GLOBAL DEMAND LOADING TOOL

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BACKGROUND

Halliburton Completions Tool (HCT) has multiple facilities worldwide and manages hundreds of millions of shipments annually. It is critical to achieve a level loading across each facility based on their capability and capacity.

OBJECTIVE

The objective of this project is to develop a dynamic demand loading tool for all HCT manufacturing facilities. The scope of the project has been set to a few of the major HCT facilities.

METHODOLOGY

Factor Identification
Identifying factors in the current demand loading logic

Data Analysis
Analysis of Product Hierarchy, Sourcing Table, Capability Table and Shipment History

Proposal of Solutions
Python for automated updating of Sourcing Table, Excel VBA to facilitate even loading across facilities

Improvements on Proposed Solutions
Added features based on feedback from HCT

Iterations
Continuously proposing ideas and improving based on feedback from HCT

Conclusion
Conclude and recommend better ways to manage the loading process

DELIVERABLES

1. Solutions to automate process of **updating** the **Sourcing Table**

2. Solutions to **facilitate even-loading** across HCT's facilities

3. **Recommendations** to better manage the loading process

DATA COLLECTED

- **Sourcing Table** – Indicates the optimal manufacturing plant which will process the order

- **Capability Table** – Indicates the capability of manufacturing plants in processing different products and orders

- **Shipment History** – Information about historical transactions

DELIVERABLE 2 – TACKLING UNEVEN LOADING

Problem Understanding

Conditions for reallocation to achieve even loading:
1. New order exceed the maximum capacity
2. The difference in loading percentage between 2 plants exceed 30%

Maximum Capacity for Plants

Capacity = Triple the standard deviation of the historical monthly production amount (USD)

Logic Flow for Reallocating Order

Factors to consider when selecting plant to manufacture from:
1. Capacity 2. Capability 3. Lead time 4. Extra cost incurred

Automation System

Input

New Order	
Product Hierarchy	1110008MDHAMUJSMUS
Amount of Product	1000000
Customer Location	
Sourcing Plant	2088

Search

Output

Output	
Decision	change
Reallocation Amount	115527
Reason of Reallocation	Exceed Max Capacity

Reallocatio Details	Plant	Load
Primary Plant	2088	884473
2nd Plant	2070	115527
3rd Plant		
Remarks		

Display of Current Loading

Plant	Location	Plant Code	Current Load	Monthly Capacity	Load Percentage
Plant 1	Singapore	1	7884573	$7,884,573.45	100%
Plant 2	UK	2	2115527	$2,795,828.93	76%
Plant 3	US	3	8000000	$8,164,422.09	98%
Plant 4	Malaysia	4	3000000	$3,964,947.76	76%
Plant 5	US	5	2000000	$2,481,525.24	81%

Current Load in Plants / Load Percentage

Data Store - Capability Table

DELIVERABLE 1 – UPDATING SOURCING TABLE

Problems with Current Process

1. Current updating of Sourcing Table involves complex and tedious process

2. Very manual process of finding specific lines of information and changing them directly

3. Information about changes made and old versions of Sourcing Table are saved manually

Solutions to Current Problems

1. Microsoft forms for all staff of HCT to propose changes on Sourcing Table

2. Supervisor to approve changes from exported results in Excel

3. Using Python, all changes shown in Excel can be automatically updated into the Sourcing Table

Sourcing Table Changes: Proof of Concept

Solutions for Deliverable 1
Step 1: Fill up Microsoft Form

Step 2: Supervisor to approve changes

Step 3: Run Python Code to update all changes in Sourcing Table

```
In [5]: oldfile_path = "sourcingtable_updated.xlsx"
microsoft_forms_file_filepath = 'Sourcing Table Changes_ Proof of Concept (1-2).xlsx'
update_excel(oldfile_path, microsoft_forms_file_filepath)

Unique value found, saving a new updated copy: [846, [None, '[1110007M*]', None, None, None, None, None, None, None, '2088', No
ne, 'Pointed to 2088']]
[1110007M*] 2070 Moved over to plant 2070
```

OUTCOME: PROOF OF CONCEPT

- Staff will be able to make changes in plant number for any particular product

- Multiple changes can be recorded in a single run of the Python code

- Remarks will be recorded in the Sourcing Table, right beside the changes made

- Old versions of the Sourcing Table will be saved

KEY SKILLSETS

- Python, Automation (left)
- Excel
- Microsoft Forms
- Scoping solution into Proof of Concept

OUTCOME: EFFICIENCY IN SUPPLY CHAIN

- Improve the utilisation of manufacturing resources to reduce idle time and lower overhead expenses

- Prevent overloading and reduce lead time for production and delivery

- Enhance the efficiency of sourcing process through automation, resulting in faster and easier procurement

KEY SKILLSETS

- Systematic thinking and attention to detail

- knowledge of Excel VBA (left figure shows)

RECOMMENDATIONS FOR BETTER DEMAND LOADING PROCESS

A) Adopting a streamline platform such as Lark to promote efficient communication and collaboration.
B) Blockchain technology can improve transparency, traceability, and efficiency in the supply chain management of Halliburton.
1. IBM Blockchain to track the flow of oil and gas products from the wellhead to the refinery
2. Data Gumbo makes it possible for businesses to automate supply chain operations using blockchain-based technology

- Through the use of third-party technology, the Halliburton demand loading tool's capacity can be enhanced → greater efficiency throughout the supply chain and the company's operations

Lark

CONCLUSION

- Gained knowledge on the manufacturing and supply chain industry
- Understand the importance of supply chain efficiency on operational success
- Gained insights into Halliburton's internal supply chain processes

ACHIEVEMENT

- Managed to save Halliburton **an estimated SGD$14,456** annually from our project (Cost of avoidance and manpower time saved)
- Managed to save about **2 hours/week** of Halliburton's employee's time

LEARNING POINTS

Hard Skills

- Excel
- Weighted Factor Analysis
- Excel VBA
- Python Coding

Soft Skills

- Communication
- Teamwork
- UX User Flow
- Adaptability

*Disclaimer: numbers are for analytics use and do not reflect real data