11-30 Relevant Cost Exercises

a. Make or Buy:

The relevant cost for producing the product is as follows:

<table>
<thead>
<tr>
<th>Cost Per Unit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Materials</td>
<td>$28</td>
</tr>
<tr>
<td>Direct Labor</td>
<td>18</td>
</tr>
<tr>
<td>Variable Overhead</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$62</strong></td>
</tr>
</tbody>
</table>

($62/unit × 2,000 units) = $124,000

The total cost to purchase the units is $120,000 (i.e., $60 per unit).

∴ Savings by producing internally = $124,000 − $120,000 = **$4,000**

The key question here is whether any of the fixed overhead is avoidable (and therefore a relevant cost of producing internally).

**Qualitative Considerations:**

a. How does the quality of product compare, insourcing vs. outsourcing?

b. Reliability (i.e., on-time delivery performance)?

c. Financial condition of the supplier? (With the supplier be in business?)

d. Are there alternative (i.e., better) uses of the available capacity?

e. Will outsourcing allow “information leakage” regarding your product (a negative if eventually in the hands of your competitors)?

f. Will outsourcing cause an increase in unemployment? Attendant costs: increased payroll taxes; negative goodwill.
b. Disposal of Assets

<table>
<thead>
<tr>
<th></th>
<th>Re-machine</th>
<th>Scrap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future Revenues</td>
<td>$30,000</td>
<td>$2,500</td>
</tr>
<tr>
<td>Deduct future costs</td>
<td>$25,000</td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>$5,000</td>
<td>$2,500</td>
</tr>
</tbody>
</table>

The difference is in favor of re-machining. The $50,000 inventory cost is irrelevant.

Alternative presentation format:

Incremental Revenues from Further Processing:
- Estimated sales value of re-machined parts: $30,000
- Current disposal value of parts: $2,500
- Incremental revenue from re-machining: $27,500

Incremental Costs (re-machining): $25,000

Difference (in favor of re-machining the parts): $2,500

Qualitative Considerations:

1. Any other (better) use of the capacity devoted to this task?
2. Perception in the market—will consumers matter that re-machined parts make their way into the market?
3. Reliability/quality of re-machined parts (in the minds of the consumer)?

c. Replacement of an Asset

<table>
<thead>
<tr>
<th></th>
<th>Replace</th>
<th>Rebuild</th>
</tr>
</thead>
<tbody>
<tr>
<td>New boat</td>
<td>$92,000</td>
<td>-</td>
</tr>
<tr>
<td>Deduct current disposal price</td>
<td>$ 9,000</td>
<td></td>
</tr>
<tr>
<td>Rebuild of existing boat</td>
<td></td>
<td>$75,000</td>
</tr>
<tr>
<td>Margin</td>
<td>$83,000</td>
<td>$75,000</td>
</tr>
</tbody>
</table>

The difference is in favor of rebuilding. The $90,000 original purchase cost is irrelevant as it is a “sunk cost.”
Alternative presentation format:

Cost to buy a replacement boat = $92,000
Total cost of refurbishing:
  Out-of-pocket cost = $75,000
  Plus: Opportunity Cost = $9,000 $84,000
Difference (in favor of refurbishing) $  8,000

Qualitative Considerations:

1. Personal preference (utility function) for new vs. refurbished asset?
2. Safety/reliability of refurbished boat vs. new boat

Other Quantitative Considerations:

1. Disposal values of each option, at the end of useful life?
2. Income tax consequences (e.g., casualty loss deduction), if any?

d. Profit from Processing Further (“Sell or Process Further”)

The main point of this exercise is that joint costs should be ignored when addressing the “sell-or-process further” decision (see also coverage of this point in Chapter 7).

1. Definitions:

   a. joint production process: process in which more than output emerges from a common resource input (e.g., barrel of crude oil)

   b. joint costs: in a joint production process, these are costs incurred before the split-off point; that is, these costs are joint or common to the outputs; since these costs are non-traceable, they must be allocated to outputs

   c. separable processing costs: in a joint production process these are the costs incurred after the split-off point; as such, these costs are traceable to individual products and incremental to the decision to process products beyond the split-off point
d. **split-off point**: point in a joint production process where products with individual identities emerge; cost incurred prior to the split-off point are called *joint costs*, while those incurred after the split-off point are called *separable processing costs*.

The situation for Deaton Corporation is depicted in the diagram that follows.

2. Which products, if any, should be processed further (rather than being sold at the split-off point)?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add’tl costs of further process</td>
<td>$28,000</td>
<td>20,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Increase in sales value*</td>
<td>40,000</td>
<td>20,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Differential benefit (loss)</td>
<td><strong>$12,000</strong></td>
<td>$0</td>
<td>($2,000)</td>
</tr>
</tbody>
</table>

* $40,000 = $280,000 − $240,000; $20,000 = $120,000 − $100,000; $10,000 = $70,000 − $60,000

Deaton Corp. is indifferent about the further processing for B since the net benefit is zero. There would be a positive benefit for further processing of A ($12,000) and a loss from further processing of C ($2,000). Notice that the joint production costs of $240,000 are sunk with respect to the decision regarding whether any of the outputs should be sold at the split-off point or processed further.
3. For financial reporting and tax purposes, accountants need to value inventory on a "full cost" basis. Thus, in the present case for income-statement preparation purposes and for purposes of preparing an end-of-period balance sheet, a portion of the joint production cost of $240,000 must be assigned to each unit sold during the period and each unit on hand at the end of the period. There are alternative ways to allocate joint production costs to outputs. Regardless of how these costs are handled for financial reporting and tax purposes, they are irrelevant to the sell-or-process further decision.

e. Make or Buy (sourcing decision)

The relevant fixed overhead is $12 per unit ($20 × 60%) because that amount could be avoided by buying the part from McMillan. All variable costs are relevant ($75 = $35 + $16 + $24). The relevant cost per unit is there $87 ($75 + $12). Eggers should make the part. The cost to make, $87, is less than the cost to buy, $90; there is a $3 per-unit savings to make.

Nonfinancial Factors that Might Be Relevant

a. Are there alternative (better) uses for the available capacity?
b. Quality of the supplier's product: how does it compare to the quality of internal production?
c. Reliability--on-time delivery performance of the supplier?
d. Future price trends: is the supplier price likely to be lower (or greater) in the long run?
e. Outsourcing may allow information about the design of the product to leak out to competitors.
f. Employment-related considerations: if we outsource, what happens to our labor force and costs such as unemployment insurance, goodwill, etc.?

f. Selection of More Profitable Product

1. The comment "Flash and Clash are processed through the same production departments" can be taken to mean that capacity-related (i.e., fixed manufacturing) costs in total are unrelated to short-term fluctuations in product mix. For short-term product planning, therefore, the total fixed costs are not relevant.
2. Selection of the more profitable product:

<table>
<thead>
<tr>
<th></th>
<th>Flash</th>
<th>Clash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling price per unit</td>
<td>$250.00</td>
<td>$140.00</td>
</tr>
<tr>
<td>Variable cost per unit*</td>
<td>200.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Contribution margin per unit</td>
<td>$50.00</td>
<td>$40.00</td>
</tr>
<tr>
<td># of DLHs per unit</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Contribution margin per labor hour</td>
<td>$25.00</td>
<td>$40.00</td>
</tr>
</tbody>
</table>

*200 = $50 + $100 + $50; $100 = $25 + $50 + $25

Note that the products have the same per unit profit, but Flash has the higher contribution margin per unit, and Clash has the higher contribution per direct labor hour (DLH). Thus, Flash would be the more profitable product without a labor constraint, while Clash is the most profitable product with the labor constraint. The measure, operating profit, is not used because it includes the sunk fixed costs.

In sum, Clash returns the highest amount per DLH, the scarce resource. Therefore, the optimum short-term product mix would consist of producing Clash up to external demand. Any remaining DLHs would then be devoted to the production of Flash.

g. Special-Order Pricing

The total cost of each meal is variable plus fixed cost or $2.00 per meal + ($1,200 ÷ 600 meals) = $4.00 per meal. This is a reasonable cost basis for long-term pricing, and Barry is getting a $1.00 margin on each meal. However, in a special-order situation the fixed costs are irrelevant, and Barry should be willing to do business for any price above variable cost of $2.00. Thus, the tour operator’s deal is a good one for Barry. As long as there is space for the additional meals, and since daily fixed costs are unaffected by the additional patrons, any price above $2.00 should be acceptable.
More generally, the minimum selling price per unit = incremental costs (variable + fixed + opportunity):

**Out-of-pocket costs:**
- Variable out-of-pocket costs per meal $2.00
- Fixed out-of-pocket costs per meal $0
- Opportunity costs $0
- Incremental costs per meal $2.00
- Bid price from tour group $3.50

Therefore, short-term profits increase by taking on the additional business.

The idea of agreeing to serve 200 patrons on any given day presents a problem with limited capacity. In this case, 100 of the regular customers would have to look elsewhere for lunch on these days, at a loss of $3.00 ($5.00 − $2.00 variable cost) per meal or a total of $300 per day. The additional new patrons at $3.00 each would bring in a contribution of only $1.00 ($3.00 − 2.00) per meal or a total of $200. It turns out the single bus load is a better deal.

The above can be reflected in a general reporting framework, as follows:

**Number of patrons per month** 200

**Special-order price offered by tour company** $3.00 (given)

**Incremental costs per tour-bus meal:**
- Variable out-of-pocket costs per meal $2.00
- Fixed out-of-pocket costs per meal $0.00
- Opportunity cost per meal:
  - Lost sales (customers) 100
  - Lost cm per customer $3.00
  - Total lost CM $300.00
  - Opportunity cost per tour-bus meal $1.50

**Incremental costs per tour-bus meal** $3.50
11-33 Special Order

1. In general, relevant cost equals the sum of out-of-pocket costs (variable + fixed), plus opportunity cost (if any). In the present case, these costs total $140,000, as follows:

Out-of-Pocket Costs:
   Variable costs:
      Manufacturing cost ($15 per unit) $75,000
      Variable costs:
      One-Time Packing & Delivery Cost $2,000
   Opportunity Cost:
      No. of lost unit sales (if any) 3,000
      CM per unit, regular sales:
      Selling price, per unit $38.00
      Variable manufacturing cost $15.00
      Variable selling cost $2.00 $21.00 $63,000
   Total Relevant Cost $140,000

2. Operating income with the special order will decrease by $15,000. The only relevant variable costs are the $15 variable manufacturing cost ($15 \times 5,000 = $75,000 total), since marketing costs are not charged for the special order. Other relevant costs include the one-time delivery/packing cost of $2,000 and the (opportunity) cost of lost sales. Since the 5,000 unit order would exceed GGI’s capacity. Currently, GGI has only 2,000 units of available capacity (22,000 units – 20,000 units), and APAC requires the order to be filled in full.

   Contribution margin lost (foregone) on 3,000 units of lost sales
   = (price – variable manufacturing cost – variable selling cost) \times \# \text{ lost units}
   = ($38 – $15 – $2) \times 3,000 \text{ units} = $63,000

   Summary of relevant costs:
   Variable manufacturing costs ($15 \times 5,000) $ 75,000
   One-time delivery costs 2,000
   Cost of lost sales (per above) 63,000
   Total relevant costs $140,000
Since the relevant costs of $140,000 exceed the price of the special order ($125,000), operating income would decrease by $15,000 if the special order is accepted.

Note that if GGI had available capacity, the only relevant cost would be the variable manufacturing cost and the delivery cost, which would total $77,000. In this case, the special order would be acceptable.

3. The breakeven selling price is the price that just equals total relevant cost of the special sales order. Put another way, the breakeven price is the selling price per unit that would leave operating income unchanged.

Total relevant cost (from Part 1 above) = $140,000
Divided by no. of units in the special order = 5,000
Breakeven selling price per unit = $28.00

Any price above $28.00 would increase operating income; any price below $28.00 per unit would have the opposite effect.

4. Comparative income statements (contribution format), with and without special order:

<table>
<thead>
<tr>
<th></th>
<th>Current Situation</th>
<th>Current Situation + Special Sales Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular (@$38/unit)</td>
<td>$760,000</td>
<td>$646,000</td>
</tr>
<tr>
<td>Special order (@ $28/unit)</td>
<td>$0</td>
<td>$760,000</td>
</tr>
<tr>
<td>Less: Variable Costs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing (@$15/unit)</td>
<td>$300,000</td>
<td>$330,000</td>
</tr>
<tr>
<td>Marketing (@ $2/unit)</td>
<td>$40,000</td>
<td>$340,000</td>
</tr>
<tr>
<td>Contribution Margin</td>
<td>$420,000</td>
<td>$422,000</td>
</tr>
<tr>
<td>Less: Fixed Costs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>$240,000</td>
<td>$240,000</td>
</tr>
<tr>
<td>Marketing</td>
<td>$40,000</td>
<td>$40,000</td>
</tr>
<tr>
<td>One-Time Packing/Delivery</td>
<td>$0</td>
<td>$280,000</td>
</tr>
<tr>
<td>Operating Income</td>
<td>$140,000</td>
<td>$140,000</td>
</tr>
</tbody>
</table>

Note: Variable selling costs ($2/unit) are not incurred on the special sale units. Thus, if the special sales units are sold at $28.00 per unit, operating income is left unchanged.
5. There are both ethical and strategic issues for GGI. From a strategic view, GGI would suffer severe damage to its reputation if APAC were to have any problems with the purity of the special order. One of the reasons APAC has requested the special order from GGI is because of its reputation for quality. It is clear that GGI competes on differentiation, with quality being a critical success factor.

Also, there is an ethical issue. The use of a competitor’s materials would deceive APAC who is expecting the highest quality product from GGI.

To take into account both strategic and ethical issues, GGI should make it clear to APAC that it will need to fill a portion of the order from competitor’s stock. GGI might request that the shipment be delayed until it can provide the entire order from its own stock. Alternatively, it might offer to reduce the price, or to perform careful tests of its own on the competitor’s materials.
11-34 Special Order; ABC Costing

1. Total Fixed Manufacturing Cost and Breakdown into Components:

   Total fixed manufacturing costs are $12/unit × 20,000 units = $240,000:

   - Total batch-related costs ($8/unit × 20,000 units) = $160,000
   - Incremental costs ($5,000/batch × 20 batches) = $100,000
   - Non-incremental batch-related costs (plug figure) = $60,000
   - Facilities-related fixed overhead costs ($4/unit × 20,000 units) = $80,000
   - Total fixed manufacturing overhead cost = $240,000

2. No. of incremental batches, special order = (22,000-20,000)/1,000 =

   = [current capacity (in units) - current usage (in units)] ÷ 1,000 units/batch

   Relevant cost for the special order:
   - Variable manufacturing cost ($15/unit × 5,000 units) = $75,000
   - Incremental batch-related ovh costs (2 batches × $5,000/batch) = $10,000
   - One-time delivery cost = $2,000
   - CM on lost sales (opportunity cost):
     - Sales ($38/unit × 3,000 units) = $114,000
     - Less: variable costs ($15 + $2) × 3,000 units = $51,000
     - Less: cost for three batches (@$5,000 per batch) = $15,000
     - $48,000
   - Total relevant cost for the special order = $135,000

3. The total relevant cost of $135,000 is greater than the special order price of $125,000, so GGI should not accept the special order. If they did accept the order, operating profit would decline by $10,000 ($135,000 – $125,000).