FEASIBILITY STUDIES FOR
ALEXAN VIRGINIA CENTER

Fall 2002
Course Project Presentation
Presentation Overview:

1. Overview on VA Center.
2. Definition of Decision and Chance Nodes.
3. Implementation of Tree.
4. Conclusion.
Overview on VA CENTER

1. This is a 7.37 acres site.
2. Total budget is $75,450,000
3. Starting date April 23rd, 2001
4. Anticipated finish sep 1st, 2003
5. Project is slightly behind schedule.
6. Money wise, project is within budget so far.
<table>
<thead>
<tr>
<th>Qty</th>
<th>Bedroom</th>
<th>Bathroom</th>
<th>Additions</th>
</tr>
</thead>
<tbody>
<tr>
<td>193</td>
<td>1</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>43</td>
<td>1</td>
<td>1</td>
<td>LOFT</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>1</td>
<td>DEN</td>
</tr>
<tr>
<td>174</td>
<td>2</td>
<td>2</td>
<td>N/A</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>2</td>
<td>LOFT</td>
</tr>
</tbody>
</table>
Amirali Nasserian

ENC627

VA CENTER OBJECTIVE

Obtain money!

MY OBJECTIVE

Study the GO/NO GO decision
INTRODUCING DECISION AND CHANCE NODES
They have $18,500,000 that they can invest in the VA CENTER or in a savings account for 15 years and get a flat 2.5% interest rate.
## SOFT COST DECISION NODE

<table>
<thead>
<tr>
<th>GROUP</th>
<th>COST</th>
<th>GROUP</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch1, Civil 1</td>
<td>$5,703,204.0</td>
<td>Arch2, Civil 1</td>
<td>$5,784,349.2</td>
</tr>
<tr>
<td>Arch1, Civil 2</td>
<td>$5,813,441.2</td>
<td>Arch2, Civil 2</td>
<td>$5,894,586.4</td>
</tr>
<tr>
<td>Arch1, Civil 3</td>
<td>$5,923,678.4</td>
<td>Arch2, Civil 3</td>
<td>$6,004,823.6</td>
</tr>
</tbody>
</table>
ARCHITECT, ENGINEER PERFORMANCE
CHANCE NODE

Small talks with 3 PM’s

Assumptions for distributions:
1- They should have a known Min & Max
2- They should be continous
<table>
<thead>
<tr>
<th>Group</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch1, Civil 1</td>
<td>Beta general (.63132,1.5937,8808.8,240625)</td>
</tr>
<tr>
<td>Arch1, Civil 2</td>
<td>Beta general (.62213,0.63641,4584.6,178654)</td>
</tr>
<tr>
<td>Arch1, Civil 3</td>
<td>Uniform (1455.1,160642)</td>
</tr>
<tr>
<td>Arch2, Civil 1</td>
<td>Beta general (.35364,.80267,9962.7,142176)</td>
</tr>
<tr>
<td>Arch2, Civil 2</td>
<td>Beta general (0.93128,0.98251,2114.4,122386)</td>
</tr>
<tr>
<td>Arch2, Civil 3</td>
<td>Uniform (3117.8,100460)</td>
</tr>
</tbody>
</table>
Arch 1, Civil 1

Mean = 74580.45

Values in 10^6

Arch 1, Civil 3

Mean = 81054.16

Values in Thousands
CONSTRUCTION SCHEDULE
DECISION NODE

- Three type of schedule is available
- Each one has it’s own cost and duration
- Each one has it’s own uncertainty
## Construction Schedule Table

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Most likely Duration</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crashed</td>
<td>20 months</td>
<td>$53,234,510</td>
</tr>
<tr>
<td>Normal</td>
<td>27 months</td>
<td>$49,304,100</td>
</tr>
<tr>
<td>Slow</td>
<td>31 months</td>
<td>$48,559,250</td>
</tr>
</tbody>
</table>
Construction Performance
Chance Node

Construction projects are never on schedule!

There is a chance to be behind or ahead schedule
<table>
<thead>
<tr>
<th>Construction Schedule</th>
<th>Min (month)</th>
<th>Most Likely (month)</th>
<th>Max (month)</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crashed</td>
<td>19</td>
<td>20</td>
<td>23</td>
<td>Triangle (19,20,23)</td>
</tr>
<tr>
<td>Normal</td>
<td>25</td>
<td>27</td>
<td>29</td>
<td>Triangle (25,27,29)</td>
</tr>
<tr>
<td>Slow</td>
<td>32</td>
<td>32</td>
<td>34</td>
<td>Triangle (32,32,34)</td>
</tr>
</tbody>
</table>
Amirali Nasserian

Crashed Schedule

@RISK Student Version
For Academic Use Only

25.0%  66.7%  8.3%

ENCE627
PENALTY
There is this assumption that, for every month that the construction gets delayed there is an additional cost of $500,000. This is both for “General Conditions” and also “Field and Home Office overhead”.
FINANCING

Assumptions:

1- Construction loan comes with an interest rate of 9.3% and it’s calculated for the full year.

2- When the construction is complete, company applies for another loan with rate of 5.3% and pays off the new one.
INCOME

Assumptions:

1- After one year of construction club house and finished units will be turned in and leasing starts.
2- Each month new units will be leased.
3- Average base monthly rent is $1531.
INCOME

Assumptions:

4- 10% of the income is allocated for property management services.
5- Rental fee will increase for 3.5% every year.
6- Final judgment is based on net present value. (NPV)
First I tried simulating the decision tree.

Did not work because @risk never tells you which scenario has been selected in each iteration. (Or at least I couldn’t use @risk in a way that shows the chosen scenario in each iteration.)
So I decided to convert the continuous distributions to the discrete ones!

For example:
Values in 10^-6

0 1 2 3 4 5 6 7 8 9

Mean = 74580.45

Discrete({x}, {p})

X ≤ 55000

X ≤ 200313

@RISK Student Version
For Academic Use Only
Same thing happened to construction schedule distributions.

For Example:
Now that every node and its relative value is known I just needed to go ahead and create the decision tree.

BUT I COULDN'T!

Because I reached the capacity of Decision Tree Software (student version)
I had $6 \times 3 \times 3 \times 4 = 216$ branches and it didn't work
As a result I decided to divide it to six trees:

(See the handouts)
Final Step:

Doing the financial analysis and running sensitivity on two possible changeable factors:

1- Base rent values.
2- Interest rates.
Sample Financial Calculations:

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total cost</strong></td>
<td>$73,482,118.40</td>
</tr>
<tr>
<td><strong>Initial investment</strong></td>
<td>$18,500,000.00</td>
</tr>
<tr>
<td><strong>Total loan</strong></td>
<td>$54,982,118.40</td>
</tr>
<tr>
<td><strong>Year 1 interest</strong></td>
<td>$5,113,337.01</td>
</tr>
<tr>
<td><strong>Year 2 interest</strong></td>
<td>$5,588,877.35</td>
</tr>
<tr>
<td><strong>Year 1 income</strong></td>
<td>$0.00</td>
</tr>
<tr>
<td><strong>Year 2 income</strong></td>
<td>$7,385,833.80</td>
</tr>
<tr>
<td><strong>Total Payable</strong></td>
<td>$58,298,498.96</td>
</tr>
</tbody>
</table>
## Loan Payments with 5.3% Apr.

<table>
<thead>
<tr>
<th>Year</th>
<th>Principal</th>
<th>Interest</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>year 3</td>
<td>$58,298,498.96</td>
<td>$8,000,000.00</td>
<td>$52,964,319.41</td>
</tr>
<tr>
<td>year 4</td>
<td>$52,964,319.41</td>
<td>$8,000,000.00</td>
<td>$47,347,428.34</td>
</tr>
<tr>
<td>year 5</td>
<td>$47,347,428.34</td>
<td>$8,000,000.00</td>
<td>$41,432,842.04</td>
</tr>
<tr>
<td>year 6</td>
<td>$41,432,842.04</td>
<td>$8,000,000.00</td>
<td>$35,204,782.67</td>
</tr>
<tr>
<td>year 7</td>
<td>$35,204,782.67</td>
<td>$8,000,000.00</td>
<td>$28,646,636.15</td>
</tr>
<tr>
<td>year 8</td>
<td>$28,646,636.15</td>
<td>$8,000,000.00</td>
<td>$21,740,907.87</td>
</tr>
<tr>
<td>year 9</td>
<td>$21,740,907.87</td>
<td>$8,000,000.00</td>
<td>$14,469,175.98</td>
</tr>
<tr>
<td>year 10</td>
<td>$14,469,175.98</td>
<td>$8,000,000.00</td>
<td>$6,812,042.31</td>
</tr>
<tr>
<td>year 11</td>
<td>$6,812,042.31</td>
<td>$6,812,042.31</td>
<td>$0.00</td>
</tr>
</tbody>
</table>
## Net Present Value Calculations (10% Yield Rate)

<table>
<thead>
<tr>
<th>Year</th>
<th>Gross Income</th>
<th>Management Expense</th>
<th>Loan Payment</th>
<th>Net Value Each Year</th>
<th>Net Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>($58,298,498.96)</td>
<td></td>
<td></td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>3</td>
<td>$9,039,024.00</td>
<td>($903,902.40)</td>
<td>($8,000,000.00)</td>
<td>$135,121.60</td>
<td>$101,518.86</td>
</tr>
<tr>
<td>4</td>
<td>$9,355,389.84</td>
<td>($935,538.98)</td>
<td>($8,000,000.00)</td>
<td>$419,850.86</td>
<td>$286,763.78</td>
</tr>
<tr>
<td>5</td>
<td>$9,682,828.48</td>
<td>($968,282.85)</td>
<td>($8,000,000.00)</td>
<td>$714,545.64</td>
<td>$443,676.62</td>
</tr>
<tr>
<td>6</td>
<td>$10,021,727.48</td>
<td>($1,002,172.75)</td>
<td>($8,000,000.00)</td>
<td>$1,019,554.73</td>
<td>$575,512.07</td>
</tr>
<tr>
<td>7</td>
<td>$10,372,487.94</td>
<td>($1,037,248.79)</td>
<td>($8,000,000.00)</td>
<td>$1,335,239.15</td>
<td>$685,188.81</td>
</tr>
<tr>
<td>8</td>
<td>$10,735,525.02</td>
<td>($1,073,552.50)</td>
<td>($8,000,000.00)</td>
<td>$1,661,972.52</td>
<td>$775,322.45</td>
</tr>
<tr>
<td>9</td>
<td>$11,111,268.40</td>
<td>($1,111,126.84)</td>
<td>($8,000,000.00)</td>
<td>$2,000,141.56</td>
<td>$848,255.27</td>
</tr>
<tr>
<td>10</td>
<td>$11,500,162.79</td>
<td>($1,150,016.28)</td>
<td>($8,000,000.00)</td>
<td>$2,350,146.51</td>
<td>$906,083.22</td>
</tr>
<tr>
<td>11</td>
<td>$11,902,668.49</td>
<td>($1,190,266.85)</td>
<td>($6,812,042.31)</td>
<td>$3,900,359.33</td>
<td>$1,367,052.15</td>
</tr>
<tr>
<td>12</td>
<td>$12,319,261.89</td>
<td>($1,231,926.19)</td>
<td></td>
<td>$0.00</td>
<td>$11,087,335.70</td>
</tr>
<tr>
<td>13</td>
<td>$12,750,436.05</td>
<td>($1,275,043.61)</td>
<td></td>
<td>$0.00</td>
<td>$11,475,392.45</td>
</tr>
<tr>
<td>14</td>
<td>$13,196,701.31</td>
<td>($1,319,670.13)</td>
<td></td>
<td>$0.00</td>
<td>$11,877,031.18</td>
</tr>
<tr>
<td>15</td>
<td>$13,658,585.86</td>
<td>($1,365,858.59)</td>
<td></td>
<td>$0.00</td>
<td>$12,292,727.27</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
<td>$18,916,527.19</td>
</tr>
</tbody>
</table>

**Total Net Present Value**

$18,916,527.19
Conclusion and Comments:

1. Up to this point all six trees are built.
2. Financial analysis are under execution.
3. I like to try another method that I can actually use simulation (Maybe using formulated expected values, @Risk and MS Excel.)
ANY COMMENTS?