Assignment Description

Develop a spreadsheet model to determine the costs associated with the scheduling problem at the call center. More specifically, answer the following four questions.

Question 1: Considering that the competitive importance of perceived service quality was well-understood by the company and its employees, do you think that establishing a preferred customer desk in the Winston-Salem center is an effective strategy to improve both the quality and the speed of service to the small but highly valued preferred customers of the company? What are the pros and cons of using specialized agents? Please elaborate on your arguments.

Question 2: Given the average handle times 6.41 minutes (calculated according to the data provided in Exhibit 5) and the pattern of average hourly call volumes (provided in Exhibit 6), apply queueing model (see formula below) to determine the minimum number of agents that must be available during each of the 24-hour period for each day of the week to maintain the average hold times to the current 45 and the proposed 30 seconds (to answer this question, you need to consider two different standards). Below is the formula to compute the average waiting time (or hold time) T_q.

$$T_q = \left(\frac{p}{m}\right) \times \left(\frac{U^{\sqrt{2(m+1)}-1}}{1-U}\right) \times \left(\frac{CV_a^2 + CV_p^2}{2}\right)$$

Where

p is the average processing time (or handle time) for each phone call

a is the average inter-arrival time (average time between two adjacent arrivals)

m is the number of servers (or agents)

U is the utilization, which can be calculated as $U = \frac{p}{a \times m}$

CVa is the coefficient of variation of inter-arrival time, which is assumed to follow exponential distribution (what's the implication?).

CVp is the coefficient of variation of processing time, which is assumed to follow exponential distribution (what's the implication?).

Question 3: A full-time agent works the standard shift of four-hours-on/one-hour-off/four-hours-on and gets paid for 8.5 hours according to the union contract. A part-time agent works four hours straight and gets paid for 4 hours. The hourly rate is the same for both full-time and part-time agents, $14 per hour plus 25% benefits. Suppose that both full-time and part-time agents can be hired, but the number of part-time agents hired cannot exceed the number of full-time agents hired. Design a work shift schedule that ensures that the number of agents (full-time and part-time combined) available in each hour meets the requirements obtained from question 2, and meanwhile, minimizes the total labor costs. To simplify your work, for each of the 24 hours, consider the worst case and take the maximum number of agents required across seven days. This way, you don't have to deal with a work shift problem for each day of the week; rather, you only deal with one day (worst case). Note, you still have to consider two different standards (45 seconds versus 30 seconds). Be sure to specify all constraints in your Excel model.

Question 4: Based on your answer in question 3, do you think it helps Sanders make a compelling argument that the company should target at a higher standard (30-sec instead of current 45-sec average wait time) for preferred customers?

Submit a report of no more than four pages. Your report should be concise and contain all key results and findings. Feel free to add an appendix if you would like to include more detailed analysis in your report. There is no page limit on your appendix. Your report should include at least the following three sections: (1) introduction and problem description; (2) analysis; and (3) conclusion and discussion. In your analysis section, state all your assumptions as provided in the case and this document. If the two conflict, follow the information provided in this document. Make additional assumptions if necessary. When you write your report, DO NOT simply answer these questions like a homework assignment. You should treat it as a mini business consulting project when you write the report. *Be sure to submit the Excel file that contains your analysis*. Your Excel files should be structured in a way that is easy for me to follow along.

Hints:

(1) Average call volume and average inter-arrival time are related. For example, given average call volume of 30 customers per hour, it implies that the average inter-arrival time is 1hour/30 = 60 minutes/30 = 2 minutes. In this case, a=2 minutes. Given the average hourly call volume provided in Exhibit 6, you can determine the average inter-arrival time for each of the 24 hours and for each day of the week.

(2) Utilization can never exceed 1. If utilization ≥ 1, it means you have to hire more agents to bring utilization under 1. Besides, you cannot apply the above formula when utilization ≥ 1.

(3) When you apply the above formula, make sure you use consistent time units, either minutes or seconds.

(4) According to Exhibit 6, calculate the minimum number of agents required for each of the 24-hour period for each day of the week to ensure that the average wait time in each period is no more than 45 seconds/30 seconds, respectively. The formula provided above shows how to calculate the wait time given the number of agents. You need to work the other way around and determine the number of agents required given the target wait time. As you might expect, as you increase the number of agents, the expected wait time will decrease. So you can start with a small number of agents and keep increasing the number until the wait time falls just under the target wait time. This is the minimum number of agents required to meet the target wait time. This can be done easily with an Excel formula.