**Management Report on the Optimization of Acquisition Strategy and Sensitivity Analyses**

This report is divided into two subsections, analyzing different problems in each. First, this report will provide the Management Team with optimized procurement strategies for the acquisition of pig valves from three different suppliers to meet the company’s monthly requirements. In the second section, the report will analyze the optimization of production costs for two drugs, 1 and 2, manufactured in two locations, Indianapolis and Los Angeles, to meet production quality requirements within the available machine hours. This strategic analysis, conducted using Ms. Excel’s Solver tool, aims to minimize acquisition and production costs for scenarios 1 and 2, respectively, while ensuring that the company obtains a sufficient quantity of products.

**Case Study 1**

The company’s objective is to purchase at least 300 small, 300 medium, and 500 large valves each month. However, due to supply constraints, the maximum number of valves that can be purchased from each supplier is 500. The results of the analysis indicate the following procurement quantities:

* Supplier 1: 125 valves
* Supplier 2: 500 valves
* Supplier 3: 500 valves

The analysis determined that the most effective strategy to meet the company’s requirements is to purchase 300 small valves, 325 medium valves, and 500 large valves. This strategy results in a total acquisition cost of $16,500, a figure that optimally minimizes the total purchasing cost the company should allocate for the valves (See embedded Excel file).



The results of the sensitivity analysis reveal important insights bout the impact of increasing the minimum purchase requirements for the valves. It is evident that small, gradual increases in required valve quantities of various sizes by 2% up to 14%, correspondingly increase the acquisition costs by $1,000, for each increase. However, when the percentage increase reaches at least 16%, the total requirements for the valves collectively exceed the maximum supply capacity of the suppliers, leading to an infeasible situation because the suppliers are unable to provide the number of valve requirements (see Figure 1 below). In such cases, the company would need to consider alternative procurement strategies, such as finding additional suppliers or revising the production plan to align with the available supply. This sensitivity analysis underscores the importance of setting realistic and attainable minimum purchase requirements for valves, carefully considering the constraints of their supply process and budget limitations when making such decisions.

**Figure 1**

*Sensitivity of Total Acquisition Cost with Gradual Increments in Valve Reequipments*

**Case Study 2**

This section addresses two key aspects of a pharmaceutical company’s drug manufacturing operations in Indianapolis and Los Angeles. First, it determines how the company can minimize the cost of producing the required drugs, drug 1 and drug 2. It then conducts a sensitivity analysis to evaluate the financial implications of acquiring extra machine time in Indianapolis and Los Angeles. Based on the objectives, the results of the Solver analysis indicate the following production quantities:

|  |  |  |
| --- | --- | --- |
| Pounds Produced | Indianapolis | Los Angeles |
| Drug 1 | 0 | 100 |
| Drug 2 | 200 | 0 |

The company’s goals include producing at least 100 pounds per week of drug 1 and at least 200 pounds per week of drug 2, all while adhering to weekly machine time constraints of 500 hours in Indianapolis and 400 hours in Los Angeles. To minimize costs, the company should produce 100 pounds of drug 1 in Los Angeles and 200 pounds of drug 2 in Indianapolis, resulting in an optimal minimum total production cost of $1,300 (See embedded file below).



In an attempt to understand the financial viability of purchasing additional hours in both locations, a sensitivity analysis of acquiring the extra machine time in the two locations was conducted. The sensitivity analysis reveals that the total production cost remains constant at $1,300, regardless of the additional machine time acquired in both Indianapolis and Los Angeles (see Figure 2 below). This suggests that the current production level and cost structures do not warrant the need for extra machine time investments. The company is operating efficiently within its machine time constraints while minimizing production costs. The pharmaceutical company’s optimized production strategy does not require additional machine time investment at this stage, so it should continue to operate within the existing machine time parameters while producing the required quantity of drugs. Regular assessments may be necessary in response to changing market conditions or production requirements.

**Figure 2**

*Sensitivity of Total Production Cost Based on Machine Time Increment*