

Case 1 :

Shipping Wood to Market

Siva & co is a lumber company that has three sources of wood and five markets to be supplied. The annual availability of wood at sources 1,2 and 3 is 20,25 and 20 million board feet, respectively. The amount that can be sold annually at markets 1,2,3,4, and 5 is 13,14,11,12 and 10 million board feet, respectively.

In the past the company has shipped the wood by train. However, because shipping costs have been increasing, the alternative of using ships to make some of the deliveries is being investigated. This alternative would require the company to invest in some ships. Expect for these investment costs, the shipping costs in thousands of dollars per million board feet by rail and by water (when feasible) would be the following for each route:

Source	Unit cost by Rail Market					Unit cost by Ship Market				
	1	2	3	4	5	1	2	3	4	5
1	65	76	49	59	70	35	42	28	-	39
2	73	82	64	53	60	40	47	32	28	35
3	63	70	67	65	51	-	37	40	36	30

The capital investment (in thousands of dollars) in ships required for each million board feet to be transported annually by ship along each route is given as follows :

Source	Investment for Ships market				
	1	2	3	4	5
1	375	403	338	-	385
2	393	418	370	350	365
3	-	383	375	368	340

Considering the expected useful life of the ships and the time value of money, the equivalent uniform annual cost of these investments is one–tenth the amount given in the table. The objective is to determine the overall shipping plan that minimizes the total equivalent uniform annual cost (including shipping costs).

You are the head of the OR team that has been assigned the task of determining this shipping plan for each of the following three options.

Option 1 : Continue shipping exclusively by rail

Option 2 : Switch to shipping exclusively by water

(expect where only rail is feasible)

Option 3 : Ship by either rail or water, depending on which is less expensive for the particular route.

Present your results for each option. Compare.

Finally , Consider the fact that these results are based on current shipping and investment costs, so the decision on the option to adopt now should take into account management’s projection of how these costs are likely to change in the future. For each option, describe a scenario of future cost changes that would justify adopting that option now.

Case 2

Sachin Manufacturing

Sachin manufacturing company produces three types of typewriters. All the three models are required to be machined first and then assembled. The time required for the various models are as follows:

Types	Manual Typewriters	Electronic Typewriters	Deluxe Typewriters
Machine time (in hours)	19	16	18
Assembly time (in hours)	8	7	9

The total available machine time assembly time are 3,000 hours and 1,200 hours, respectively. The data regarding the selling price and variable cost for the three types are :

Types	Manual Typewriters	Electronic Typewriters	Deluxe Typewriters
Selling price(Rs)	5200	8000	16200
Labour, material and other variable cost	3600	4800	12000

The company sells all the three types on credit, but can only collect the amounts on the first of the following months. The labour, material and other variable expenses will have to be paid in cash. This company has taken a loan of Rs 50,000 from a co- operative bank and will have to repay it to the bank on 1 April 2019. The TNC Bank from whom this company has borrowed Rs 70,000 has expressed its approval to renew the loan.

Liabilities	Rs	Assets	Rs
Equity Share capital	1,50,000	Land	90,000
Capital Reserve	15,000	Building	70,000
General Reserve	1,10,000	Plant & Machinery	1,00,000
Profit & Loss A /c	25,000	Furniture & Fixture	15,000
Long-term loan	1,00,000	Vehicles	30,000
Loan from TNC Bank	60,000	Inventory	5,000
Loan from Co-operative Bank	40,000	Receivables	50,000
		Cash	1,40,000
Total	5,00,000	Total	5,00,000

The company will have to pay a sum of Rs 10,000 towards salary of top management executives and other fixed overheads for the month. Interest on long-term loans is to be paid every month at 24% per annum. Interest on loans from TNC and cooperative banks may be taken to be 1,200 for the month . Also this company has promised to deliver 2 manual typewriters and 8 deluxe electronic typewriters to one of its valued customer next month. Keep in mind the fact that the level of operations in this company is subject to the availability of cash next month. This company will also be able to sell all types of typewriters in the market. The senior manager of this company desires to know as to how many units of each typewriter must be manufactured in the factory next month so as maximize the profits of the

company. Advise the management of the company for manufacturing strategy with an aim to maximize profit.