

MFAC Optimization Workshop

The Case of XYZ Paper

XYZ Paper, a manufacturer of newsprint paper in Northern Minnesota wishes to capture a larger share of the expanding paper export market in China and Indonesia. In 2014, XYZ had \$10 million in revenue from sales of paper rolls to ABC Paper Wholesalers in Shanghai China. XWY seeks increase its sales in China by reducing total costs in part by optimizing its paper export supply chain.

The large paper rolls produced by XYZ are used for newspapers, magazines and other printing processes by receivers in Asia who typically have limited on site storage. ABC Paper Wholesalers in China who import paper from manufacturers in the U.S. and Europe holds approximately 1-week of inventory outside of Shanghai to supply local print shops. Timely shipment delivery to wholesalers is sensitive, but not JIT critical. A delivery window of one-day either side of the actual delivery date is standard. However, missing the delivery window can be costly: In 2014, six container shipments loaded with XYZ paper rolls missed their delivery day by two days or more, and as a result ABC cut orders from XWZ by 10%. It is believed that continued poor delivery could result in further reductions in orders.

XYZ packs finished paper rolls in 40 foot ISO containers. Each container can hold 30 rolls before exceeding highway weight limits. In 2014 XYZ held a contract with ABC Paper Wholesalers to deliver 10,000 rolls of paper. Before transportation the profit margin on each roll is \$400.00. (i.e. the profit margin on each container of paper rolls is \$12,000 before transport). Due to missed deliveries in 2014, ABC indicated they would broaden their supplier base, reducing XYZ’s contract by 10% to 9,000 rolls. ABC said they would re-evaluate contracts at year-end, suggesting that if XYZ can reduce missed deliveries to less than two during the contract period they will consider replacing the 10% reduction. Further, zero missed deliveries could result in up to an additional 10% increase orders (e.g. 11,000 roles). ABC currently receives over 50,000 rolls annually from all suppliers.

Summary Information:

Currently, XYZ Paper ships 6 containers of paper rolls each week (50 weeks per year) bound for Shanghai China. XWZ has several choices for moving containers from its plant in Northern MN to Shanghai:

Transport Costs and Attributes*	Shipping Options				
	A. Rail MSP to Seattle	B. Rail Chicago to LA/LB	C. Truck from MSP to LA/LB	D. Rail MSP to Prince Rupert	E. Barge from MSP to Gulf
a. Origin drayage	\$350.00	\$800.00	\$0	800.00	350.00
b. Linehaul charge	\$3,200	\$2,600	\$3,900	\$3,400	\$1,600 (Not yet available)
c. Port/ocean charge	\$2,100	\$1,900	\$1,900	\$2,000	\$3,500
d. Destination drayage	\$150	\$150	\$150	\$150	\$150
Total Landed Cost	\$5,800	\$5,450	\$5,950	\$6,350	\$5,600
e. O/D transit time	13-15 days	15-18 days	11-12 days	12-13 days	??
f. Time variability	22 hours	32 hours	16 hours	24 hours	?

* All cost data is for illustrative purposes only and does not represent actual pricing.

Small Group Discussion Questions

1. Based on the given transportation costs and profit margin per container before transportation.

Which delivery option provides the greatest profit under the existing contract.

- a. $\$12,000 - \$5,800 = \$6,200.00$ $(6,200 / 30) * 9,000 = \$1,860,000$
 - b. $\$12,000 - \$5,450 = \$6,550.00$ $(6,550 / 30) * 9,000 = \$1,965,000$
 - c. $\$12,000 - \$5,950 = \$6,050.00$ $(6,050 / 30) * 9,000 = \$1,815,000$
 - d. $\$12,000 - \$6,350 = \$5,650.00$ $(5,650 / 30) * 9,000 = \$1,695,000$
 - e. $\$12,000 - \$5,600 = \$6,400.00$ $(6,400 / 30) * 9,000 = \$1,920,000$
2. Which mode/port option appears to provide XYZ with the greatest profit potential? Why?
 - a. What is the impact of Option c, if it results in ABC in raising its annual orders from XYZ to 11,000 rolls? E.g. $(6050 / 30) * 11,000 = \$2,218,000$
 - b. What is the impact of Option a, if it results in ABC restoring orders to last year's level of 10,000 rolls from XYZ? E.g. $(6200 / 30) * 10,000 = \$2,066,667$
 3. Has your company ever had to deal with similar supply chain questions? If so, how did you address or resolve these questions? What option do you think XYZ should pursue?

The Minnesota Statewide Freight System Plan points out that China is Minnesota's second largest export market, accounting for nearly one-quarter of all Minnesota exports by value. In 2015 the U.S. Commerce Department reported that Minnesota exports to China were valued at \$1.8 billion. Since 2005, Minnesota's exports to China have grown 142%, however that ranks just thirty-fourth (34th) among all states. In 2015, Minnesota's total exports to all markets totaled approximately \$20 billion, ranking Minnesota 24th among states in export value. Since 2005, Minnesota's exports have grown 45%, ranking Minnesota forty-second (42nd) among all states in export growth by value.

4. Assume that 50% of Minnesota's China bound exports by value move in shipping containers. If it requires 300 containers to move \$10 million worth of XYZ's paper rolls to China, and we assume that is a reasonable average, how many containers would be required to move \$900 million worth of goods?
 - $\$1.8 \text{ billion} \times 50\% = \900 million
 - $\text{Approximate total container volume} = \$900\text{m} / \$10\text{m} \times 300 = 27,000$
5. In your opinion, could supply chain / transportation costs be a factor in Minnesota's weak export growth? How might this question be answered?
6. What options should Minnesota consider in addressing these issues, i.e., If MnDOT pursues a statewide optimization project what are some of the "what-if" questions you would like to see explored?
7. If MnDOT pursues a statewide optimization project, do you think your company may be willing to share shipping data under non-disclosure agreements with the consultant?