**INTM 442/542**

**GROUP PROJECT REPORT #2**



**ILLINOIS INSTITUTE OF TECHNOLOGY,**

**CHICAGO**

**A research submitted to**

Prof. Bob Dunn

**in partial fulfillment for the Subject**

(INTM-542) Warehousing & Distribution

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Following the provided instructions, our team has diligently completed the review and analysis of the listed parts, focusing on the G3 sheet contained within the provided Excel document. We have systematically compiled a comprehensive list of the desired outcomes and have presented them in an organized tabular format.

To facilitate easy reference within the modified spreadsheet, we categorized the products based on specific criteria and described which columns pertain to each category.

1) To categorize these items, our initial step involved sorting all items in descending order, using "hits" as the primary reference point. Subsequently, we calculated the weightage of each product by comparing it to the total number of hits. The next stage involved calculating cumulative values for the products, allowing us to classify them into the following categories:

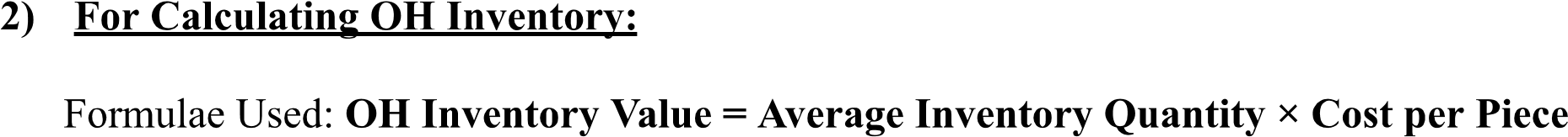
**Class A:** This category comprises products representing the top 71% of the cumulative values, indicating a significant impact on the overall outcomes.

**Class B:** Products in this category constitute up to 14% of the cumulative values, signifying a moderate influence on the outcomes.

**Class C**: This group includes products contributing to outcomes up to 3% of the cumulative values, indicating a relatively modest impact.

**Class D**: The final category encompasses products with a minimal contribution, representing only 1% of the cumulative values.

|  |  |
| --- | --- |
| Classes | Classes according to Column(refer to spreadsheet) |
| Class A | Col -3 to Col -80 |
| Class B | Col - 81 to Col - 356 |
| Class C | Col - 357 to Col -657 |
| Class D | Col - 658 to Col - 752 |



Using the above formula, the OH inventory is calculated and tabulated in **Col AT** in the Spreadsheet attached.

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Using the above formula, the DSI inventory is calculated and tabulated in **Col AU** in the Spreadsheet attached.

**4) On reviewing the last 12 months' Sales from months (1–12):**

We calculated the average monthly usage for each item using the formula shown below:

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The monthly average from months 1- 12 is calculated using the average function in the Spreadsheets and tabulated in **Col AV**

The Daily usage is calculated by dividing the monthly average by 30 (as mentioned in the question) and tabulated in **Col AW.**

5. From the calculated Monthly Usage, to remove the outliners, we considered the Average of the Monthly Average and removed the outliners accordingly (i.e., 50% less than the average for Class A and Class B), similarly below 25% from Class C and Class D.

|  |  |  |
| --- | --- | --- |
| Classes | Average of Monthly Usage | Adjusted Monthly Usage |
| Class A | 31.72 | 33.56 |
| Class B | 7.68 | 7.68 |
| Class C | 1.03 | 3.01 |
| Class D | 0.29 | 3.03 |

|  |  |  |
| --- | --- | --- |
| Classes | Average Dailly Usage | Adjusted Daily Usage |
| Class A | 1.057229345 | 1.118602447 |
| Class B | 0.174838969 | 0.255870589 |
| Class C | 0.034385382 | 0.100415326 |
| Class D | 0.009502924 | 0.100877193 |

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The Safety stock is tabulated and calculated in the **Col BA** in the spreadsheet attached for all the documents in each Class.

7) Calculate the Order Point and Line Point using Adj Daily Usage, Leadtime, SS, and Review Cycle. The formulas used to calculate are:

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Using the formulas, the Line Point and order Point are calculated for all the products in each Category. The Order Points for each Product are tabulated in **Col BB**, and similarly, the Line Point is calculated and Tabulated in **Col BC**.

8) Sporadic items are items with irregular or unpredictable demand patterns. These items often have inconsistent sales or usage, making it challenging to forecast their demand accurately.

Managing sporadic items can be more complex because their sales or consumption can vary significantly from one period to another, and they may not follow typical seasonal or demand trends.

On Analysing the Products in Class C and Class D the tabulated are some of the Sporadic Products which have irregular demand patterns and the max demand and min requirement of the product can be ordered according to customer order quantity.

|  |  |  |
| --- | --- | --- |
| Sporadic Products | Min.Demand | Max.Demand |
| Prod - 1504 | 1 | 3 |
| Prod - 1547 | 1 | 16 |
| Prod - 1980 | 6 | 13 |
| Prod - 2244 | 7 | 13 |
| Prod - 1994 | 8 | 10 |
| Prod - 1512 | 0 | 11 |

9) On assuming the Average 12 months of inventory as the current inventory quantity and checking whether we need to order the products or not are decided by the function:

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|  |  |
| --- | --- |
| Vendor | Orders per vendor |
| 110 | 168 |
| 142 | 2240 |
| 700 | 42 |
| 702 | 798 |
| 1101 | 84 |
| 1110 | 910 |
| 1297 | 42 |
| 1394 | 182 |
| 1421 | 294 |
| 1491 | 217 |
| 1695 | 329 |
| 100009 | 42 |
| 100045 | 84 |
| 100329 | 294 |
| 100567 | 14 |
| 100715 | 21 |
| 100756 | 266 |
| 101780 | 1463 |

|  |  |
| --- | --- |
| Classes | Amount of orders to be ordered per class |
| Class A | 658 |
| Class B | 2758 |
| Class C | 3234 |
| Class D | 840 |

On considering the above list Vendor- 142 has more orders to disperse right now. And Class B Chas the highest number of orders to has to be ordered

The maximum number of order are for Product Group P14-50 which are 1946 products

|  |  |
| --- | --- |
| Product Groups | No. Of orders required (per product group) |
| P01-35 | 56 |
| P01-40 | 70 |
| P02-20 | 28 |
| P02-31 | 266 |
| P02-45 | 210 |
| P02-55 | 147 |
| P03-34 | 98 |
| P03-35 | 644 |
| P03-37 | 70 |
| P03-40 | 882 |
| P05-06 | 21 |
| P05-50 | 14 |
| P06-29 | 14 |
| P08-62 | 560 |
| P08-76 | 7 |
| P09-46 | 287 |
| P09-55 | 147 |
| P09-56 | 70 |
| P09-60 | 7 |
| P09-61 | 14 |
| P10-50 | 42 |
| P10-52 | 84 |
| P12-48 | 294 |
| P12-60 | 294 |
| P13-45 | 28 |
| P13-50 | 42 |
| P14-41 | 91 |
| P14-44 | 294 |
| P14-49 | 140 |
| P14-50 | 1946 |
| P14-58 | 7 |
| P16-75 | 49 |
| P16-76 | 42 |
| P16-77 | 525 |

10) On Pivoting the Vendors List and calculating the average of their total 12 months $ Cost our top 3 Vendors are:

Vendor-100329

Vendor- 100756

Vendor-101780

The average Lead time and DSI for group of items per Vendor are calculated and tabulated

|  |  |  |  |
| --- | --- | --- | --- |
| Vendor | Avg. LT | Avg. DSI per vendor | Avg. 12 months COGS |
| 110 | 50 | 91.13 | 83.24 |
| 142 | 50.15625 | 0 | 394.34 |
| 700 | 50 | 57.67 | 155.57 |
| 702 | 62.10526316 | 162.63 | 60.04 |
| 1101 | 105 | 172.57 | 213.75 |
| 1110 | 99.375 | 144.74 | 96.94 |
| 1297 | 30 | 47.33 | 225.70 |
| 1394 | 78.46153846 | 168.41 | 57.34 |
| 1421 | 47.85714286 | 115.53 | 535.69 |
| 1491 | 61.15384615 | 120.51 | 681.18 |
| 1695 | 49.78723404 | 203.94 | 139.78 |
| 100009 | 30 | 43.03 | 152.13 |
| 100045 | 67.5 | 14 | 476.25 |
| 100329 | 63.57142857 | 477.09 | 1,430.79 |
| 100567 | 30 | 113.03 | 882.71 |
| 100715 | 40 | 476.68 | 465.85 |
| 100756 | 76.57894737 | 328.27 | 1,354.51 |
| 101780 | 40.45673077 | 129.70 | 1,259.30 |

11) On Pivoting the Vendors List and calculating the average of their total 12 months $ Cost our top 3 Product Groups are:

P16-76

P08-62

P02-31

The average Lead time and DSI for group of items per Product Group are calculated and tabulated.

|  |  |  |  |
| --- | --- | --- | --- |
| Product Groups | Avg. Lead time | Avg. DSI | Avg. of 12 months (COGS) |
| P01-35 | 14 | 236.89 | 49.57 |
| P01-40 | 32 | 38.40 | 220.14 |
| P02-20 | 16 | 1227.05 | 258.60 |
| P02-31 | 16 | 328.27 | 1,354.51 |
| P02-45 | 11 | 84.43 | 97.70 |
| P02-55 | 15 | 137.51 | 113.49 |
| P03-34 | 12 | 119.56 | 37.74 |
| P03-35 | 11 | 162.72 | 64.35 |
| P03-37 | 20 | 54.01 | 135.09 |
| P03-40 | 18 | 146.65 | 95.12 |
| P05-06 | 18 | 476.68 | 465.85 |
| P05-50 | 9 | 168.24 | 43.39 |
| P06-29 | 17 | 113.03 | 882.71 |
| P08-62 | 22 | 105.77 | 1,723.02 |
| P08-76 | 0 | 320.21 | 30.72 |
| P09-46 | 16 | 73.93 | 292.90 |
| P09-55 | 18 | 145.24 | 145.24 |
| P09-56 | 17 | 80.94 | 692.28 |
| P09-60 | 0 | 121.29 | 155.73 |
| P09-61 | 19 | 60.43 | 246.04 |
| P10-50 | 12 | 43.03 | 43.03 |
| P10-52 | 20 | 172.57 | 213.75 |
| P12-48 | 17 | 477.09 | 477.09 |
| P12-60 | 11 | 367.28 | 335.40 |
| P13-45 | 10 | 291.76 | 25.54 |
| P13-50 | 11 | 101.79 | 97.49 |
| P14-41 | 17 | 130.01 | 470.17 |
| P14-44 | 17 | 17 | 535.69 |
| P14-49 | 12 | 143.76 | 65.10 |
| P14-50 | 10 | 0.00 | 403.24 |
| P14-58 | 0 | 0 | 103.84 |
| P16-75 | 27 | 202.90 | 467.04 |
| P16-76 | 33 | 293.20 | 2,187.91 |
| P16-77 | 17 | 165.80 | 165.80 |

12) **Vendor- 100009** has the lower DSI and Short LT when compared to all other Vendors in the above performed analysis.

**Improvement Strategies for Other Vendors:**

For the two suppliers with higher DSI and longer LT, consider the following strategies:

* Negotiate shorter lead times with the vendors to reduce LT.
* Work with suppliers to optimize order quantities and lead times.
* Implement better demand forecasting to reduce excess inventory.
* Explore alternative suppliers who can offer better terms.
* Develop better communication and collaboration with suppliers to streamline the supply chain.

Similarly for the Product Groups **P14-58** has the lower DSI and Short LT on performing

the analysis.

Improvement Strategies for Other Product Groups:

For the other product groups with higher DSI and longer LT, consider similar strategies as mentioned for suppliers:

* Optimize order quantities and lead times for these product groups.
* Enhance demand forecasting to reduce excess inventory.
* Explore alternative product sources or vendors for specific product groups
* Improve communication and collaboration between departments involved in the supply chain and product management.

13) On Comparing the Average Usage from Months (1-12) and Monthly Usage from (13-24) we found out few products for which we see a seasonal demand where the demand for 3-4 months are increasing and rest of the months demand remains normal or with the average sales

The Products below are some which we found they have a seasonal demand and observed hike in demand for 3-4 months.

|  |
| --- |
| Products with seasonal Demands |
| Prod-1518 |
| Prod-1519 |
| Prod-1541 |
| Prod-1542 |
| Prod-1543 |