Catherine,

After reviewing each of your 4 products, it was evident that product 1 was your most popular with close to 16,000 units sold over the 26-week period. We calculated the total and average weekly demand for each of the products. From these analyses, we found that as the products went on, the total and average weekly demand decreased. Product 4 has the lowest total and average weekly demand, at 5,554 units total. From these analyses, we also discovered that product 1, while not the most profitable, is the most popular. Product 2 is the most profitable per unit but is not the most popular.

While the company currently uses three different types of transportation methods, one does not align with your future goals for the company. Air transport costs are the highest weekly transport cost per unit regardless of product and plant reaching as high as $32.50 per week compared to $0.30 per week for road transport costs and $5.00 per week for ocean transport costs. Air transport costs will increase your weekly transport costs but reduce the lead time of a product, which is the main trade off to the method. On the other hand, ocean transport lead time was the longest, which increases the inventory holding costs associated with ocean transport. Ocean holding costs are the highest among the three and can get as expensive as $2887.55 depending on product type. Road lead time, and transport costs ranked the second best for both categories. Product 2 and 3 were unable to be transported via road and required either ocean or air transport methods. The shorter the lead time for the product, the lower the weekly inventory holding costs. Transport costs increase with a faster lead time and holding costs increase with a longer lead time.

Analyzing the labor cost per unit for each product at each plant facility, it is cheaper to produce products at plant 2 located in China compared to plant 1 located in Canada. This is due to the hourly labor rate in China is $8 compared to $29 in Canada. Therefore, all products created at plant 2 will be cheaper to produce than plant 1.

In transporting each of the products, we found that transporting by air has the highest overall level of emissions compared to road and ocean transportation emissions. When using plant 2, ocean transportation has a much lower level of emissions per unit compared to air, producing 25 times less emissions than air transportation. with 0.14 emissions per unit by ocean travel compared to 3.5 emissions per unit by air travel. We also found that air transport produced the highest weekly emissions as well, reaching as high as 30,611.54 kilograms for product 3, while road transport emissions produced only a fraction of that amount with as little as 101.47 kilograms for product 4.

Based on all the data collected and analyzed, our recommendations are to eliminate product 3 at plant 2, which would then allow you to increase production of product 2 at plant 2, and finally utilize ocean transportation from plant 2 to keep emissions low and aligning with your sustainability goals. We recommend eliminating product 3 because it has the lowest total annual profits of all products with just under $1 million. Doing this would free up space at plant 2 which could be utilized to increase production on product 2 as it has the highest total annual profits of all products with over $4 million. It also has the lowest labor cost per unit of all products at $8 compared to $40 for product 3. The profit per unit is also highest for product 2 compares to all other products at all plants. This would increase total company profits as well as labor costs would go down. Finally, to align with your sustainability goals, we recommend utilizing ocean transportation from plant 2 to keep emissions as low as possible as it produces 25 times less emissions than air transportation.