Managing a Humanitarian Project Endowment in Kampala, Uganda

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***Abstract*—Your non-governmental organization (NGO) is the fortunate beneficiary of a Bill and Melinda Gates Foundation grant that will provide additional pediatric health services to the greater Kampala, Uganda, area for ten years. You will construct a physical brick-and-mortar facility centrally located in Kampala, Uganda, and 15 satellite clinics in a 100-mile radius of Kampala. Each clinic will be staffed with two doctors and three Physician Assistants, paid the median local annual wage. Supply and utility costs for each facility are estimated at USD 10k/month. The operation will have an initial total capital expense (building and equipment of $5MM) and annual operating expenses (utilities, people, supplies, etc.) estimated by you. Assume continuous discounting with a discount rate of 5% for all calculations. Assume the project start date was January 3, 2023.**
The grant assumes that your organization will invest the grant capital and then self-sustain all operating expenses and a 20% annual reinvestment payment to ensure future operations.

I. Introduction

Our NGO has been provided with Bill and Melinda Gates Foundation grant and we are tasked accomplishing the following objectives :

1) Identifying the capital and operating costs required for your venture for the ten-year term.
2) Structuring an endowment (ex-capital required) that will provide enough annual revenues to meet the necessary operating expenses and the 20% yearly reinvestment payment, assuming that the initial endowment face value must be repaid to the Gates Foundation at the end of the term. Any remaining endowment balance can then be used to ensure ongoing operations following the Gates Foundation grant.
3) Quantifying the initial grant size to meet our operational and investment objectives and develop an investment portfolio to meet our obligations.
4) Develop and evaluate the year-to-date portfolio performance (from 01/03/2023 to 11/17/2023) relative to the SPY benchmark and report the total asset value under management in current dollars, and the outlook for the following years

The approach that has been adopted, is to compute the total capital and annual operating cost, project it to the tenure and then come up with a final grant amount value which full fills all the project obligations

II. Results

The results for the project objectives are outlined below :

- The capital cost for the project is USD 5,00,000
- The annual operating cost for 15 clinics is USD 3,190,374.00 (Detailed calculation illustrated in *Methods* section)
- The total grant amount will be USD 41,585,845.43 considering a minimum desired return rate of 12% annually from the portfolio
- The total amount for self sustaining post 10 year period will be will be USD 26,586,450.00 and this achieved by the pro folio at the end of tenure
- The simulation of the cash flow for the 10 year period is given below:

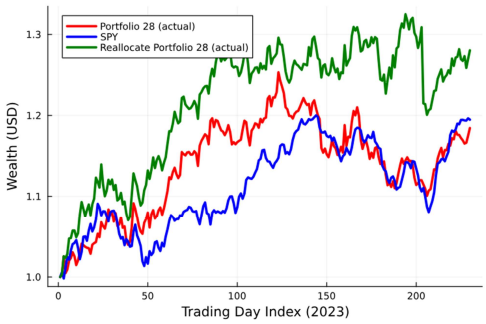
Simulation

Total Grant Amount	Principal Amount	Interest Earned Annually	Operating Cost	Reinvestment Crieteria	Amount Remaining	Interest Amount Balance
41,585,845.43	41,585,845.43					
	43,385,772.89	4,990,301.45	3,190,374.00	638,074.80	1,161,852.65	1,799,927.45
	45,401,691.63	5,206,292.75	3,190,374.00	638,074.80	1,377,843.95	2,015,918.75
	47,659,520.63	5,448,203.00	3,190,374.00	638,074.80	1,619,754.20	2,257,829.00
	50,188,289.10	5,719,142.48	3,190,374.00	638,074.80	1,890,693.68	2,528,768.48
	53,020,509.80	6,022,594.69	3,190,374.00	638,074.80	2,194,145.89	2,832,220.69
	56,192,596.97	6,362,461.18	3,190,374.00	638,074.80	2,534,012.38	3,172,087.18
	59,745,334.61	6,743,111.64	3,190,374.00	638,074.80	2,914,662.84	3,552,737.64
	63,724,400.76	7,169,440.15	3,190,374.00	638,074.80	3,340,991.35	3,979,066.15
	68,180,954.85	7,646,928.09	3,190,374.00	638,074.80	3,818,479.29	4,456,554.09
	73,172,295.43	8,181,714.58	3,190,374.00	638,074.80	4,353,265.78	4,991,340.58
Minus	5,000,000.00	Capital Cost				
	68,172,295.43					
Minus	41,585,845.43	Total Grant Amount				
	26,586,450.00	Self Sustain Amount (Amount Left in Hand)				

- The Porfirio performance simulation has been illustrated in the Julia notebook and has been included as part of the Appendix and the summary plot for this is given below :

III. Discussion

- From the portfolio performance we can see that we are able to achieve the minimum desired return rate of 12% with a risk of 10%
- Reallocation of portfolio
- A summary table of different minimum desired return rate and their associated risk is given below :
- With this selected portfolio our NGO will be able to meet and full fill the following :
  - Annual Operating Expense for the project tenure and also post project tenure by earning interest from the self sustain amount that will be left after repaying the initial grant amount to the Bills Foundation



- The 20% reinvestment requirement is also satisified
- At the end of the tenure, the NGO will be able to repay the total initial grant amount which includes the capital cost and will be left with enough portfolio value which will earn them revenue which can meet all their expenses

IV. Methodology

This section outlines the overview of the methodology.

1) Capital and Operating Cost Calculations

The detailed calculation illustration for the Capital and Operating Cost can be found in the calculation excel sheet *costcalculation* submitted as an appendix along with this report.

a) Capital Cost

In the problem statement it is specified that the initial total capital expense i.e. for building and equipment will be **USD 5,000,000**

b) Operating Cost

- Salaries

The salaries for the doctors and assistant are given below :

Annual Salary Doctor	USD	23,528.91 [1]
Salary Physician Assistant	USD	15,211.26 [2]

For a single clinic :

Entity	UOM	Count	Total Salary [USD]
Number of Doctors per clinic	-	2	47,057.82
Number of Physician Assistant per clinic	-	3	45,633.78

Therefore the total annual salary for one clinic is USD 92,691.60

- Supply and Utility Cost

The problem statement has defined the monthly supply and utility cost to be USD 10,000.00. Therefore the annual supply and utility cost will be USD 120,000.00

Therefore, for 1 clinic the total operating cost will be summation of annual salary and annual supply and utility cost which comes to USD 212,691.60
Therefore, for 15 clinics the total operating cost will be **USD 3,190,374.00**

2) Initial Grant Amount

The detailed calculation illustration for the grant amount calculation can be found in the calculation excel sheets *simulation8pa, simulation10pa, simulation12pa, simulation14pa* submitted as an along with this report.
The summary of this is given below :

- In order to compute the grant value which caters to all the constraints of the the problem statement, a minimum desired return percentage was taken and simulated at different annualized return rates percentages i.e. 8,10,12.14
- Based on the minimum desired return percentage the discounted values for the 10 year period were computed
- The yearly reinvestment value was taken as 20% and this amount was used to repay the capital cost of USD 5,000,000 at the end of project tenure
- The amount needed for self sustaining post project tenure was computed used the following formula :

- The *simulation* section in each sheet illustrates how the final grant amount is able to cater to all the constraints i.e.
  - Annual Operating Cost
  - 20% Reinvestment
  - Self Sustain post project tenure

The final results and discussions are outlined in the previous sections

V. Data and model availability

The model equations were implemented in Julia (v.1.9.3) [3] The model code is available at https://github.com/CHEME-5660-Cornell-Fall-2023/team-project-submission-link-angelo.git

References

1. Annual salary of doctors in kampala uganda .
2. Annual salary of physician assitant in kampala uganda .
3. Bezanson, J., Edelman, A., Karpinski, S. & Shah, V. B. Julia: A fresh approach to numerical computing (2014). arXiv:1411.1607.