THE STATE OF NORTHWIND TRADER BUSINESS

March 2019 Presentation to the Board of Directors

MEETING AGENDA

Setting the Scene:
- Northwind Trader Data Science Team & Improving Business Decision Making
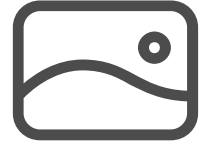- Northwind Trader Data Assets

Current State of NT:
- Discount
- Pricing
- Inventory
- Revenue per Regional Employee

Recommendations:
A Framework for the Future Sales and Marketing Strategy and Campaign Future

SETTING THE SCENE:
## NT DATA SCIENCE TEAM & IMPROVING BUSINESS DECISION MAKING


What it means for business decision-making?

NT Data Science Hypothesis Testing Process	Hypothesis Testing for Business Decision-Making
1. Make assumptions	NT managers make decisions on a daily basis that affect the efficiency and success of NT companies. It is critical that we correctly analyze and interpret the data before applying it to improve business performance.
2. Take an initial position. 3. Determine the alternate position. 4. Set acceptance criteria	For example, if we wants to increase sales by funding a new marketing campaign. We uses the campaign in one region of the country to test the effects and begins collecting data to see whether the campaign has had its desired effect. We will only continue the new campaign nationally if it believes sales will rise by more than 25%.
5. Conduct fact based tests 6. Evaluate results. Does the evaluation support the initial position? Are we confident that the result is not due to chance? 7. Evaluate results. Does the evaluation support the initial position? Are we confident that the result is not due to chance?	To test the claim, we perform hypothesis testing on the sample data collected from the test region. We can then analyze and present our results to help determine whether to use the campaign nationally. Correctly interpreting the results will affect our company's ability to make the optimal business decision and have a profound impact on our future operations.

SETTING THE SCENE:
CURRENT STATE OF NORTHWIND TRADERS' DATA ASSETS
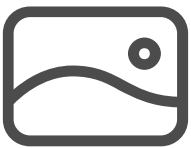
Over the last 3 months, we have extracted and explored all the NT's data assets. The diagram below illustrates (at a high-level) the data assets. We have four key areas that we will be covering today based on last quarter's board of directors meeting decision.
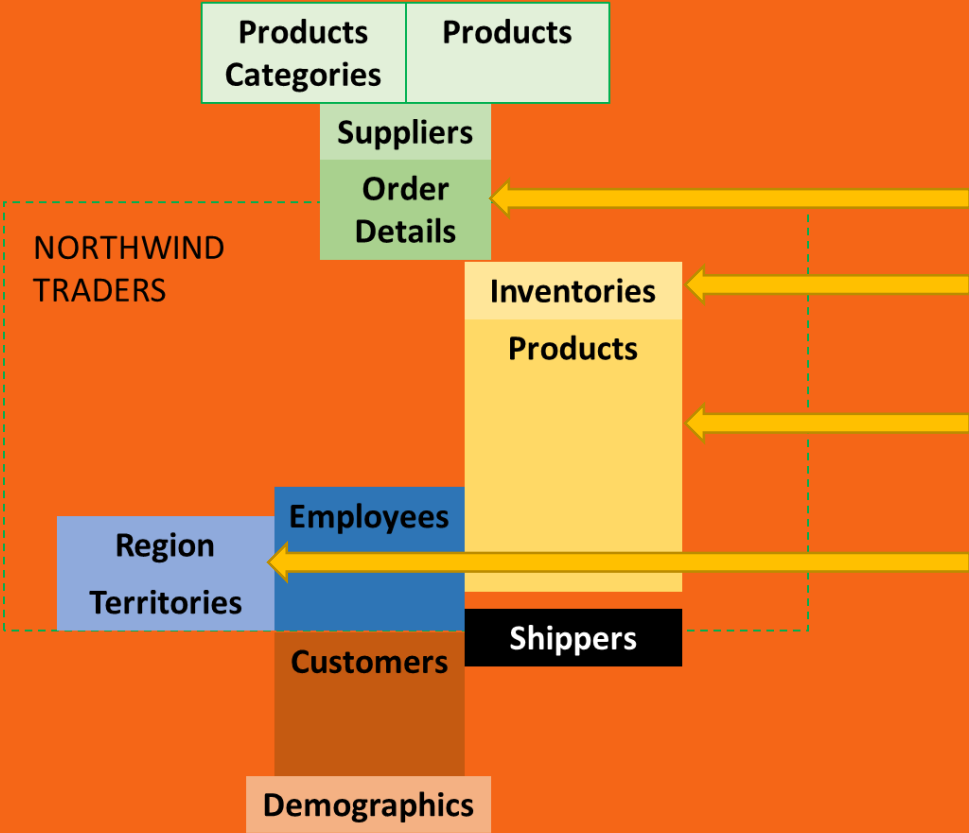
CURRENT STATE OF NT:
DISCOUNT, ~~PRICING, INVENTORY, AND REVENUE PER REGIONAL EMPLOYEE~~

1 DETERMINING SIGNIFICANT OF DISCOUNTED PRODUCTS ON QUANTITY ORDER

*We can conclude statistically that there is a **statistically significant difference in the quantity ordered of discounted vs. non-discounted products.** In another words, discount have a significant impact on quantity purchased (low p-value), regardless of the size of the discount (effect size).*

Determine whether discount given to customers will eventual yield greater revenue or not.

WHAT THIS MEANS FOR BUSINESS DECISION-MAKING?
- NT customers are price sensitive because discounts have an effect on quantity ordered.
- This also means a small discount will have an effect on quantity ordered, therefore improve sales.
- Most of NT products are commodity food produces like diaries and condiments, therefore they are fast moving consumer goods.
- NT business is subject to high competition/low barrier to entry because of commodity food typically exhibits these kind of characteristics.

WHAT THIS MEANS FOR SALES AND MARKETING CAMPAIGNS?
- Reduce marketing campaigns such as advertisement, trader shows and suppliers's conference. The money saved, can be invested on discounting product prices.
- Competitions in the commodity produce marketplace like diaries and condiments are fierce. Focus on flexible or dynamic pricing to time discount at the right time. Therefore, there is a need to construct almost real-time monitoring of competition pricing and discount.

2 DETERMINING SIGNIFICANT OF UNIT PRICE OF CONDIMENTS AND CONFECTIONS

*We can conclude statistically that there is a **statistically significant difference in the unit price for condiments and confections**. In another words, there is significant difference in unit pricing between condiments and confections (low p-value), regardless of the size of the unit pricing, in this case very small (effect size)*

Determine whether small items and side produce such as condiments and confections have similar unit price behavior.

WHAT THIS MEANS FOR BUSINESS DECISION-MAKING?
- Small size items or side produce such as condiments and confections have dissimilar unit price behavior, even-though their characteristics are similar.
- The mean price for condiments = US$23, and mean price for confections = US$25.
- Distribution unit price for confections are positively skewed, whereas condiments unit price is reflect a slightly normal distribution.

WHAT THIS MEANS FOR SALES AND MARKETING CAMPAIGNS FOR CONDIMENTS AND CONFECTIONS?
- Further analysis on the followings:
  - Whether side produce like condiments and confections have direct influence on other purchases such as seafood or poultry (vice versa)?
  - Further investigate on higher margin condiments and confections to understand whether there are different in unit pricing. If yes, perhaps NT can specialize, instead on focusing on high-volume, low margin product – cost saving on logistics such demand to work with different suppliers, etc.
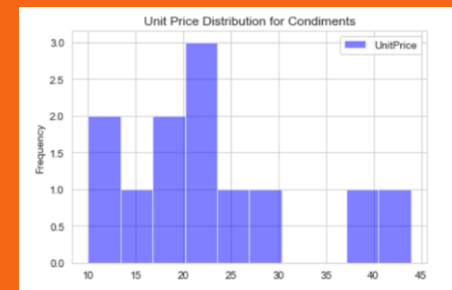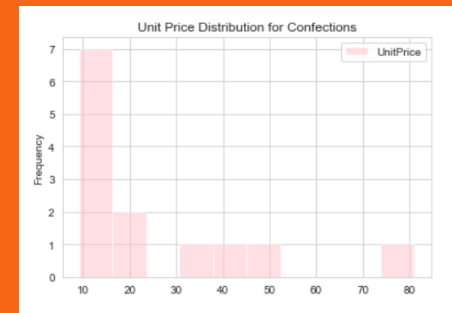
Unit Price Distribution for Confections

Unit Price Distribution for Condiments

3 DETERMINING SIGNIFICANT OF UNIT-IN-STOCK POULTRY AND SEAFOOD
*We can conclude statistically that there is a **statistically significant difference in the unit-in-stock for poultry and seafood**. In another words, there is significant difference in unit pricing between unit-in-stock for poultry and seafood (low p-value), regardless of the size of the unit pricing, in this case medium (effect size).*

Determine whether NT focus is more towards seafood business, other the other way.

WHAT THIS MEANS FOR BUSINESS DECISION-MAKING?
- NT is heavy on trading seafood, as compared to poultry. A 4.2 to 1 ratio.
- Poultry mean price = US$54, Seafood mean price = US$20.

WHAT THIS MEANS FOR SALES AND MARKETING CAMPAIGNS FOR POULTRY AND SEAFOOD?
- Further considerations need to be made whether NT should focus on higher price produce such as poultry (mean price = US$54), as compared to lower price produce such as seafood (US$20).
- Further analysis on the followings:
  - Determine NT customer demographics – are they seafood or poultry lovers?
  - Determine the margin difference between Poultry and Seafood.

POULTRY

	UnitsInStock	ProductName
0	115	Pâté chinois
1	29	Mishi Kobe Niku
2	21	Tourtière
3	0	Alice Mutton
4	0	Thüringer Rostbratwurst
5	0	Perth Pasties

SEAFOOD

	UnitsInStock	ProductName
0	123	Boston Crab Meat
1	112	Inlagd Sill
2	101	Röd Kaviar
3	95	Spegesild
4	85	Jack's New England Clam Chowder
5	62	Escargots de Bourgogne
6	42	Carnarvon Tigers
7	31	Ikura
8	24	Konbu
9	11	Gravad lax
10	10	Nord-Ost Matjeshering
11	5	Rogede sild

CURRENT STATE OF NT:
~~DISCOUNT, PRICING, INVENTORY, AND~~ REVENUE PER REGIONAL EMPLOYEE

4 DETERMINING SIGNIFICANT OF DIFFERENCE IN REVENUE FROM EMPLOYEES IN US AND THE UK

We can conclude statistically that there is no statistically significant difference in employee revenue either in US or UK. In another words, there is no significant difference in revenue between US and UK employees (low p-value), regardless of the location, in this case low (effect size).

Determine whether employees in the US or the UK bring in more revenue

WHAT THIS MEANS FOR BUSINESS DECISION-MAKING?
- There is no difference in revenue per employee.
- As there is no difference in revenue per employee, the next hiring decision may depends on other factors such as size of the market, closeness of employee to the market (therefore better serve each market?), and cost of doing business (hiring cost, office cost)

RECOMMENDATIONS:
A FRAMEWORK FOR THE FUTURE SALES AND MARKETING STRATEGY AND CAMPAIGN

DATA FIRST: We have demonstrated that NT has valuable data assets in the following classes: Product Category, Products, Suppliers, Order Details, Inventories, Employees Details, Customer Demographics, Shippers Details.

We will use this to further action on the following areas: Sales, Marketing, Inventory Operations, Regional Focus.

1 — NT to be a Data First Company

REAL-TIME: We will focus on getting and using data in a timely manner. This would means that we will continue to invest in data science, and building a capacity to democratize data across NT – data can be query at the finger tips, especially on time sensitive data such as sales, marketing, pricing, discount.

2 — NT to be a Real-Time Company

3 — NT to be Specialized Food Trading Company

SPECIALIZED: We should diversify away from commodity food trading to stay away from pricing discount, which will hurt margin, and in the longer run profitability of NT

4 — NT to be a JIT Company

Just-In-Time (JIT): The food business is a fast moving consumer business, therefore managing the right volume will key factors that will have downstream impact on sales, marketing, and logistics.