

# ICA 8: Aggregate Truck Shipments

ISE 453: Design of PLS Systems

Spring 2020

This ICA continues with the same example from the previous ICA and has three questions that can be answered using a worksheet (and submitting your answers in Moodle). Note: If you did not complete your spreadsheet for the previous ICA, then you should do that before extending it for this ICA (a printout of this spreadsheet is provided as the solution of the previous ICA on the Schedule).

1. What is the monetary weight to ship the product FTL?

$$TC_{FTL} = f r_{FTL} d = n r d \quad (= w d, w = \text{monetary weight in } \$/\text{mi})$$

2. A second product is to be shipped with the same origin and destination, and each unit weighs 80 lb, occupies 15 ft<sup>3</sup>, is valued at \$1,000, and it loses one percent of its value each month. Annual demand for the product is 30 tons, and its production and demand is constant throughout the year. If the second product is shipped independent, should it be shipped FTL, TL, or LTL?

3. What is the savings in TLC if both shipments will always be shipped TL together on the same truck (with same shipment interval) instead of as separate independent shipments?

$$f_{\text{agg}} = f_1 + f_2, \quad q_{TL}^* = \sqrt{\frac{f_{\text{agg}} r_{TL} d}{\alpha_{\text{agg}} v_{\text{agg}} h_{\text{agg}}}}$$

$$s_{\text{agg}} = \frac{(\text{aggregate weight, in lb})}{(\text{aggregate cube, in ft}^3)} = \frac{f_{\text{agg}}}{\frac{f_1}{s_1} + \frac{f_2}{s_2}}$$

$$v_{\text{agg}} = \frac{f_1}{f_{\text{agg}}} v_1 + \frac{f_2}{f_{\text{agg}}} v_2, \quad h_{\text{agg}} = \frac{f_1}{f_{\text{agg}}} h_1 + \frac{f_2}{f_{\text{agg}}} h_2$$