Project Team 1
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Facilities Planning and Layout Design

Mini-Project
100 points

Complete this mini project in **groups of three students** using the Excel data provided on Blackboard. Submit your typed responses to the problems below to the Blackboard assignment in a Word file. Within the Word file, for each profile, provide a corresponding table of values or indicate the percentages on the graph, where appropriate. Also attach any data files used to analyze the problem (e.g., Excel and/or Access files).

PROFILE 1: Demand Profile

a. Create an **Activity Profile** for all of the SKUs that have been ordered. The value on the y-axis should be the cumulative percentage of the total number of lines shipped, and the value on the x-axis should be the cumulative percentage of the total number of SKUs.

i. Indicate how many SKUs are needed to account for 80% of the picking activity.
We need 1751 SKUs to account for 80% of the picking activity
What percentage of all SKUs ordered is this?
80% of total picking activity corresponds to 32.50% of all SKUs ordered

ii. How could the information from this profile be used?
We can assign front areas to these high-picking items for an efficient picking and replenishment process.

b. Create a **Demand Profile**, which is the cumulative percentage of the total number of units shipped versus the cumulative percentage of the total number of SKUs.

i. Indicate how many SKUs are needed to account for 80% of the demand (Quantity shipped).
675 SKUs are needed to account for 80% of the demand
ii. What percentage of all SKUs ordered is this?
12.53% of the total number of SKUs are utilized in 80% of the total orders.

iii. Comment on the difference between this graph and the one in part a. How would the results inform different decisions?
In part A we identify the fast movers SKUs that got ordered more frequently, in part B we identify the best-selling SKU which means 12.5% represents 80% of the total SKUs sold.

We can use this profile information to allocate good locations to these fast-moving SKUs in the warehouse.

PROFILE 2: Lines-per-Order Profile

a. Create a **Lines-Per-Order Profile** for all of the orders in the database.

b. Change the profile from part a to display only the orders with 25 lines or less.

c. What percentage of orders contains only one line? How might you handle these orders differently than orders with multiple lines?
   Out of a total of 7,096 orders, a significant proportion 57.68% consists of single-line orders. To optimize efficiency, we propose allocating dedicated personnel specifically for handling these orders. Additionally, implementing batching processes can further streamline our operations.

d. What percentage of orders contains only one item? What warehouse processes could be eliminated for orders that can contain only one item?
   51.85%. the process that could be eliminated is sorting.

PROFILE 3: Order Quantity Profile

a. Create an **Order Quantity Profile** showing the percentage of orders that require full cases, broken cases, and a mixture of full and broken cases.

b. What percentage of orders is made up of all full cases? Broken cases? A mixture of full and broken cases?
   Percentage of orders that require broken cases =99.21%
   Percentage of orders that require Full cases =0.11%
   Percentage of orders that require Mixture cases =0.68%

c. Using this information, how would you design the picking area for these items? For example, would you design a picking area for cases and a separate picking area for broken cases? Include your rationale.
   Since most of the cases are ordered less than their carton size, we suggest reducing the carton size.
   With that said, reserving a specific area for these broken cases might not be effective, since the touches required to pick these orders will remain the same.
   We can reduce the number of broken cases, by analyzing the broken cases and finding the disparity between the current size and units it must be in, to be considered as a full case.

PROFILE 4: Item Family Profile

a. Create an **Item Family Profile** for the different product types listed in the Item Master sheet (Belts, Footwear, Jewelry, Neckwear, Outerwear, Shirts, Slacks). For each product family, plot the percentage of orders that consist only of that family. Show the numbers and percentages for each family, either in a table or on your plot.
   See excel sheet

b. For orders that consist of a single product family, what product type represents the largest percentage of orders? How would you use this information in designing your warehouse?
   From Single-product family orders, the Shirts family has the largest percentage of orders at 78.7%. This information tells us that Shirts should be kept in forward areas to have less travel of picking. Or they can have a specific picking line because they are a very HIGH percentage of the total.

c. Create a new chart that shows the Item Family Profile for just the top two product types from part a. In addition to these two families, show a third bar on the chart that represents all orders that include just items from the top two product families. (For example, show A, B and AB.)
   See excel sheet

PROFILE 5: Unit Load Profile

a. Create a **Unit Load Profile** for SKU 495770.

b. Where are the significant peaks in this distribution?
   The significant Peak is at 10 units repeated 39 times per order, then 1 unit orders repeated 25 times, and 5 unit orders repeated 22 times, item per order.

c. Given this information, would you recommend making any changes to the current number of units stored per case? Explain your answer.
   We analyzed two different scenarios:
   1. Placing 5 units in each carton. Given that 50% of the orders consist of multiples of five, this approach will optimize the picking process.
   2. Placing 10 units in each carton, By changing the size as 10, We eliminate the time that is required to place the pallet back (i.e. Half filled)

   More information is needed to suggest how many units stored per case to make the picking process more efficient.