CEL®
CONSULTING

SUPPLY CHAIN & OPERATIONS
IN EMERGING MARKETS

CEL FUTURE SUPPLY CHAIN TALENT CHAMPIONSHIP

ROUND 1

1. INTRODUCTION

Farmings is a Vietnamese food company established in 2015. After achieving remarkable growth in the past few years, Mr. Phuong Minh - supply chain director of the company, recognizes that the company is struggling to fulfill its customer's orders while keeping logistics cost at a reasonable level. Seeing the potential of applying cutting edge data analytics and decision support tools to improve Farmings supply chain performance, you have just been hired to join the supply chain team as a junior analyst.

One of your first tasks is to analyze the company's data to provide a clear overview of Farming's current operation in order to suggest further advancement.

Nowadays, their network consists of 4 suppliers located in Can Tho, Ben Tre, Bao Loc and Da Lat, one main distribution center in Ho Chi Minh city, and 132 customers covering both distributors and retailers across the country.

2. INPUTS

In this context, your coordinator shared with you the following datasets that were extracted from the company's system:

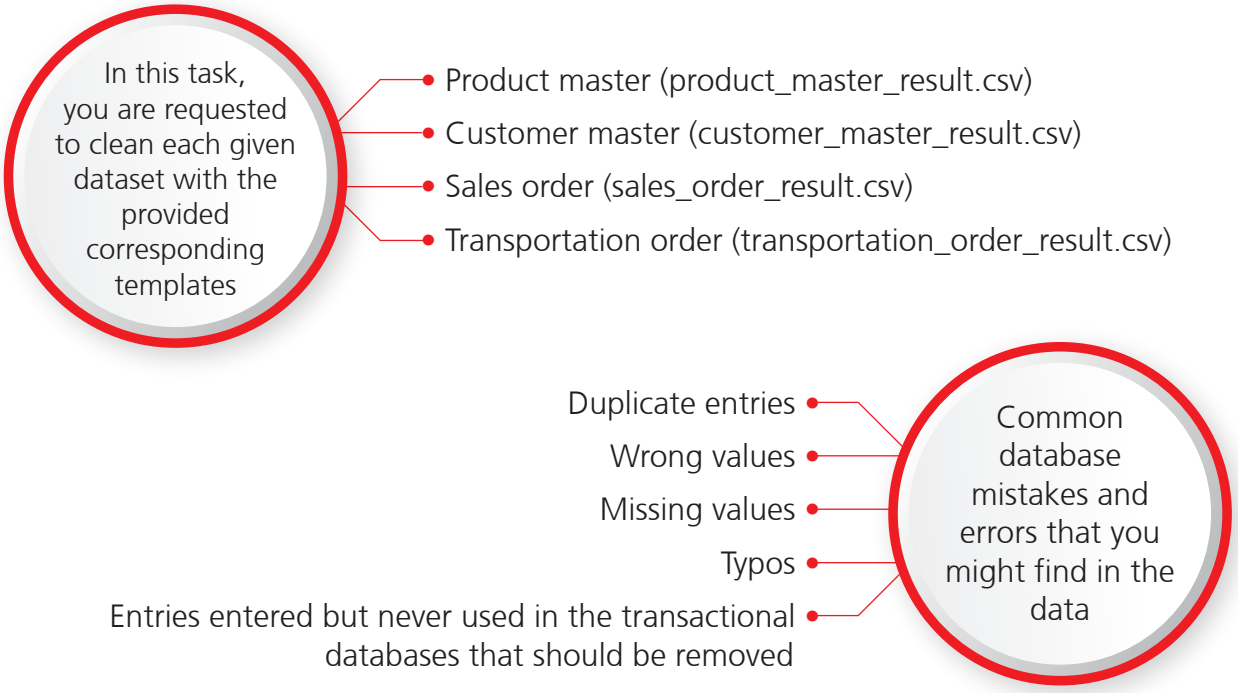
	DATASET NAME	DESCRIPTION	COMPONENTS
1	**Product Master**	Information of stock-keeping units (SKUs)	• ProductId • Name • ProductGroup • KgPerCarton • CartonsPerPallet • KgPerPallet • SalesUnit • SupplierUnit
2	**Customer Master**	Information of customers	• CusId • Name • Longitude • Latitude
3	**Sales Order (SO)**	Record of customer orders Every SO is composed of one or multiple SO lines	• SoOrderlineId • SoOrderId • SoEnteredDate • SoExpectedDate: Expected due date customers want to receive orders • SoCustomerId • SoProductId • SoQuantity: Order quantity • SoUnitCost • SoSalesUnit
4	**Transportation Order (TO)**	Record of actual product delivery to customers	• ToOrderlineId • SoOrderlineId: Corresponding SoOrderId in SO • ToCustomerId • ToDepartureDate: The day company ships products to customers • ToArrivalDate: The day customer receives products from company • ToProductId • ToSalesQuantity: Actual sales quantity • ToSalesUnit

TABLE: DATASET EXPLANATION

3. TASKS AND TEMPLATE DELIVERABLES

A. DATA CLEANING

Data cleaning is the first step of any data analysis process. This step usually takes a lot of time and effort due to mistakes of data entries. Additionally, data from different systems will have different input format, which is required to convert to the standard structure before doing the analysis.



Additional rules:

- ProductId and CustomerId should follow one format
- SoOrderLineId in Transportation Order must be included in Sales Order

B. DATA ANALYSIS

You are requested to provide some high-level KPIs for C-level executives to understand the overview of the business' performance. Therefore, you will do some quick descriptive analysis to identify the potential problem in the current operation and then later to suggest the strategy of where the company should focus more to improve.

The required KPIs are listed in the templates:

- **Transaction summary** (transaction_summary_result.csv)
- **Shipment by product group** (shipment_by_productgroup_result.csv)
- **Shipment by customer** (shipment_by_customer_result.csv)

APPENDIX

This part provides explanations and examples for the above mentioned tasks.

A. DATA CLEANING

• Example of possible mistakes in Product Master data:

ProductID	Product Group	Name	KgPerCarton	CartonsPerPallet	KgPerPallet	Sales Unit	Supplier Unit
SKU01	Food	Dried mixed fruits	6	136	816	Kg	Car
SKU02	Drink	Coconut	10	125	1,250.00	Kg	Kg
SKU01	Food	Dried mixed fruits	6	136	816	Kg	Car
SKU03	Fruitt	Mango fresh	10		1360	Kg	Kg

Table: Example of uncleaned Product Master data

- SKU02 has wrong KgPerPallet value format.
- SKU01 is a duplicated entry ProductId, that should be removed from the master file.
- SKU03 has a typo, "Fruitt" instead of "Fruit". In this case, change the value to "Fruit".
- SKU03 the column value CartonsPerPallet is missing which requires you to fill in.

ProductID	Product Group	Name	KgPerCarton	CartonsPerPallet	KgPerPallet	Sales Unit	Supplier Unit
SKU01	Food	Dried mixed fruits	6	136	816	Kg	Car
SKU02	Drink	Coconut water	10	125	1250	Kg	Kg
SKU03	Fruit	Mango fresh	10	136	1360	Kg	Kg

Table: Example of cleaned Product Master data

- **Example of possible mistakes in Sales Order data:**

So OrderLineId	So OrderId	So ProductId	So CustomerId	So EnteredDate	So ExpectedDate	So Quantity	So SalesUnit	So UnitCost
2001	1001	SKU01	CUS001	2017-08-01	2017-08-01	6	Kg	5
2002	1002	SKU01	CUS001	2017-08-05	2017-08-05	12	Kg	5
2003	1002	SKU02	CUS001	08/13/2017	08/13/2017	20	Kg	5
2005	1004	SKU101	CUS001	2017-08-30	2017-08-30	100	PC	20
2006	1005	SKU04	FA0001	2017-09-03	2017-09-03	15	Kg	5
2007	1006	SKU03	CUS003	13/09/2017	13/09/2017	100	kg	1

Table: Example of uncleaned So data

- Observation 3 and 6 has SoEnteredDate, SoExpectedDate in wrong date format.
- Observation 4, ProductId SKU101 is not in the cleaned Product Master data.
- Observation 5, SoCustomerId is FA0001 is not in Customer Master.

-> Invalid transactional data (SO, TO), should be **removed** before analysis.

So OrderLineId	So OrderId	So ProductId	So CustomerId	So EnteredDate	So ExpectedDate	So Quantity	So SalesUnit	So UnitCost	So InKg	Soln Carton
2001	1001	SKU01	CUS001	2017-08-01	2017-08-01	6	Kg	5	6	1
2002	1002	SKU01	CUS001	2017-08-05	2017-08-05	12	Kg	5	10	2
2003	1002	SKU02	CUS001	2017-08-05	2017-08-05	20	Kg	5	20	2
2007	1006	SKU03	CUS003	2017-09-13	2017-09-13	100	kg	1	100	10

Table: Example of cleaned So data

B. DATA ANALYSIS

• ABC Classification

ABC classification is a ranking system for identifying and grouping items in terms of how useful they are for achieving business goals. The system requires grouping things into three categories:

A - extremely important.

B - moderately important.

C - relatively unimportant.

In this case, ABC classification is based on the following rules:

- **'A'** items – 80% of the annual sales value (TO values) of the company sales. (cumulative sales value share < 80%).
- **'B'** items – 15% of the annual sales value (TO values) of the company sales. (80% ≤ cumulative sales value share ≤ 95%).
- **'C'** items – 5% of the annual sales value (TO values) of the company sales. (cumulative sales value share > 95%)

• Order fill rate

The order fill rate represents the percent of the quantity ordered that was actually shipped to customers.

$$\text{Order fill rate} = \frac{\text{Delivered Quantity}}{\text{Ordered Quantity}}$$

Note that a SoOrderLineId can be associated with several ToOrderLineId, since shipment can be broken into several distinct shipments.

ProductGroup	SoInKg	ToInKg	OrderFillRatePercent
Food	26	25	96.15
Drink	100	100	100.00
Fruit	50	40	80.00

Table: Example of Order Fill Rate by ProductGroup

REQUIREMENTS

This part describes the requirements that you need to follow strictly when doing your task.

- All **date data** must be in the format **"YYYY-MM-DD"**.
- All number data must be in a format **without thousand grouping**. Use "." for **decimal separator.**
- All numeric data must be rounded in **3 decimal digits.**
- Note that, since the correction of this task is automated, you have to strictly follow the template, otherwise CEL will not be able to calculate your results. Do not rename columns or file names, or provide results for data columns that are **not requested.**
- All requested files must be put in a folder named after your Id number, which has been assigned to you after your registration. The folder is then archived in "**.zip**" file format.
- You are requested to submit all mentioned files below and files must be in the format of "**.csv**" and named exactly as described.

	Output file name	Description
1	product_master_result.csv	Product master
2	customer_master_result.csv	Customer master
3	sales_orders_result.csv	Sales orders
4	transportation_order_result.csv	Transportation orders
5	shipment_by_customer_result.csv	Shipment by customer
6	shipment_by_productgroup_result.csv	Shipment by product group
7	transaction_summary_result.csv	Transactional summary

Table: Output files

SCORING METHOD

In round one we will score the test with the scale of 100 with the ratio is as below:

Table	Percentage of Score	Note
Presentation	10%	If you miss any files, columns, wrong filenames, wrong column names or even have more columns than expected. You will lose 10/100
Transaction Summary	20%	Each task will have the total score equivalent to the total calculated observations and will be scaled to 100. If your answer match with corresponding observation then you get one point.
Shipment by Customer	45%	
Shipment by Product Group	25%	

As the result of any kind of data cleaning is the summary, it means that the data analysis part will be the main score to evaluate round one. In case, many teams have the same score in data analysis part, we will consider cleaning data (product master, customer master, sales order, transportation orders) and count the errors, team with higher errors will be not qualified for the next round.

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