Homework 11

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"I pledge my honor that I have abided by the Stevens Honor System." - JM, EO, DB, MM

Summary:
For this assignment, the team was tasked with finding the costs, benefits, ROIs, and CBRs of two improvements that could be made to the existing ticket reservation system from Homework 9. The two improvements include a hot backup and a second credit card system, each with different downtime reductions and associated implementation costs. The team's solution shows that after two years, the return on the investment for both improvements remains negative, with the second credit card system showing a greater upward potential in the near future.

Continuing from HW9:

Assume the customer loses $10,000 in profits for each hour the system is unavailable;

Assume the following benefit prediction based on HW9 analysis:

- the improvement of hot backup can reduce downtime by 1.5 hours, and
- the improvement of second credit card system can reduce downtime by 4 hours.

Assume the cost of money is 2% per month, and you start implementing both improvements immediately

- For the hot backup, it will
    - Take 6 months
    - Cost $50K (all expense is for servers and developments.) Cost is in month 1
    - Have an ongoing cost of $10K per month for months 2 through 6
- For the second credit card system:
    - The development effort is 3 staff month at $12K per staff month
    - It will take three months for the project
    - You need to pay the verification software company $5K per month for the service.
    - No additional hardware is required.

Analyze for each improvement:

- **What is the cost (over a year)?**

Hot backup:
Before cost of money = 50,000 + (10,000 * 5) = $100,000
PV cost = $97,134.60

Second credit card system:
Before cost of money = (12,000 * 3) + (5,000 * 9) = $81,000
PV Cost = $79,525.16

- **What is the benefit?**

Hot backup:
Before cost of money = (1.5 * 10,000) / 2 = $7500
PV benefit = $6,341.73

Second credit card system:
Before cost of money = ((4 * 10,000) / 12) * 9 = $30,000
PV benefit = $26,150.95

- **What is the ROI after one year? After two years?**

*ROI does not take into account cost of money
ROI = net benefits/costs = (benefit - cost)/cost

Hot backup:
Year 1:
- Benefit: $7500
- Cost: $100,000
- ROI = (7500 - 100,000) / 100,000 = -0.925 = -92.5%

Year 2:
- Benefit = (1.5 * 10,000) * 1.5 = $22,500
- Cost: $100,000
- ROI = ($22,500-$100,000)/$100,000 = -0.775 = -77.5%

Second credit card system:

Year 1:
- Benefit: $30,000
- Cost: $81,000
- ROI = ($30,000-$81,000)/$81,000 = -0.6296 = -62.96%

Year 2:
- Benefit: 7 * 10,000 = $70,000
- Cost: ($5,000 * 21) + ($12,000 * 3) = $141,000
- ROI = ($70,000-$141,000)/$141,000 = -0.5035 = -50.35%

- **What is the cost benefit ratio after one year? After two years?**

Cost/Benefit Ratio = PV(total costs/total benefits)

Hot backup:

After one Year, Cost/Benefit = $97,134.6/$6,341.7 = 15.32
After two Years, Cost/Benefit = $97,134.6/$16,973.4 = 5.72

Second credit card system:

After one Year, Cost/Benefit = $79,525.2/$26,150.9 = 3.04
After two Years, Cost/Benefit = $125,984.4/$57,123.8 = 2.21