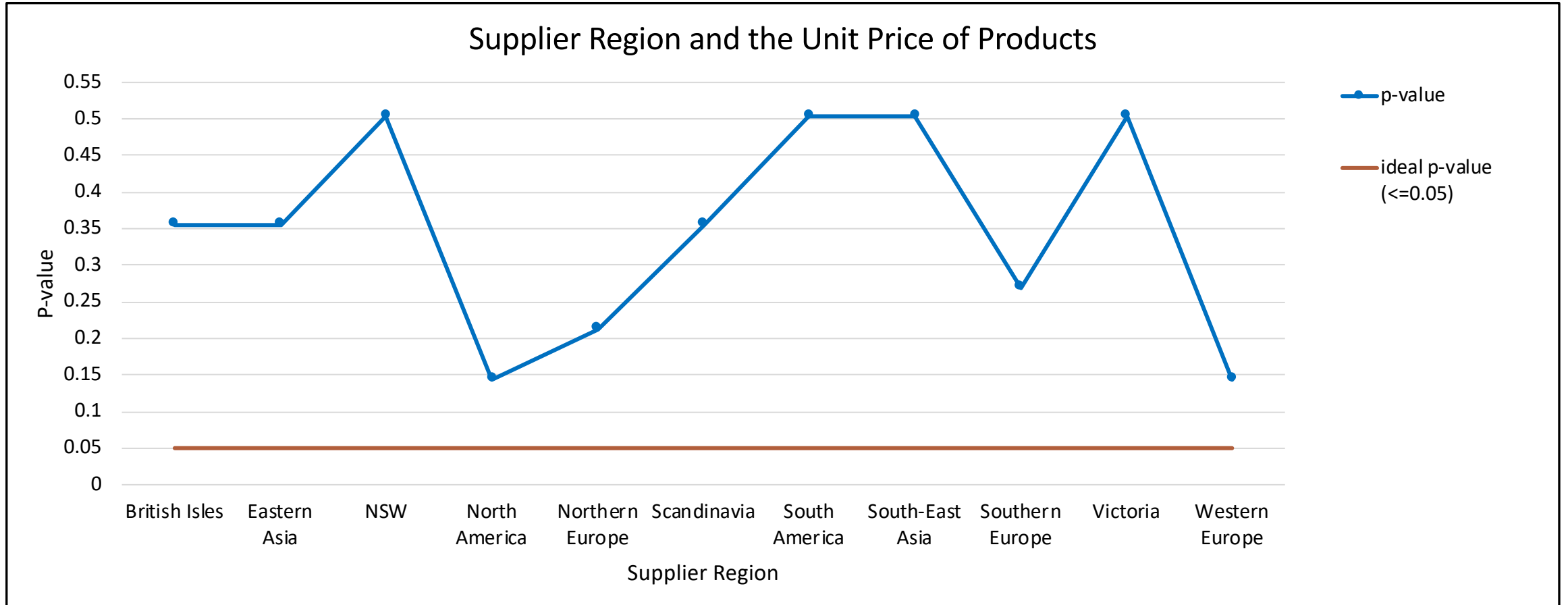


## Recommendations:

- Northwind should continue to offer discount rates to customers to increase the quantity of products in an order
- In particular, Northwind should offer 5% or 15% discount rates to customers as they have the largest effect

## Question 2

Does the region of Northwind's suppliers have a statistically significant effect on the unit price of products?



### Recommendations:

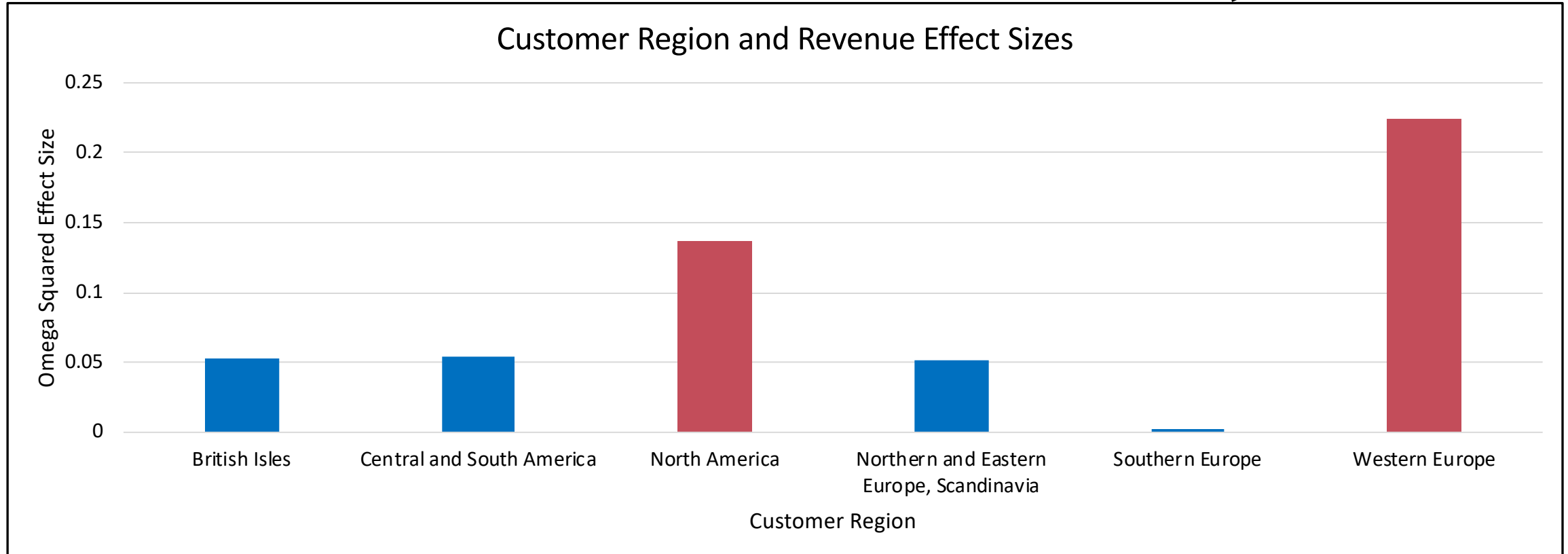
- Northwind should not worry about the region of their suppliers as it does not effect the unit price of products



# Question 3

Does the region customers live in have a statistically significant effect on the amount of money they spend on their orders?

All p-values were < 0.05



## Recommendations:

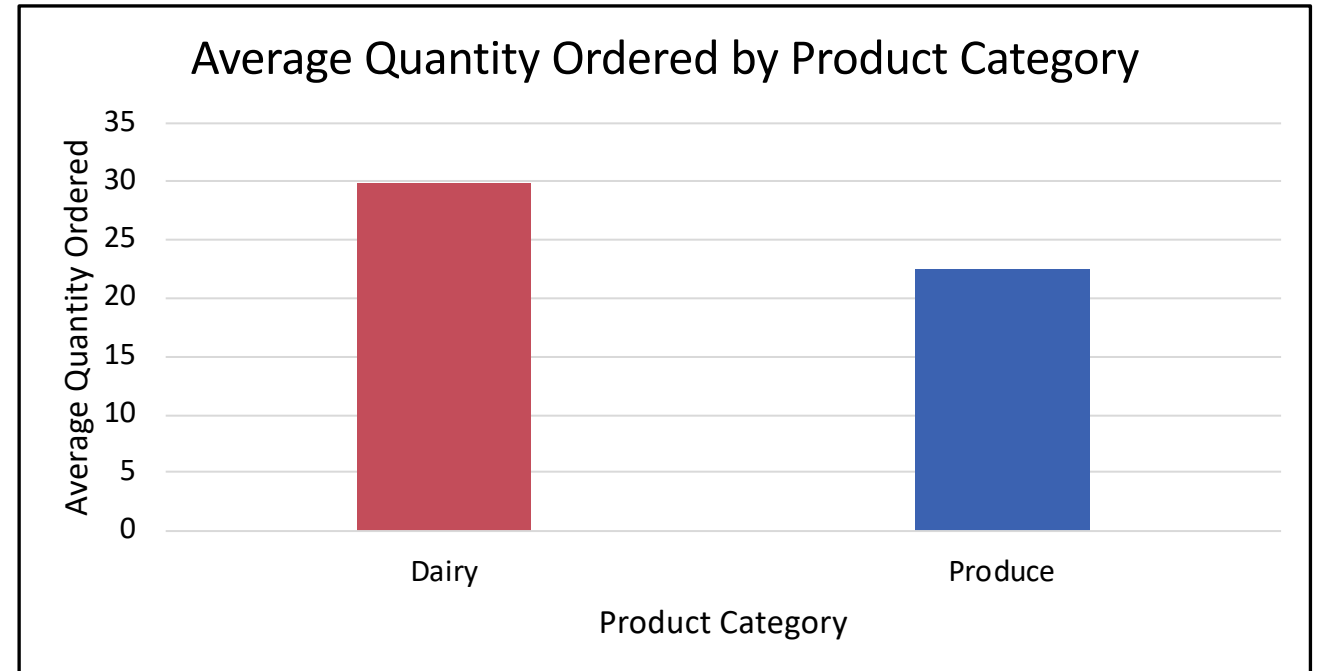
- Northwind should consider the region a customer lives in and how it effects their total revenue
- Northwind should focus their efforts more on Western Europe and North America to continue to increase revenue and perhaps stop providing business to Southern Europe to help support these efforts

# Question 4

Is the quantity sold for produce products and dairy products statistically different?

Dairy vs. Produce products have an effect on the quantity ordered*:	
P-value	0.0
Cohen's d Effect Size	0.3
Power	0.9

\*values are rounded



## Recommendations:

- It is recommended Northwind focuses their efforts more towards selling dairy products than produce products since there is a larger quantity ordered

# **Future Work and Next Steps**

# Future Work and Next Steps

## **Future Work:**

- Aronson Consulting would like to explore further with Northwind:
  - Why customers are not responding to 10% discount rates; and
  - Why customers in Southern Europe are not contributing much to Northwind's revenue stream

## **Next Steps:**

- Northwind to share recommendations and findings with executives
- Northwind to provide Aronson Consulting with additional questions they would like to understand further after meeting with executives
- Aronson Consulting to update findings after 6 months to determine if there have been any changes in the data after Northwind updates their business efforts based on current insights

**Questions?**

**Thank You!**