**Case Study – Cost-Benefit Analysis Example**

Certainly there are reasons other than profit why organizations conduct training. Some are due to government regulations and others for employee morale and welfare. However, more and more managers are asking important questions about the worth of training. They want to know if training is contributing to organizational objectives, including profit. Determine the Return on Investment (ROI) of a training course or program helps answer those questions. Sometimes the expected ROI is calculated prior to developing a course to determine if the anticipated results will be worth the effort. Other times it is calculated after training to track what actually took place. In either case a cost-benefit analysis is used to calculate the ROI.

A cost benefit analysis is usually calculated as follows:

1. Calculate the cost of developing the course.
2. Calculate the implementation cost.
3. Calculate the dollar benefits.
4. Subtract the benefits from the cost to get the ROI

<table>
<thead>
<tr>
<th>Activity</th>
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<tbody>
<tr>
<td>Consider the following example of the cost-benefit analysis of a training course. Assume that you are the Program Manager of a training project. You need to calculate the cost of the project so that you can inform your boss so she can get permission to do the work. Work the case study from the information given.</td>
</tr>
</tbody>
</table>

Assume your Human Resource Development department wants to design and develop a new course for operating a new electronic tester that will be used in your company. You decide to determine the cost to the company for developing and presenting the new course over the life-time of this unit of equipment.

You talk to the engineers and they tell you they will initially need to train **20 workers** to use the equipment and then about **five replacement workers each year** over the subsequent **four years**.

You review your records of the last time you developed a similar program. While it was about three years ago, you determine that many of the costs are the same. However, you know that wages and salaries have gone up.

So you estimate the costs as follows:

**Personnel costs**
Project Manager (you) at a salary of $30,000 per year. You will probably spend 200 hours on the project. Benefits are figured at 30% of a manager's salary. Calculate your cost at the full salary rate.

A part time writer with no benefits will be hired at $20 per hour. She spent about 200 hours on the project.

Subject Matter Expert (an engineer) with a salary of $60,000 per year. He spent 50 hours on the project. His cost is figured at full wage rate.

A company artist worked on the project and earned a salary of $26,000 per year. She spent 40 hours on the project. Her cost is calculated at the full wage rate.
To calculate the full wage rate you do calculate the value of the person's benefits. In this case the calculations would be:

1. Multiply salary by 1.3 for salary and benefits.
2. Divide the result ($33,800) by the number of days paid in year (260)
3. Divide the result ($130) by the number of work hours in a day (8)
4. Multiply the result ( $16.25) by the number of hours allocated to the project (40)
5. The result of $650 is the personnel cost of the artist.

Materials Cost

In this case the project manager (you) decided to use three videos, 100 transparencies, an instructional manual used by instructor and students, and certificates of completion.

To save time and money, the videos would be purchased from the company that built the tester (cost is $750 each). Writing paper and pencils would be provided during the course ($10 per class).

The project manager (you) estimated that the course would be given twice the first year using 1 instructor for 10 participants in each class. Then for the following four years it will be presented to five participants once each year by one instructor.

In the calculation of production costs, course materials are identified. A required amount for each type of course material is assigned and an estimate of the cost is determined, either through historical data or by contacting vendors for estimates. The specific items are then added to provide a total by type. The totals by type are then added together to give the total materials costs for the course.

The following figures can be used to figure cost of materials for the course:

Transparencies cost $3 per copy

1000 transparencies x $3 = $300

Word processing per page is calculated at $.20 per page. The average course manual is 100 pages long.

100 pages x $.20 = $20
Photocopying the manuals cost $0.06 a page.

1. 

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\begin{align*}
\text{(10 students + 1 instructor per class x 2 classes) } &= 22 \text{ manuals} \\
\text{(5 students and 1 instructor per class x 4 classes) } &= 24 \text{ manuals}
\end{align*}
\]

2. 46 manuals X 100 pages per manual = 4600 pages

3. 4600 pages x $0.06 = $276

Standard Certificates of Completion will be used and cost $5.00 each.

1. Two classes of ten + four classes of 5 students = 40 certificates

2. 40 certificates x $5 = $200

Total Materials cost:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Video (3)</td>
<td>$2250</td>
</tr>
<tr>
<td>Paper &amp; Pencils</td>
<td>60</td>
</tr>
<tr>
<td>Transparencies</td>
<td>300</td>
</tr>
<tr>
<td>Word Processing</td>
<td>20</td>
</tr>
<tr>
<td>Manual Printing</td>
<td>276</td>
</tr>
<tr>
<td>Certificates</td>
<td>200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$3,106</td>
</tr>
</tbody>
</table>

Delivery Costs:

The following delivery costs should be considered:

Instructor cost is estimated at $250 per day. The course is expected to last three days.

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\text{\$250 x 3 days x 6 classes x 1 instructor = } \text{\$4,500}
\]

Trainees have an average salary of $120 per day. They will be at the course for three days.

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\text{\$120 x 3 days x 40 students = \$14,400}
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Half will need to fly in and stay in a hotel during the course. 
Airfare averages $400 per trainee
Lodging averages $300 per trainee

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\begin{align*}
&\frac{(400 \times 40)}{2 \text{ students}} = \$8,000 \text{ for airfare} \\
&300 \times 40 \text{ students} = \$12,000 \text{ for lodging}
\end{align*}
\]

Miscellaneous costs:
- Telephone charges at $10 per trainee
- Telephone charges at $25 per instructor
- Local transportation at $25 per trainee
- Refreshments at $30 per trainee and instructor

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\begin{align*}
\text{Telephone cost} \\
&10 \times 40 \text{ students} = \$400 \\
&25 \times 6 \text{ instructor} = \$150 \\
\text{Local transportation cost} \\
&25 \times (40 \text{ students} + 6 \text{ instructors}) = \$1150 \\
\text{Refreshments} \\
&30 \times (40 \text{ students} + 6 \text{ instructors}) = \$1380 \\
\end{align*}
\]

Total Delivery cost:
- Instructor cost $4,500
- Student cost 14,400
- Airfare 8,000
- Lodging 12,000
- Miscellaneous costs 3,080
- **Total** $41,980

Total Cost:
Personnel cost + Materials cost + Delivery costs = Estimated course cost
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(3750 + 4000 + 1875 + 650) + 3106 + 41,980 = \$55,361
\]
The Benefits

You have determined that the cost of the course you want to implement over five years is $55,361. Now you need to find out if the benefits of implementing the course are worth the cost. Your boss wants to know the yearly benefits for implementing this course. Your course will train 40 workers but no more than 20 will be employed an any one time. The additional 20 workers will be replacement workers. Their average wage is $120 per day.

Time

You calculate that this training will result in a reduction of 10 minutes of needless nonproductive activity per day. The average wage of trained workers is $120 per day.

To calculate this cost, multiply the time saved by the full cost of the employees. You must find out how much they earn a minute. A work day has 8 hours or sixty minute or 480 minutes. If the employees earn $120 per day divide the hours per day by 480 minutes to get the minute rate of pay (0.25). Then multiply that by the time saved (10 minutes). Finally, multiply that figure by the 20 trained workers to get the daily savings. To get the annual savings for one year multiply by 260 work days per year.

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(\frac{120}{8 \times 60}) \times 10 \times 20 \times 260 = $13,000 \text{ saved}
\]

Materials

Materials costs can be reduced by improving quality control, inventory procedures, and materials handling procedures. You figure that this training will result in the savings of $1.00 of supplies per day per worker.

\[
$1 \times 20 \text{ workers} \times 260 \text{ days} = $5,200
\]

Equipment

Cost avoidance by eliminating equipment downtime or increased revenues through improved productivity can result from better use of equipment. The first step is to determine the value of the equipment.

Assume that each trained employee operates a machine that is worth $10,000. The machines earn about $15 per hour. Through the result of improved maintenance procedures learned in the training course it is expected that down time of the machines will increase productivity at least one hour per week.
$15 per hour x 260/8 weeks x 20 workers = $9,750

Personnel

This training is not expected to have a direct impact on the turnover rate of employees.

Records indicate that the average cost of accidents for employees performing jobs this training covers is **$200 per event**. The past three years there was an average of ten accidents per year. Because of the increased safety training received by the trained employees, it is anticipated that the accident rate will drop to **two per year**.

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<thead>
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<tbody>
<tr>
<td>Last year</td>
<td>$200 x 10 = $2000</td>
</tr>
<tr>
<td>After training</td>
<td>$200 x 2 = $400</td>
</tr>
<tr>
<td>Savings</td>
<td>$2000 - $400 = $1600</td>
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Intangible Benefits

An intangible benefit cannot be described by a dollar amount or other measurement. Since intangible benefits cannot be measured, they can't be included in a cost/benefit analysis, but they can be used to supplement it. Even though intangible benefits are extremely difficult to quantify, they shouldn't be ignored.

Among the intangible benefits that can accrue from training programs are:

- Improved productivity
- Customer satisfaction
- Employee motivation, achievement, recognition, interest, responsibility, advancement
- Potential value of the worker
- Payback to profession or society
- Decreased costs
  - Turnover
  - Tardiness
  - Alcoholism, drug abuse

The Analysis

Once all the costs and benefits have been valued, it's time to do the cost-benefit analysis. The analysis consists of two simple steps:

- Compare costs to benefits.
- Value the problem, the solution, and the result.
The resulting analysis report should interpret the results of the comparison and provide recommendations about solutions.

<table>
<thead>
<tr>
<th>Total Annual Benefits:</th>
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<tbody>
<tr>
<td>Time $13,000</td>
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<tr>
<td>Materials 5,200</td>
</tr>
<tr>
<td>Equipment 9,750</td>
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<tr>
<td>Safety 1,600</td>
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<tr>
<td>Total $29,550</td>
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Comparing the Costs to Benefits

Comparing costs to benefits means determining which items are larger than others. Comparisons should be made of the totals and any similar line items.

If the costs outweigh the benefits, the trainer can do several things:

- Decide not to go forward with the project
- Change the course to make it less costly or to accrue more benefits
- Emphasize that some benefits are more vital than the large costs or are long-term

<table>
<thead>
<tr>
<th>Estimated Course Cost $ 55,361</th>
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<tbody>
<tr>
<td>Estimated Benefits ($29,550 x 5 years) 147,750</td>
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<tr>
<td>Estimated gain over 5 years $92,389</td>
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</tbody>
</table>

Preparing the Cost Benefit Analysis Report

The cost-benefit analysis report should lead the decision maker to make the decision the report writer wants. It should include the cost and benefit work sheets, as well as the summary worksheet and narrative recommendations. The report should discuss the:

**Existing problem.** Management may not be aware that a problem situation exists that could be helped by training. The trainer should determine the dollar value of the problem by determining the lost revenue or costs resulting from the problem.

**Training solution.** The trainer needs to show that training will help reduce the impact of the problem on the company. By using the cost-benefit analysis, the trainer can show that the benefits of the training outweigh the costs.
**Result.** After the training is completed, the trainer can demonstrate the actual value derived from the program. Follow-up and evaluate the results of the program and then state in dollar terms the actual savings that resulted.