JBK Cabling: Shipping Shenanigans

JBK Cabling: Background

JBK Cabling is a large manufacturer and distributor of a electronic cabling products. Founded in 1957, the company has experienced significant growth throughout the years. By 1999, JBK Cabling had increased its number of manufacturing facilities to 42 and doubled its sales and asset base.

After 1999

After 1999, sales territories had been redrawn to improve efficiency. However, problems still remained. Plants suffered from a range of problems, such as: lack of capacity, excess capacity, operating problems, poor profitability, etc.

Prior to 1999, plants competed for sales in regions. After the 1999 reorganization, sales territories within the region were reorganized to minimize delivery expense. However, no detail had been given to balancing capacity, changing plant margins as product was shifted from one plant to another and delivery costs varied, or overall long-term profitability.

JBK Cabling's Decisions for the Future

JBK Cabling had the options of closing and selling plants, expanding plants, and building new plants. Overall, JBK Cabling needed a thorough analysis of all of its options to make production and shipping decisions for the future that would optimize their resources and maximize their profit.

The Midwest Region

The Midwest Region was one of JBK Cabling's most profitable. Three plants existed in the region and had been reorganized to allocate production to minimize delivery expense.

Plant Characteristics of the Midwest Region

Plant	Tulsa	Kansas City	Des Moines
Original Capacity	225,000	225,000	160,000
Expandable By	175,000	-0-	50,000
Plant/Land Value	$3.25 M	$4 M	$2 M
Plant Expansion Cost	$900,000	N/A	$600,000
Increase in Variable Manufacturing Costs	$2 per unit	N/A	$1 per unit
Increase in Fixed Costs	$400,000	N/A	$250,000
Operating Margin	10.6%	12.9%	20.2%

Table 1.

However, no attempt had been made to balance capacity and transportation costs while incorporating the sell/build/expand decisions into the analysis.
Table 1 summarizes the characteristics of the existing plants. Full income statements as a percentage of sales are given later in the case (see Table 8).

In addition to these plants, two potential sites for new plants are being considered. These are Oklahoma City, Oklahoma and St. Louis, Missouri. Both plants had advantages and disadvantages. Table 2 summarizes the characteristics of the potential plants.

Plant Characteristics of the Potential Sites

Plant	Oklahoma City	St. Louis
Capacity	62,500 - 250,000	62,500 - 250,000
Plant Cost	$2.5 M	$3.5 M
Construction Costs	$4 per unit	$4 per unit
Operating Margin and Production Level	Des Moines-Like	Tulsa-Like

Table 2.

The next section will provide a strategic analysis of JBK Cabling Inc.

Strategic Analysis

James Bernard was the operations manager for the Midwest Region. He was able to highlight the strengths and weaknesses of JBK Cabling's operations. James believed these characteristics could be used as a guide to define a problem statement, establish assumptions, formulate methodology, and analyze alternatives.

Strengths

• Large overall market base and individual market share	• Expansion possibilities at Tulsa, OK and Des Moines, IA plants
• Kansas City, MO plant stability and good work force	• Overall efficiency of rural plants
• Des Moines, IA plant high profitability, good work force, and close supplier proximity	• Increased value of Kansas City, MO plant and property
• New plant sites	• Increased value of Tulsa, OK plant and property

Weaknesses

• Tradeoff of high cost of expansion to low added units at plants that could expand	• Poor work situation at Tulsa, OK plant
• No expansion possibilities at Kansas City, MO plant	• Overall lower profitability of Tulsa, OK plant
• Current misallocation of resources and sub-optimization of plants and profits	• Non-improving margin on product

Realizing these strategic points the following problem statement has been developed.

Problem Statement

James had stated that JBK Cabling's overall objective is to:

> Determine the most profitable operating system for the Midwest Region that meets all customer demand and capacity requirements.

In addition, he wishes to determine the most efficient allocation of JBK Cabling resources to accomplish this statement. This will include analyzing possible sell, build, and/or expand scenarios as well as modifying current sales distributions.

Assumptions

The following assumptions were made regarding the state of affairs in the Midwest Region of JBK Cabling Inc.

- No increase in margin will occur from the initial investment to build a new plant; capital required will be secured by using the proceeds from the sale of a current site as collateral or viewed as a sunk cost
- Plants that are built will be built to produce maximum capacity
- Low industry growth is expected (i.e., demand will stay the same)
- Oklahoma City's income profile will match Des Moines' profile
- St. Louis' income profile will match Tulsa's profile
- Average price per unit was calculated as such

Net Sales/Total Pieces = Average price/unit

in turn, the average price/unit for each plant is calculated and displayed in Table 3.

Average Price/Unit Calculations by Plant YTD

	Tulsa	Kansas City	Des Moines
Net Sales ($000)	$11,788	$8,075	$7,444
Total Pieces	125,952	84,177	78,677
Average price/unit	$93.59	$95.93	$94.61

Table 3.

- Increases in fixed costs added with expansion of a plant or the construction of a new plant can be included in the administration margin of the income statement
- Increases in variable costs added with expansion of a plant or the construction of a new plant can be included in the COGS margin of the income statement

therefore, the COGS margin for the $4 increase in variable costs for St. Louis and Oklahoma City can be calculated as such and is displayed in Figure 1

COGS Margin Calculations for Increased Variable Costs

St. Louis		**Oklahoma City**	
Ave price/unit	$93.59	Ave price/unit	$94.61
COGS Margin 62.7%	58.68	COGS Margin 57.4%	54.31
Add $4	4.00	Add $4	4.00
Total	$62.68	Total	$59.31
New COGS Margin	**66.97%**	**New COGS Margin**	**62.69%**

Figure 1.

this methodology was also applied to expansion at Tulsa and Des Moines the final values for all plants and scenarios.

- Estimated year-end total pieces at each existing plant are displayed in Figure 2

Year End Total Pieces By Plant

Yearly Total Pieces		
Tulsa	**Kansas City**	**Des Moines**
215,917	144,303	134,874

Figure 2.

- Moneys generated from the sale of a plant will either be used to finance new plants or deposited in a corporate account, i.e., the moneys are not added to the year end profit figures for the region

Methodology

Scenarios regarding expansion, construction, and/or modification of current JBK Cabling enterprises will be examined here. A total of 72 scenarios exist. This number is derived as follows in Table 4.

Table of Scenarios

Tulsa	Kansas City	Des Moines	Oklahoma City	St. Louis	
Status Quo	Status Quo	Status Quo	N/A	N/A	
Expand	N/A	Expand	Build	Build	
Sell	Sell	Sell	No Build	No Build	
3 alt.	2 alt.	3 alt.	2 alt.	2 alt.	**= 72 combos**

Table 4.

However, due to capacity constraints and other factors all but 7 scenarios can be eliminated. The seven scenarios that must be investigated are listed in Table 5.

Seven Scenarios

Plant Production Decision / Scenario	Tulsa	Kansas City	Des Moines	Oklahoma City	St. Louis
1	Expand	Sell	Expand	Build	Build
2	Sell	Status Quo	Expand	Don't Build	Build
3	Sell	Status Quo	Status Quo	Build	Build
4	Sell	Status Quo	Status Quo	Build	Don't Build
5	Sell	Status Quo	Status Quo	Don't Build	Build
6	Status Quo	Status Quo	Status Quo	Build	Don't Build
7	Status Quo	Sell	Expand	Build	Build

Table 5.

Method of Comparison - Development of A Linear Programming Solution

The different scenarios must be compared using year-end profit as a base. A model needs to be developed to maximize year-end profit with respect to capacity and demand constraints and efficient use of company resources – namely capital.

The Model

The basic model is as follows:

Maximize	Profit
Subject to	Demand
	Capacity

The profit equation is subject to the following constraints: customer demand and plant capacity. Table 6 below displays the customer demand figures by customer area. Furthermore these capacity constraints must be met, as listed in Table 7, minimums apply if the plant is on-line (i.e., minimums do not apply to plants not being used, being sold, or not being built).

Customer Demand

Customer	Demand
Kansas City	90001
Dodge City	17500
Evansville	62000
Lincoln	24604
Denver	51339
Sioux Falls	76050
Columbia	19316
Dallas	110253
Tulsa	29173
Omaha	56251
Wichita	7856
Houston	84562

Table 6.

Maximum and Minimum Capacity Constraints

Plant	Tulsa	Kansas City	Des Moines	Oklahoma City	St. Louis
Max –No Expansion	225000	225000	160000	250000	250000
Max - Expansion	400000	N/A	210000	N/A	N/A
Min – No Expansion	0	0	62500	62500	62500
Min – Expansion	62500	N/A	100000	N/A	N/A

Table 7.

Development of The Profit Function

The total profit function can be derived from the income statements of the Midwest Region Plants (see Table 8). The profit function is modeled using the Op Margin for each plant and the number of units shipped from each of those plants (e.g., Profit for Tulsa = Op Margin %*Average Net Sales Price*# units shipped from Tulsa).

Income Statements as a Percentage of Net Sales

	Tulsa Status Quo	Tulsa Expand	Kansas City	Des Moines Status Quo	Des Moines Expand	Oklahoma City Build	St. Louis Build
Net Sales	100%	100%	100%	100%	100%	100%	100%
Material	46.50%	48.64%	45.40%	43.90%	44.96%	48.13%	50.77%
Labor	7.10%	7.10%	6.20%	6.10%	6.10%	6.10%	7.10%
Overhead	9.10%	9.10%	10.20%	7.40%	7.40%	7.40%	9.10%
COGS	62.70%	64.84%	61.80%	57.40%	58.46%	61.48%	66.97%
Gross Margin	37.30%	35.16%	38.20%	42.60%	41.54%	39%	33%
Delivery	4.60%	4.60%	4.10%	3.20%	3.20%	6.00%	3.28%
S&A	18.60%	18.60%	17.80%	15.40%	15.40%	15.40%	18.60%
Admin	3.50%	5.95%	3.40%	3.80%	6.21%	3.80%	3.50%
Op Exp	26.70%	29.15%	25.30%	22.40%	24.81%	25.20%	25.38%
Op Margin	10.60%	6.01%	12.90%	20.20%	16.72%	13.32%	7.65%

Table 8.

Final Remarks

James needed to advise his superiors on which course of action should be taken regarding plant expansion, sale, and/or production capacity levels. He also needed to provide his managers with the optimal shipping quantities for each operational plant. JBK's customers also had to be notified on how much to expect from which plants. In addition, he needed to provide a number for the approximate profit that would be generated by these actions. Finally, James also had to supply a brief sensitivity analysis regarding changes in operating margins, supply limitations, and demand schedule. All of this had to be written up in a one-page executive summary as soon as possible.