

MBA643A: Mid Semester Exam (Take Home)

Traditional financial planning involves what is typically known as line-item budgeting. Simulation experts call this as first generation financial planning. In this planning approach, estimates are made for the items in the budget, and these estimates are then combined to obtain the desired financial estimate. Such a budget for a Medical-Surgical department of a hospital is provided in Table 1. Single values estimates are made for budget items. These inputs are then summed to estimate total expenses.

Table I: Line Item Budget of Medical-Surgical Department

Budget head	Planned amount (\$)
Salary and wages	17000
Payroll taxes and benefits	1300
Operating supplies	600
Laundry and linen	1300
Dietary transfers	200
Education and travel	100
Maintenance of equipment	100
Equipment rental	300
Total expense	20900

However, the hospital administration always faced issues with lack/surplus of funds due to poor planning. They identified that rather than a deterministic budget, a probabilistic budget that is dependent on patient days is required. For that, the administration requested a simulation expert to conduct the modeling and analysis. The model proposed by the expert is as follow.

- Salary and wages = fixed salary and wages + variable salary and wages x patient-days
- Payroll taxes and benefits = fixed payroll taxes and benefits + variable payroll taxes and benefits x patient-days
- Operating supplies = fixed operating supplies + variable operating supplies x patient-days
- Laundry and linen = fixed laundry and linen + variable laundry and linen x patient-days
- Dietary transfers = fixed dietary transfers + variable dietary transfers x patient-days
- Education and travel = education and travel
- Maintenance of equipment = 100
- Equipment rental = 300

The modeler also proposed the following limits for different variables of the probabilistic model. They are summarized in Table 2. The initial model assumes that all values between these limits are equally likely.

Table II: Estimated limits for the probabilistic financial planning model

Variable (factor) name	Minimum	Maximum
Patient-days	700	1300
Fixed salary and wages	12500	15500
Variable salary and wages	2.2	3.4
Fixed payroll taxes and benefits	900	1000
Variable payroll taxes and benefits	0.28	0.33
Fixed operating supplies	425	475

Variable operating supplies	0.14	0.26
Fixed laundry and linen	900	1000
Variable laundry and linen	0.29	0.71
Fixed dietary transfers	105	120
Variable dietary transfers	0.07	0.13
Education and travel	500	500

Using the above stated information and data, conduct Monte Carlo Simulations to answer the following questions.

1. What are the budget estimates using the probabilistic model? How are these estimates compared with the point estimate provided in Table 1?
2. Quantify and tabulate the standard deviations associated with averages of all dynamic parameters of the model?
3. Estimate the budgetary requirements for the Medical-Surgical department when the patient-days exhibit a 10% increase?
4. Similarly, what would be the budgetary estimates for the department, if the patient days exhibit a negative growth of 25%?
5. What are the budget estimates if the entire simulation was conducted as a single experiment with 100000 replications?
6. What is the impact of a 20% increase in the fixed salary and wages component in the final budget?
7. Instead of increasing the fixed salary and wages component by 20%, the hospital has proposed a 20% increase on the variable salary and wages component. How will it impact the final budget estimates?

You are expected to complete the take-home before 17:00 PM of 24 September 2022. You are required to submit a summary of the analysis with your observations, neatly typed – 12 point font, before the start of the in class component of the mid semester examination. The total number of pages should not be more than 10, excluding appendices.