CHAPTER 15
15-17 Single-rate method, budgeted versus actual costs and quantities.

1. a. Budgeted rate = \( \frac{\text{Budgeted indirect costs}}{\text{Budgeted trips}} = \frac{115,000}{50 \text{ trips}} = 2,300 \text{ per round-trip} \)

Indirect costs allocated to Dark C. Division = \( \text{2,300 per round-trip} \times 30 \text{ budgeted round trips} = 69,000 \)

Indirect costs allocated to Milk C. Division = \( \text{2,300 per round-trip} \times 20 \text{ budgeted round trips} = 46,000 \)

b. Budgeted rate = $2,300 per round-trip

Indirect costs allocated to Dark C. Division = \( \text{2,300 per round-trip} \times 30 \text{ actual round trips} = 69,000 \)

Indirect costs allocated to Milk C. Division = \( \text{2,300 per round-trip} \times 15 \text{ actual round trips} = 34,500 \)

c. Actual rate = \( \frac{\text{Actual indirect costs}}{\text{Actual trips}} = \frac{96,750}{45 \text{ trips}} = 2,150 \text{ per round-trip} \)

Indirect costs allocated to Dark C. Division = \( \text{2,150 per round-trip} \times 30 \text{ actual round trips} = 64,500 \)

Indirect costs allocated to Milk C. Division = \( \text{2,150 per round-trip} \times 15 \text{ actual round trips} = 32,250 \)

2. When budgeted rates/budgeted quantities are used, the Dark Chocolate and Milk Chocolate Divisions know at the start of 2013 that they will be charged a total of $69,000 and $46,000, respectively, for transportation. In effect, the fleet resource becomes a fixed cost for each division. Then, each may be motivated to over-use the trucking fleet, knowing that their 2013 transportation costs will not change.

When budgeted rates/actual quantities are used, the Dark Chocolate and Milk Chocolate Divisions know at the start of 2013 that they will be charged a rate of $2,300 per round trip, i.e., they know the price per unit of this resource. This enables them to make operating decisions knowing the rate they will have to pay for transportation. Each can still control its total transportation costs by minimizing the number of round trips it uses. Assuming that the budgeted rate was based on honest estimates of their annual usage, this method will also provide an estimate of the excess trucking capacity (the portion of fleet costs not charged to either division). In contrast, when actual costs/actual quantities are used, the two divisions must wait until year-end to know their transportation charges.

The use of actual costs/actual quantities makes the costs allocated to one division a function of the actual demand of other users. In 2013, the actual usage was 45 trips, which is 5 trips below the 50 trips budgeted. The Dark Chocolate Division used all the 30 trips it had
budgeted. The Milk Chocolate Division used only 15 of the 20 trips budgeted. When costs are allocated based on actual costs and actual quantities, the same fixed costs are spread over fewer trips resulting in a higher rate than if the Milk Chocolate Division had used its budgeted 20 trips. As a result, the Dark Chocolate Division bears a proportionately higher share of the fixed costs.

Using actual costs/actual rates also means that any efficiencies or inefficiencies of the trucking fleet get passed along to the user divisions. In general, this will have the effect of making the truck fleet less careful about its costs although, in 2013, it appears to have managed its costs well, leading to a lower actual cost per roundtrip relative to the budgeted cost per round trip.

For the reasons stated previously, of the three single-rate methods suggested in this problem, the budgeted rate and actual quantity may be the best one to use. (The management of Chocolate would have to ensure that the managers of the Dark Chocolate and Milk Chocolate divisions do not systematically overestimate their budgeted use of the fleet division in an effort to drive down the budgeted rate).

15-18 Dual-rate method, budgeted versus actual costs, and practical capacity versus actual quantities (continuation of 15-17).

1. Charges with dual rate method.

\[
\begin{align*}
\text{Variable indirect cost rate} & = \$1,350 \text{ per trip} \\
\text{Fixed indirect cost rate} & = \$47,500 \text{ budgeted costs/ 50 round trips budgeted} \\
& = \$950 \text{ per trip}
\end{align*}
\]

Dark Chocolate Division

\[
\begin{align*}
\text{Variable indirect costs,}\ 1,350 \times 30 & = \$40,500 \\
\text{Fixed indirect costs,}\ 950 \times 30 & = \$28,500 \\
\text{Fixed indirect costs,}\ 950 \times 30 & = \$69,000
\end{align*}
\]

Milk Chocolate Division

\[
\begin{align*}
\text{Variable indirect costs,}\ 1,350 \times 15 & = \$20,250 \\
\text{Fixed indirect costs,}\ 950 \times 20 & = \$19,000 \\
\text{Fixed indirect costs,}\ 950 \times 20 & = \$39,250
\end{align*}
\]

2. The dual rate changes how the fixed indirect cost component is treated. By using budgeted trips made, the Dark Chocolate Division is unaffected by changes from its own budgeted usage or that of other divisions. When budgeted rates and actual trips are used for allocation (see requirement 1.b. of problem 15-17), the Dark Chocolate Division is assigned the same $28,500 for fixed costs as under the dual-rate method because it made the same number of trips as budgeted. However, note that the Milk Chocolate Division is allocated $19,000 in fixed trucking costs under the dual-rate system, compared to $950 \times 15 actual trips = $14,250 when actual trips are used for allocation. As such, the Dark Chocolate Division is not made to appear disproportionately more expensive than the Milk Chocolate Division simply because the latter did not make the number of trips it budgeted at the start of the year.
15-19 Support department cost allocation; direct and step-down methods.

1. AS IS GOVT CORP
   
   a. Direct method costs $600,000 $2,400,000
      Alloc. of AS costs (40/75, 35/75) (600,000) $ 320,000 $ 280,000
      Alloc. of IS costs (30/90, 60/90) (2,400,000) 800,000 1,600,000
      $ 0 $ 0 $1,120,000 $1,880,000
   
   b. Step-down (AS first) costs $600,000 $2,400,000
      Alloc. of AS costs (0.25, 0.40, 0.35) (600,000) 150,000 $ 240,000 $ 210,000
      Alloc. of IS costs (30/90, 60/90) (2,550,000) 850,000 1,700,000
      $ 0 $ 0 $1,090,000 $1,910,000
   
   c. Step-down (IS first) costs $600,000 $2,400,000
      Alloc. of IS costs (0.10, 0.30, 0.60) 240,000 (2,400,000) $ 720,000 $1,440,000
      Alloc. of AS costs (40/75, 35/75) (840,000) 448,000 392,000
      $ 0 $ 0 $1,168,000 $1,832,000

2. GOVT CORP
   
   Direct method $1,120,000 $1,880,000
   Step-down (AS first) 1,090,000 1,910,000
   Step-down (IS first) 1,168,000 1,832,000

The direct method ignores any services to other support departments. The step-down method partially recognizes services to other support departments. The information systems support group (with total budget of $2,400,000) provides 10% of its services to the AS group. The AS support group (with total budget of $600,000) provides 25% of its services to the information systems support group. When the AS group is allocated first, a total of $2,550,000 is then assigned out from the IS group. Given CORP’s disproportionate (2:1) usage of the services of IS, this method then results in the highest overall allocation of costs to CORP. By contrast, GOVT’s usage of the AS group exceeds that of CORP (by a ratio of 8:7), and so GOVT is assigned relatively more in support costs when AS costs are assigned second, after they have already been incremented by the AS share of IS costs as well.
3. Three criteria that could determine the sequence in the step-down method are as follows:

   a. Allocate support departments on a ranking of the percentage of their total services provided to other support departments.
      1. Administrative Services 25%
      2. Information Systems 10%

   b. Allocate support departments on a ranking of the total dollar amount in the support departments.
      1. Information Systems $2,400,000
      2. Administrative Services $600,000

   c. Allocate support departments on a ranking of the dollar amounts of service provided to other support departments.
      1. Information Systems 
         \[(0.10 \times 2,400,000) = \$240,000\]
      2. Administrative Services 
         \[(0.25 \times 600,000) = \$150,000\]

The approach in (a) above typically better approximates the theoretically preferred reciprocal method. It results in a higher percentage of support-department costs provided to other support departments being incorporated into the step-down process than does (b) or (c), above.
15-21  Direct and step-down allocation. H-W

1. Support Departments Operating Departments
   HR  Info. Systems  Corporate  Consumer  Total
   Costs Incurred $72,700  $234,400  $ 998,270  $489,860  $1,795,230
   Alloc. of HR costs (42/70, 28/70) (72,700)  43,620  29,080
   Alloc. of Info. Syst. costs (1,920/3,520, 1,600/3,520) (234,400)  127,855  106,545
   $ 0  $ 0  $1,169,745  $625,485  $1,795,230

2. Rank on percentage of services rendered to other support departments.
   Step 1: HR provides 23.077% of its services to information systems:
   \[
   \frac{21}{42 + 28 + 21} = \frac{21}{91} = 23.077\%
   \]
   This 23.077% of $72,700 HR department costs is $16,777.
   Step 2: Information systems provides 8.333% of its services to HR:
   \[
   \frac{320}{1,920 + 1,600 + 320} = \frac{320}{3,840} = 8.333\%
   \]
   This 8.333% of $234,400 information systems department costs is $19,533.

3. An alternative ranking is based on the dollar amount of services rendered to other support departments. Using numbers from requirement 2, this approach would use the following sequence:
   Step 1: Allocate Information Systems first ($19,533 provided to HR).
   Step 2: Allocate HR second ($16,777 provided to Information Systems).
15-24 Allocation of common costs. H-W

In some print editions of the book, requirement 1 states the airfare to be $1,600. The airfare in requirement 1 should be $1,200 instead of $1,600.

1. Alternative approaches for the allocation of the $1,200 airfare include the following:
   a. The stand-alone cost allocation method. This method would allocate the air fare on the basis of each client’s percentage of the total of the individual stand-alone costs.

   \[
   \begin{align*}
   \text{Baltimore client} & \quad \frac{900}{(900 + 600)} \times 1,200 = 720 \\
   \text{Chicago client} & \quad \frac{600}{(900 + 600)} \times 1,200 = 480
   \end{align*}
   \]

   Advocates of this method often emphasize an equity or fairness rationale.

   b. The incremental cost allocation method. This requires the choice of a primary party and an incremental party.

   If the Baltimore client is the primary party, the allocation would be:

   \[
   \begin{align*}
   \text{Baltimore client} & \quad 900 \\
   \text{Chicago client} & \quad 300
   \end{align*}
   \]

   One rationale is that Richardson was planning to make the Baltimore trip, and the Chicago stop was added subsequently. Some students have suggested allocating as much as possible to the Baltimore client because Richardson had decided not to work for them.

   If the Chicago client is the primary party, the allocation would be:

   \[
   \begin{align*}
   \text{Chicago client} & \quad 600 \\
   \text{Baltimore client} & \quad 300
   \end{align*}
   \]

   One rationale is that the Chicago client is the one who is going to use Richardson’s services and, presumably, receives more benefits from the travel expenditures.

   c. Richardson could calculate the Shapley value that considers each client in turn as the primary party: The Baltimore client is allocated $900 as the primary party and $600 as the incremental party for an average of \((900 + 600) \div 2 = 750\). The Chicago client is allocated $600 as the primary party and $300 as the incremental party for an average of \((600 + 300) \div 2 = 450\). The Shapley value approach would allocate $750 to the Baltimore client and $450 to the Chicago client.
2. Richardson should use the Shapley value method. It is fairer than the incremental method because it avoids considering one party as the primary party and allocating more of the common costs to that party. It also avoids disputes about who is the primary party. It allocates costs in a manner that is close to the costs allocated under the stand-alone method but takes a more comprehensive view of the common cost allocation problem by considering primary and incremental users, which the stand-alone method ignores.

The Shapley value (or the stand-alone cost allocation method) would be the preferred methods if Richardson was to send the travel expenses to the Baltimore and Chicago clients before deciding which engagement to accept. Other factors such as whether to charge the Chicago client more because Richardson is accepting the Chicago engagement or the Baltimore client more because Richardson is not going to work for them can be considered if Richardson sends in her travel expenses after making her decision. However, each company would not want to be considered as the primary party and so is likely to object to these arguments.

3. A simple approach is to split the $60 equally between the two clients. The limousine costs at the Sacramento end are not a function of distance traveled on the plane.

An alternative approach is to add the $60 to the $1,200 and repeat requirement 1:

a. Stand-alone cost allocation method.

   \[
   \begin{align*}
   \text{Baltimore client} & \quad \frac{\$960}{(\$960+\$660)} \times \$1,260 = \$746.67 \\
   \text{Chicago client} & \quad \frac{\$660}{(\$960+\$660)} \times \$1,260 = \$513.33
   \end{align*}
   \]

b. Incremental cost allocation method.

   With Baltimore client as the primary party:
   \[
   \begin{align*}
   \text{Baltimore client} & \quad $960 \\
   \text{Chicago client} & \quad 300 \\
   \text{Total} & \quad $1,260
   \end{align*}
   \]

   With Chicago client as the primary party:
   \[
   \begin{align*}
   \text{Chicago client} & \quad $660 \\
   \text{Baltimore client} & \quad 600 \\
   \text{Total} & \quad $1,260
   \end{align*}
   \]

c. Shapley value.

   \[
   \begin{align*}
   \text{Baltimore client:} & \quad (\$960 + \$600) \div 2 = \$780 \\
   \text{Chicago client:} & \quad (\$300 + \$660) \div 2 = \$480
   \end{align*}
   \]

   As discussed in requirement 2, the Shapley value or the stand-alone cost allocation method would be the preferred approaches.
Note: If any students in the class have faced this situation when visiting prospective employers, ask them how they handled it.

15-25 Revenue allocation, bundled products.

1a. Under the stand-alone revenue-allocation method based on selling price, Him will be allocated 33.33% of all revenues, or $20 of the bundled selling price, and Her will be allocated 66.67% of all revenues, or $40 of the bundled selling price, as shown below.

<table>
<thead>
<tr>
<th>Stand-alone method, based on selling prices</th>
<th>Him</th>
<th>Her</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling price</td>
<td>$25</td>
<td>$50</td>
<td>$75</td>
</tr>
<tr>
<td>Selling price as a % of total</td>
<td>33.33%</td>
<td>66.67%</td>
<td>100%</td>
</tr>
<tr>
<td>($25 ÷ $75; $50 ÷ $75)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allocation of $60 bundled selling price</td>
<td>$20</td>
<td>$40</td>
<td>$60</td>
</tr>
<tr>
<td>(33.33% × $60; 66.67% × $60)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1b. Under the incremental revenue-allocation method, with Him ranked as the primary product, Him will be allocated $25 (its own stand-alone selling price), and Her will be allocated $35 of the $60 selling price, as shown below.

<table>
<thead>
<tr>
<th>Incremental Method (Him rank 1)</th>
<th>Him</th>
<th>Her</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling price</td>
<td>$25</td>
<td>$50</td>
</tr>
<tr>
<td>Allocation of $60 bundled selling price ($25; $35 = $60 – $25)</td>
<td>$25</td>
<td>$35</td>
</tr>
</tbody>
</table>

1c. Under the incremental revenue-allocation method, with Her ranked as the primary product, Her will be allocated $50 (its own stand-alone selling price) and Him will be allocated $10 of the $60 selling price, as shown below.

<table>
<thead>
<tr>
<th>Incremental Method (Her rank 1)</th>
<th>Him</th>
<th>Her</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling price</td>
<td>$25</td>
<td>$50</td>
</tr>
<tr>
<td>Allocation of $60 bundled selling price ($10 = $60 – $50; $50)</td>
<td>$10</td>
<td>$50</td>
</tr>
</tbody>
</table>

1d. Under the Shapley value method, each product will be allocated the average of its allocations in 1b and 1c, i.e., the average of its allocations when it is the primary product and when it is the secondary product, as shown below.
2. A summary of the allocations based on the four methods in requirement 1 is shown below.

<table>
<thead>
<tr>
<th></th>
<th>Stand-alone (Selling Prices)</th>
<th>Incremental (Him first)</th>
<th>Incremental (Her first)</th>
<th>Shapley</th>
</tr>
</thead>
<tbody>
<tr>
<td>Him</td>
<td>$20</td>
<td>$25</td>
<td>$10</td>
<td>$17.50</td>
</tr>
<tr>
<td>Her</td>
<td>40</td>
<td>35</td>
<td>50</td>
<td>42.50</td>
</tr>
<tr>
<td>Total for Sync</td>
<td>$60</td>
<td>$60</td>
<td>$60</td>
<td>$60.00</td>
</tr>
</tbody>
</table>

If there is no clear indication of which product is the more “important” product, or if it can be reasonably assumed that the two products are equally important to the company's strategy, the Shapley value method is the fairest of all the methods because it averages the effect of product rank. In this particular case, note that the allocations from the stand-alone method based on selling price are reasonably similar to the allocations from the Shapley value method, so the managers at Essence may well want to use the much simpler stand-alone method. The stand-alone method also does not require ranking the products in the suite, and so it is less likely to cause debates among product managers in the Men's and Women's Fragrance divisions. If, however, one of the products (Him or Her) is clearly the product that is driving sales of the bundled product, then that product should be considered the primary product or weighted more heavily (rather than equally) when applying the Shapley value method.