

Hotel Example: ROI Analysis

The ROI Analysis needs to be done on all design options considered in a Feasibility Study.

Option 1: Stay with Current System

Background Information

Note: For this hypothetical example we have made up reasonable background numbers in order to perform the analysis. However, for your assignment, you should try and get as much of this information as possible from the real organization, (it's probably easier to ask simple questions than to try and make up reasonable numbers anyway).

Current Information

Discount rate: Here we use the discount rate from the lecture notes: 12%

Reminder: $\text{Present_value}(n) = 1/(1 + i)^n$ where $n = \text{year}$, $i = 0.12$

Lifetime of System: 6 years

Definition: Hotel Customer: The occupants of a room are together considered as one "customer".

Error Frequency: On average one in every five customer checkouts results in a billing error.

- Half of these errors are over-billing errors, and we always assume that the hotel is honest and returns all over-billed money to the customers.
- Half of these errors are under-billing errors, and we always assume that the hotel does not pursue customers to correct under-billing errors, as the damage in customer satisfaction and hotel employee work load is not worth the potential money recovered.

Average Amount of Billing Error: \$20 per customer

Current Number of Rooms in the Hotel: 50

Average Occupancy Rate: 60%

Check-ins/Check-outs: Each day 1/3 of customers check in, 1/3 of customers check out and 1/3 of customers remain unchanged.

Average Customer Charges (Room Cost + Extras) per Day: \$100

Customer Loyalty Loss Due to Over-billing: Let's assume that the occupancy rate of the hotel would actually be 65% were it not for the loss of return customers due to over-billing.

Average Hotel Employee Wage: \$15/hour

Average Time to Perform One Update: 2 hours

Updates per Day: 2

Expansion in Year 2

We assume that the hotel expansion corresponds with some sort of beneficial event, like a new tourist attraction, which would result in the occupancy rate remaining at 60%, even though the number of rooms are doubled (effectively the number of customers is then doubled by this new event).

New Number of Rooms: 100

Occupancy Rate: 60%

Average Time to Perform One Update: 4 hours

All other information remains the same.

Cost/Benefit Calculations

Current Situation

Average Billing Error/Customer: \$20 per customer/(1 in every 5 customers) = \$2/customer

Average Number of Rooms Occupied per Day: 60% of 50 Rooms = 30 customers

Average Number of Checkouts per Day: 1/3 of 30 customers check out = 10 checkouts

Average Loss in Under-billing Errors Per Day: 10 checkouts * Average Billing Error/Customer \$2 = \$20

Yearly Loss from Under-billing Errors: \$20 * 365 = \$7,300

Employee Costs of Updates per year: 2hrs/update * 2 updates per day * \$15/hr wage * 365 days = \$21,900

Daily Costs of Over-billing: Loss of 5% in occupancy * 50 rooms * \$100 average room cost = \$250

Yearly Costs of Over-billing: \$250 * 365 = \$91,250

Total Yearly Current Costs of Current System: \$7,300 + \$21,900 + \$91,250 = \$120,450

Expansion in Year 2

The number of rooms is doubled but the occupancy rate remains the same, thus average number of customers per day is doubled. Therefore the yearly loss from under-billing errors, and the daily cost of over-billing is simply doubled (conveniently). As the number of customers doubles, the time to perform updates doubles, therefore the Employee Costs of Updates per Year also doubles.

Yearly Loss from Under-billing: \$14,600

Yearly Loss from Over-billing: \$182,500

Employee Costs of Updates per Year: \$43,800

Total Yearly Costs of Expanded System:

Net Present Value

Cash Flow	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Dev Costs	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Oper. Costs	\$0	\$120,450	\$240,900	\$240,900	\$240,900	\$240,900	\$240,900
Present Value	1.00	0.89	0.80	0.71	0.64	0.57	0.51
Time adj. Costs	\$0	\$107,545	\$192,044	\$171,468	\$153,096	\$136,693	\$122,047
Cumulative Costs	\$0	\$107,545	\$299,589	\$471,057	\$624,153	\$760,846	\$882,893
Benefits	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Time adj. Benefits	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cumulative Benefits	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Net Costs+Benefits	\$0	-\$107,545	-\$299,589	-\$471,057	-\$624,153	-\$760,846	-\$882,893

Payback Period

There isn't one

ROI

Not really applicable, as there is no investment

Option 2: Deploy New Automated System

For this option we are assuming the purchase of a customizable software system.

Background Information and Cost/Benefit Calculations

Two Separate Interconnected Systems:

Restaurant System:

Upfront Costs

Hardware and Software Costs: \$3,000

Upfront Customization Costs: 5 hours at \$50/hour = \$250

Training Costs for Hotel Employees: 5 hours of training * \$15/hour = \$75

Training Costs for Trainer: 5 hours of training * \$50/hour = \$250

Total Restaurant System Development Costs = \$3,575

Maintenance Costs per Year

Software Content Changes: average 1 hr/week * \$50/hr * 52 weeks = \$2,600

Front Desk/Management System

Upfront Costs

Hardware and Networking Costs (backup system included): \$20,000

Software: \$150,000

Software Customization: \$50,000

Pay TV Software Module Acquisition: \$5,000

Hotel Staff Training Costs: 50 hours * \$15/hour = \$750

Trainer Costs: 50 hours * \$50/hour = \$2,500

Total Front Desk/Management System Development Costs: \$228,250

Maintenance Costs per Year

Part-time Maintenance Person who does backups, training: average 5 hrs/week * \$50/hr * 52 weeks = \$13,000

Software Changes: average 1hr/week * \$100/hour * 52 weeks = \$5,200

Total Yearly Maintenance Costs: \$5,200 + \$13,000 = \$18,200

Totals

Total System Development Costs: \$228,250 + \$3,575 = \$231,825

Total Yearly Maintenance Costs: \$18,200 + \$2,600 = \$20,800

Benefits

The benefits of the new system are equal to the costs of the old system, as the new system will correct all billing errors and eliminate the time needed to do manual updates.

Expansion in Year Two

As the system is designed to be (or purchased to be) completely expandable, there are no extra costs incurred during the Hotel expansion in year 2.

Net Present Value

Cash Flow	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Dev Costs	-\$231,825						
Oper. Costs		-\$20,800	-\$20,800	-\$20,800	-\$20,800	-\$20,800	-\$20,800
Present Value	1.00	0.89	0.80	0.71	0.64	0.57	0.51
Time adj. Costs	-\$231,825	-\$18,571	-\$16,582	-\$14,805	-\$13,219	-\$11,802	-\$10,538
Cumulative Costs	-\$231,825	-\$250,396	-\$266,978	-\$281,783	-\$295,002	-\$306,804	-\$317,342
Benefits	\$0	\$120,450	\$240,900	\$240,900	\$240,900	\$240,900	\$240,900
Present Value	\$1	\$1	\$1	\$1	\$1	\$1	\$1
Time adj. Benefits	\$0	\$107,545	\$192,044	\$171,468	\$153,096	\$136,693	\$122,047
Cumulative Benefits	\$0	\$107,545	\$299,589	\$471,057	\$624,153	\$760,846	\$882,893
Net Costs + Benefits	-\$231,825	-\$142,852	\$32,611	\$189,273	\$329,151	\$454,042	\$565,551

Payback Period

The payback here occurs between year 1 and year 2, but we want to know specifically how far into year 1 it occurs.

$$\text{Payback period} = |\text{year 1 amount}| / (|\text{year 1 amount}| + \text{year 2 amount})$$

$$= 142,852 / (142,852 + 32,611) = 0.81$$

So payback occurs after 1.81 years.

ROI

$$\text{ROI} = (\text{Estimated Lifetime Benefits} - \text{Estimated Lifetime Costs}) / \text{Estimated Lifetime Costs}$$

$$= (882,893 - 317,342) / 317,342 = 1.78$$

So the ROI is %178, this is very good.