#### Implementation of selecting certain number of suppliers from the pool to achieve the best colligation benefit

**Step 1: Calculate single supplier tour length**

* For each supplier (60 in total), calculate the tour length for each courier assigned to the supplier d1, d2, d3… (including the trip length back to original point??)
* Calculate the total tour length for each supplier by combining all the assigned couriers’ tour length D = d1 + d2 +…
* Data source: base case results from Tiramizoo (obtained already)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Supplier ID | Tour # | Stop # | Courier id | Distance |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Note: distance will be obtained from post.jason distance\_matrix.

**Step 2: Calculate the allocated tour length for each supplier after optimization based on the number of order proportion.**

For each tour {  
 For each stop {  
 Calculate the total number of orders on the van: N= NAi + NBi + NCi +…   
 Calculate the number of orders proportion for each suppliers: WAi = NAi /N, WBi = NBi /N…  
 Calculate the allocate distance Di to each supplier: DAi = Di x WAi …  
 Calculate the total allocate distance to each supplier in this tour: sum(DAi for all stops)  
 }  
 Calculate the total allocate distance to each supplier in all tours:   
 DA,opt = sum(total allocate distance to each supplier in each tour)  
}

**Step 3: Calculate the saved tour length for each supplier**

DA,save = DA – DA,opt , DB,save = DB – DB,opt

**Step 4: For each supplier, calculate the colligation benefit from other suppliers, e.g supplier A**For each tour {  
 For each stop {  
 Calculate the number of shared orders miles for each pair suppliers: NABi= Di x (NAi + NBi )…  
 Calculate the total number of shared order miles for each pair in this tour   
 }  
 Calculate the total number of shared order miles for each pair in in all tours  
}

For each supplier {  
 Calculate the total shared order miles involved this supplier  
 Calculate the colligation benefit percentage of each other supplier with this supplier  
 Calculate the colligation benefit of each other supplier with this supplier

}

Calculate the colligation benefit for each pair of suppliers, e.g supplier (A, B)

**Step 6: Eliminate the least benefit suppliers from the supplier pools based on the following rank**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D |  | Score |
| A |  |  |  |  | **Asave** | **Asave** + Acontribute |
| B |  |  |  |  |  |  |
| C |  |  |  |  |  |  |
| D |  |  |  |  |  |  |
|  | Acontribute |  |  |  |  |  |

1. Construct nxn table as above based on step 4.5 results
2. For row i, exclude cell (i,i) and calculate row.total and col.total for row i and col i
3. Score for row i=row.total + col.total
4. Sort rows based on score from high to low
5. Select top K rows

**Step 7: Select the best group of J suppliers in terms of colligation benefit from the supplier pool (J <= K)**

For ( group i in groups){

For each pair combination in group i {

Calculate Total colligation benefit

}  
}

Sort the groups based on Total colligation benefit and select the top one.