A management control system is a means of gathering and using information to aid and coordinate the planning and control decisions throughout an organization and to guide the behavior of its managers and employees. The goal of the system is to improve the collective decisions within an organization.

To be effective, management control systems should be (a) closely aligned to an organization's strategies and goals, (b) designed to support the organizational responsibilities of individual managers, and (c) able to motivate managers and employees to put in effort to attain selected goals desired by top management.

Motivation combines goal congruence and effort. Motivation is the desire to attain a selected goal specified by top management (the goal-congruence aspect) combined with the resulting pursuit of that goal (the effort aspect).

The chapter cites five benefits of decentralization:
1. Creates greater responsiveness to local needs
2. Leads to gains from faster decision making
3. Increases motivation of subunit managers
4. Assists management development and learning
5. Sharpens the focus of subunit managers

The chapter cites four costs of decentralization:
1. Leads to suboptimal decision making
2. Focuses managers’ attention on the subunit rather than the company as a whole
3. Increases costs of gathering information
4. Results in duplication of activities

No. Organizations typically compare the benefits and costs of decentralization on a function-by-function basis. For example, companies with highly decentralized operating divisions frequently have centralized income tax strategies.

A transfer price is the price one subunit of an organization charges for a product or service supplied to another subunit of the same organization. The two segments can be cost centers, profit centers, or investment centers. For example, the allocation of service department costs to production departments that are set up as either cost centers or investment centers is an example of transfer pricing.

The three general methods for determining transfer prices are:
1. Market-based transfer prices
2. Cost-based transfer prices
3. Hybrid transfer prices
Transfer prices should have the following properties. They should
1. promote goal congruence,
2. be useful for evaluating subunit performance,
3. motivate management effort, and
4. preserve a high level of subunit autonomy in decision making.

No, the chapter illustration demonstrates how division operating incomes differ dramatically under the variable-cost, full-cost, and market-price methods of transfer pricing.

Transferring products or services at market prices generally leads to optimal decisions when (a) the market for the intermediate product market is perfectly competitive, (b) interdependencies of subunits are minimal, and (c) there are no additional costs or benefits to the company as a whole from buying or selling in the external market instead of transacting internally.

One potential limitation of full-cost-based transfer prices is that they can lead to suboptimal decisions for the company as a whole. An example of a conflict between divisional action and overall company profitability resulting from an inappropriate transfer-pricing policy is buying products or services outside the company when it is beneficial to overall company profitability to source them internally. This situation often arises where full-cost-based transfer prices are used. This situation can make the fixed costs of the supplying division appear to be variable costs of the purchasing division. Another limitation is that the supplying division may not have sufficient incentives to control costs if the full-cost-based transfer price uses actual costs rather than standard costs.

The purchasing division sources externally if market prices are lower than full costs. From the viewpoint of the company as a whole, the purchasing division should source from outside only if market prices are less than variable costs of production, not full costs of production.

Reasons why a dual-pricing approach to transfer pricing is not widely used in practice include:
1. In this approach, the manager of the supplying division uses a cost-based method to record revenues and does not have sufficient incentives to control costs.
2. This approach does not provide clear signals to division managers about the level of decentralization top management wants.
3. This approach tends to insulate managers from the frictions of the marketplace because costs, not market prices, affect the revenues of the supplying division.
4. It leads to problems in computing the taxable income of subunits located in different tax jurisdictions.

Disagree. Cost and price information are often useful starting points in the negotiation process. Costs, particularly variable costs of the selling division, serve as a “floor” below which the selling division would be unwilling to sell. Prices that the buying division would pay to purchase products from the outside market serves as a “ceiling” above which the buying division would be unwilling to buy. The price negotiated by the two divisions will, in general, have no specific relationship to either costs or prices. But the negotiated price will generally fall between the variable costs-based floor and the market price-based ceiling.
Yes. The general transfer-pricing guideline specifies that the minimum transfer price equals the *incremental cost per unit* incurred up to the point of transfer *plus* the *opportunity cost per unit* to the supplying division. When the supplying division has idle capacity, its opportunity cost per unit is zero; when the supplying division has no idle capacity, its opportunity cost per unit is positive. Hence, the minimum transfer price will vary depending on whether the supplying division has idle capacity or not.

Alternative transfer-pricing methods can result in sizable differences in the reported operating income of divisions in different income tax jurisdictions. If these jurisdictions have different tax rates or deductions, the net income of the company as a whole is significantly affected by the choice of the transfer-pricing method.

**Evaluating management control systems, balanced scorecard.**

1. Correct answers may include any of the following:
   - Financial perspective – stock price, net income, return on investment, cash flow from operations, cost per visitor, gross margin percentage in retail venues
   - Customer perspective – percentage of repeat visitors, customer satisfaction, ratings by travel organizations, cleanliness ratings
   - Internal-business-process perspective – wait time and number of riders per hour for popular rides, accident-free days, downtime for repairs
   - Learning-and-growth perspective – employee satisfaction, return employees, training hours, absenteeism

2. Each manager would be concerned with management controls related specifically to their level of responsibility. Within the financial perspective, for example, the souvenir shop manager might be concerned with controlling gross margin percentage or inventory turnover, the theme park manager might be concerned with gate proceeds or cash flow from operations, and the CEO might be concerned with stock price or earnings per share. Within the customer perspective, the souvenir shop manager might be concerned with sales per customer, the theme park manager might be concerned with percentage of repeat visitors, and the CEO might be concerned with travel organization ratings across the entire group of parks.
22-17 (25 min.) **Cost centers, profit centers, decentralization.**

1. The Glass Department sends its product to the Wood and Metal Departments for finishing. The Glass Department does not negotiate internal prices. The Glass, Wood and Metal Departments are cost centers because they are only evaluated on output and cost control (cost variances).

2. The three departments are centralized because upper management dictates their production schedules.

3. A centralized department can be a profit center. Centralization relates to the degree of autonomy that a department has for decision making. This concept is independent of the type of responsibility center used to evaluate performance (for example the Glass Department could be a profit center if upper management chooses a transfer price for the glass transferred from the Glass to the Wood and Metal Departments). A department may be organized as a profit center but it will be centralized if it has little freedom in making decisions.

4. a) With these changes, Fenster will be moving toward a more decentralized environment because each department will have more local decision-making authority, such as the ability to set its own production schedule, buy and sell products in the external market, and negotiate transfer prices. These changes also make all three departments profit centers (rather than cost centers) because the managers of each department are responsible for both costs and revenues.

   b) I would recommend that upper management evaluate the three departments as profit centers because profits would be a good indicator of the performance of each department.
Benefits and costs of decentralization.

1. Health Source has a centralized structure. Individual managers have little autonomy in decision-making.

2. Harvest Moon has a decentralized structure. Store managers have significant autonomy. They are able to customize product offerings, negotiate purchases with local farmers, and can even influence store expansion decisions.

Benefits of a decentralized structure include: greater responsiveness to local needs and local opportunities, gains from faster decision making, increased motivation and personal commitment of store managers, and freedom of corporate managers to concentrate on strategic planning.

Costs of a decentralized structure include: potential for suboptimal decision making, shift of store managers’ focus away from company as a whole, increased cost of information gathering, and duplication of effort.

3. The stores in the Health Source chain would be considered profit centers. Store managers are responsible for store revenues and costs, and as such, would be evaluated based on operating income. Harvest Moon store managers would be considered investment center managers, as they also make, or at least influence, capital investment decisions. They would be evaluated based on return on investment or residual income.

4. Jackson must be attentive to the fact that Harvest Moon managers have enjoyed significant freedom to make decisions about their own stores. Jackson will need to carefully blend the two corporate cultures, and communicate to store managers that their input and efforts are valued. Bonuses and other rewards must be aligned with the corporation’s best interests. Specifically, Jackson should discourage price competition between stores and encourage cooperation among store managers. For example, store managers should be rewarded based on achieving both store-specific and corporate-wide profitability goals.
Multinational transfer pricing, effect of alternative transfer-pricing methods, global income tax minimization.

1. This is a three-country, three-division transfer-pricing problem with three alternative transfer-pricing methods. Summary data in U.S. dollars are:

**China Plant**
- Variable costs: $900 Yuan ÷ 9 Yuan per $ = $100 per subunit
- Fixed costs: $1,980 Yuan ÷ 9 Yuan per $ = $220 per subunit

**South Korea Plant**
- Variable costs: $350,000 Won ÷ 1,000 Won per $ = $350 per unit
- Fixed costs: $470,000 Won ÷ 1,000 Won per $ = $470 per unit

**U.S. Plant**
- Variable costs: $125 per unit
- Fixed costs: $325 per unit

Market prices for private-label sale alternatives:
- China Plant: $4,500 Yuan ÷ 9 Yuan per $ = $500 per subunit
- South Korea Plant: $1,340,000 Won ÷ 1,000 Won per $ = $1,340 per unit

The transfer prices under each method are:

a. Market price
   - China to South Korea = $500 per subunit
   - South Korea to U.S. Plant = $1,340 per unit

b. 200% of full costs
   - China to South Korea:
     $2.0 \times ($100 + $220) = $640 per subunit
   - South Korea to U.S. Plant:
     $2.0 \times ($640 + $350 + $470) = $2,920 per unit

c. 350% of variable costs
   - China to South Korea:
     $3.5 \times $100 = $350 per subunit
   - South Korea to U.S. Plant:
     $3.5 \times ($350 + $350) = $2,450 per unit
<table>
<thead>
<tr>
<th>Method A</th>
<th>Method B</th>
<th>Method C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Transfers at Market Price</td>
<td>Internal Transfers at 200% of Full Costs</td>
<td>Internal Transfers at 350% of Variable Costs</td>
</tr>
</tbody>
</table>

1. China Division

<table>
<thead>
<tr>
<th>Division revenue per unit</th>
<th>$ 500</th>
<th>$ 640</th>
<th>$ 350</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per unit:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division variable cost per unit</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Division fixed cost per unit</td>
<td>220</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td>Total division cost per unit</td>
<td>320</td>
<td>320</td>
<td>320</td>
</tr>
<tr>
<td>Division operating income per unit</td>
<td>180</td>
<td>320</td>
<td>30</td>
</tr>
<tr>
<td>Income tax at 40%</td>
<td>72</td>
<td>128</td>
<td>12</td>
</tr>
<tr>
<td>Division net income per unit</td>
<td>$ 108</td>
<td>$ 192</td>
<td>$ 18</td>
</tr>
</tbody>
</table>

2. South Korea Division

<table>
<thead>
<tr>
<th>Division revenue per unit</th>
<th>$1,340</th>
<th>$2,920</th>
<th>$2,450</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per unit:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transferred-in cost per unit</td>
<td>500</td>
<td>640</td>
<td>350</td>
</tr>
<tr>
<td>Division variable cost per unit</td>
<td>350</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>Division fixed cost per unit</td>
<td>470</td>
<td>470</td>
<td>470</td>
</tr>
<tr>
<td>Total division cost per unit</td>
<td>1,320</td>
<td>1,460</td>
<td>1,170</td>
</tr>
<tr>
<td>Division operating income per unit</td>
<td>20</td>
<td>1,460</td>
<td>1,280</td>
</tr>
<tr>
<td>Income tax at 20%</td>
<td>4</td>
<td>292</td>
<td>256</td>
</tr>
<tr>
<td>Division net income per unit</td>
<td>$ 16</td>
<td>$1,168</td>
<td>$1,024</td>
</tr>
</tbody>
</table>

3. United States Division

<table>
<thead>
<tr>
<th>Division revenue per unit</th>
<th>$3,800</th>
<th>$3,800</th>
<th>$3,800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per unit:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transferred-in cost per unit</td>
<td>1,340</td>
<td>2,920</td>
<td>2,450</td>
</tr>
<tr>
<td>Division variable cost per unit</td>
<td>125</td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td>Division fixed cost per unit</td>
<td>325</td>
<td>325</td>
<td>325</td>
</tr>
<tr>
<td>Total division cost per unit</td>
<td>1,790</td>
<td>3,370</td>
<td>2,900</td>
</tr>
<tr>
<td>Division operating income per unit</td>
<td>2,010</td>
<td>430</td>
<td>900</td>
</tr>
<tr>
<td>Income tax at 30%</td>
<td>603</td>
<td>129</td>
<td>270</td>
</tr>
<tr>
<td>Division net income per unit</td>
<td>$1,407</td>
<td>$ 301</td>
<td>$ 630</td>
</tr>
</tbody>
</table>

2. Division net income:

<table>
<thead>
<tr>
<th></th>
<th>Market Price</th>
<th>200% of Full Costs</th>
<th>350% of Variable Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>China Division</td>
<td>$ 108</td>
<td>$ 192</td>
<td>$ 18</td>
</tr>
<tr>
<td>South Korea Division</td>
<td>16</td>
<td>1,168</td>
<td>1,024</td>
</tr>
<tr>
<td>U.S. Division</td>
<td>1,407</td>
<td>301</td>
<td>630</td>
</tr>
<tr>
<td>Tech Friendly Computer, Inc.</td>
<td>$1,531</td>
<td>$1,661</td>
<td>$1,672</td>
</tr>
</tbody>
</table>

Tech Friendly will maximize its net income by using the third method, 350% of variable costs, as the transfer price. This is because this method sources relatively little income in China, the country with the highest income tax rate.
22-20  (30 min.)  Transfer-pricing methods, goal congruence.

1.  Alternative 1:  Sell as raw lumber for $200 per 100 board feet:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>$200</td>
</tr>
<tr>
<td>Variable costs</td>
<td>100</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$100 per 100 board feet</td>
</tr>
</tbody>
</table>

Alternative 2:  Sell as finished lumber for $275 per 100 board feet:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>$275</td>
</tr>
<tr>
<td>Variable costs:</td>
<td></td>
</tr>
<tr>
<td>Raw lumber</td>
<td>$100</td>
</tr>
<tr>
<td>Finished lumber</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>225</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$50 per 100 board feet</td>
</tr>
</tbody>
</table>

British Columbia Lumber will maximize its total contribution margin by selling lumber in its raw form.

An alternative approach is to examine the incremental revenues and incremental costs in the Finished Lumber Division:

| Incremental revenues, $275 – $200 | $  75 |
| Incremental costs               | 125   |
| Incremental loss                |  $ (50) per 100 board feet |

2.  Transfer price at 110% of variable costs:

\[ = $100 + ($100 \times 0.10) \]
\[ = $110 per 100 board feet \]

<table>
<thead>
<tr>
<th></th>
<th>Sell as Raw Lumber</th>
<th>Sell as Finished Lumber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Lumber Division</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division revenues</td>
<td>$200</td>
<td>$110</td>
</tr>
<tr>
<td>Division variable costs</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Division operating income</td>
<td>$100</td>
<td>$  10</td>
</tr>
<tr>
<td>Finished Lumber Division</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division revenues</td>
<td>$ 0</td>
<td>$275</td>
</tr>
<tr>
<td>Transferred-in costs</td>
<td>—</td>
<td>110</td>
</tr>
<tr>
<td>Division variable costs</td>
<td>—</td>
<td>125</td>
</tr>
<tr>
<td>Division operating income</td>
<td>$ 0</td>
<td>$  40</td>
</tr>
</tbody>
</table>

The Raw Lumber Division will maximize reported division operating income by selling raw lumber, which is the action preferred by the company as a whole. The Finished Lumber Division will maximize division operating income by selling finished lumber, which is contrary to the action preferred by the company as a whole.
3. Transfer price at market price = $200 per 100 board feet.

<table>
<thead>
<tr>
<th></th>
<th>Sell as Raw Lumber</th>
<th>Sell as Finished Lumber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Lumber Division</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division revenues</td>
<td>$200</td>
<td>$200</td>
</tr>
<tr>
<td>Division variable costs</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Division operating income</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td>Finished Lumber Division</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division revenues</td>
<td>0</td>
<td>275</td>
</tr>
<tr>
<td>Transferred-in costs</td>
<td>—</td>
<td>200</td>
</tr>
<tr>
<td>Division variable costs</td>
<td>—</td>
<td>125</td>
</tr>
<tr>
<td>Division operating income</td>
<td>0</td>
<td>(50)</td>
</tr>
</tbody>
</table>

Since the Raw Lumber Division will be indifferent between selling the lumber in raw or finished form, it would be willing to maximize division operating income by selling raw lumber, which is the action preferred by the company as a whole. The Finished Lumber Division will maximize division operating income by not further processing raw lumber and this is preferred by the company as a whole. Thus, transfer at market price will result in division actions that are also in the best interest of the company as a whole.
Effect of alternative transfer-pricing methods on division operating income.

<table>
<thead>
<tr>
<th></th>
<th>Method A</th>
<th>Method B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Internal Transfers</td>
<td>Internal Transfers at 110% of Full Costs</td>
</tr>
<tr>
<td><strong>Mining Division</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Revenues:</strong></td>
<td>$90 × 200,000 units</td>
<td>$66 × 200,000 units</td>
</tr>
<tr>
<td><strong>Costs:</strong></td>
<td>$52 × 200,000 units</td>
<td>$8 × 200,000 units</td>
</tr>
<tr>
<td><strong>Division operating income</strong></td>
<td>$10,400,000</td>
<td>$1,600,000</td>
</tr>
</tbody>
</table>

| **Metals Division** |          |          |
| **Revenues:**       | $150 × 200,000 units | $60 × 200,000 units |
| **Costs:**          | $90 × 200,000 units | $66 × 200,000 units |
| **Division operating income** | $7,200,000 | $300,000,000 |

1. $66 = Full manufacturing cost per unit in the Mining Division, $60 × 110%
2. Variable cost per unit in Mining Division = Direct materials + Direct manufacturing labor + 75% of manufacturing overhead = $12 + $16 + (75% × $32) = $52
3. Fixed cost per unit = 25% of manufacturing overhead = 25% × $32 = $8
4. Variable cost per unit in Metals Division = Direct materials + Direct manufacturing labor + 40% of manufacturing overhead = $6 + $20 + (40% × $25) = $36
5. Fixed cost per unit in Metals Division = 60% of manufacturing overhead = 60% × $25 = $15
2. Bonus paid to division managers at 1% of division operating income will be as follows:

<table>
<thead>
<tr>
<th></th>
<th>Method A</th>
<th>Method B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Internal Transfers</td>
<td>Internal Transfers at</td>
</tr>
<tr>
<td></td>
<td>at Market Prices</td>
<td>110% of Full Costs</td>
</tr>
<tr>
<td>Mining Division</td>
<td></td>
<td></td>
</tr>
<tr>
<td>manager’s bonus</td>
<td>(1% × $6,000,000; 1% × $1,200,000)</td>
<td>$60,000 $12,000</td>
</tr>
<tr>
<td>Metals Division</td>
<td></td>
<td></td>
</tr>
<tr>
<td>manager’s bonus</td>
<td>(1% × $1,800,000; 1% × $6,600,000)</td>
<td>18,000 66,000</td>
</tr>
</tbody>
</table>

The Mining Division manager will prefer Method A (transfer at market prices) because this method gives $60,000 of bonus rather than $12,000 under Method B (transfers at 110% of full costs). The Metals Division manager will prefer Method B because this method gives $66,000 of bonus rather than $18,000 under Method A.

3. Brian Jones, the manager of the Mining Division, will appeal to the existence of a competitive market to price transfers at market prices. Using market prices for transfers in these conditions leads to goal congruence. Division managers acting in their own best interests make decisions that are also in the best interests of the company as a whole.

Jones will further argue that setting transfer prices based on cost will cause Jones to pay no attention to controlling costs since all costs incurred will be recovered from the Metals Division at 110% of full costs.
22-22  (30 min.) Transfer pricing, general guideline, goal congruence.

1. Using the general guideline presented in the chapter, the minimum price at which the Airbag Division would sell airbags to the Vivo Division is $90, the incremental costs. The Airbag Division has idle capacity (it is currently working at 80% of capacity). Therefore, its opportunity cost is zero—the Airbag Division does not forgo any external sales and as a result, does not forgo any contribution margin from internal transfers. Transferring airbags at incremental cost achieves goal congruence.

2. Transferring products internally at incremental cost has the following properties:
   a. Achieves goal congruence—Yes, as described in requirement 1 above.
   b. Useful for evaluating division performance—No, because this transfer price does not cover or exceed full costs. By transferring at incremental costs and not covering fixed costs, the Airbag Division will show a loss. This loss, the result of the incremental cost-based transfer price, is not a good measure of the economic performance of the subunit.
   c. Motivating management effort—Yes, if based on budgeted costs (actual costs can then be compared to budgeted costs). If, however, transfers are based on actual costs, Airbag Division management has little incentive to control costs.
   d. Preserves division autonomy—No. Because it is rule-based, the Airbag Division has no say in the setting of the transfer price.

3. If the two divisions were to negotiate a transfer price, the range of possible transfer prices will be between $90 and $125 per unit. The Airbag Division has excess capacity that it can use to supply airbags to the Vivo Division. The Airbag Division will be willing to supply the airbags only if the transfer price equals or exceeds $90, its incremental costs of manufacturing the airbags. The Vivo Division will be willing to buy airbags from the Airbag Division only if the price does not exceed $125 per airbag, the price at which the Vivo division can buy airbags in the market from external suppliers. Within the price range of $90 and $125, each division will be willing to transact with the other and maximize overall income of Quest Motors. The exact transfer price between $90 and $125 will depend on the bargaining strengths of the two divisions. The negotiated transfer price has the following properties.
   a. Achieves goal congruence—Yes, as described above.
   b. Useful for evaluating division performance—Yes, because the transfer price is the result of direct negotiations between the two divisions. Of course, the transfer prices will be affected by the bargaining strengths of the two divisions.
   c. Motivating management effort—Yes, because once negotiated, the transfer price is independent of actual costs of the Airbag Division. Airbag Division management has every incentive to manage efficiently to improve profits.
   d. Preserves subunit autonomy—Yes, because the transfer price is based on direct negotiations between the two divisions and is not specified by headquarters on the basis of some rule (such as Airbag Division’s incremental costs).

4. Since the range of possible transfer prices is between $90 and $125 per unit, a “split the difference” hybrid solution would lead to a transfer price of \((\$90 + \$125)/2 = \$107.50\).
22-23 (25 min.) Multinational transfer pricing, global tax minimization.

1. Solution Exhibit 22-23 shows the after-tax operating incomes earned by the U.S. and Austrian divisions from transferring 10,000 units of Product 4A36 using (a) full manufacturing cost per unit, and (b) market price of comparable imports as transfer prices.

2. There are many ways to proceed, but the first thing to note is that the transfer price that minimizes the total of company import duties and income taxes will be either the full manufacturing cost or the market price of comparable imports.

   Consider what happens every time the transfer price is increased by $1 over, say, the full manufacturing cost of $800. This results in the following change for each unit:

   a. an increase in U.S. taxes of 35% × $1 = $0.35
   b. an increase in import duties paid in Austria, 15% × $1 = 0.15
   c. a decrease in Austrian taxes of 40% × $1.15
      (the $1 increase in transfer price + $0.15 paid by way of import duty)
      Net effect is an increase in import duty and tax payments of: (0.46)
      Net effect is an increase in import duty and tax payments of: $0.04

   To verify this solution, note that if the transfer price changes from $800 to $950, the net effect is an increase in import duty and tax payments of ($950 - $800) × $0.04 = $6 per unit. Across 10,000 units, this implies a decrease in total profits of (10,000) × $6 = $60,000, which corresponds exactly to the $60,000 difference in total after-tax operating incomes documented in Solution Exhibit 22-23.

   Hence, Mornay Company will minimize import duties and income taxes by setting the transfer price at its minimum level of $800, the full manufacturing cost.
### SOLUTION EXHIBIT 22-23

Division Incomes of U.S. and Austrian Divisions from Transferring 10,000 Units of Product

<table>
<thead>
<tr>
<th></th>
<th>Method A</th>
<th>Method B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Internal Transfers</td>
<td>Internal Transfers</td>
</tr>
<tr>
<td></td>
<td>at Full Manufacturing Cost</td>
<td>at Market Price</td>
</tr>
<tr>
<td><strong>U.S. Division</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenues:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$800, $950 \times 10,000 units</td>
<td>$8,000,000</td>
<td>$9,500,000</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full manufacturing cost:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$800 \times 10,000 units</td>
<td>8,000,000</td>
<td>8,000,000</td>
</tr>
<tr>
<td>Division operating income</td>
<td>0</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Division income taxes at 35%</td>
<td>0</td>
<td>525,000</td>
</tr>
<tr>
<td>Division after-tax operating income</td>
<td>$0</td>
<td>$975,000</td>
</tr>
<tr>
<td><strong>Austrian Division</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenues:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$1,150 \times 10,000 units</td>
<td>$11,500,000</td>
<td>$11,500,000</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transferred-in costs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$800 \times 10,000, $950 \times 10,000 units</td>
<td>8,000,000</td>
<td>9,500,000</td>
</tr>
<tr>
<td>Import duties at 15% of transferred-in price</td>
<td>1,200,000</td>
<td>1,425,000</td>
</tr>
<tr>
<td>$120 \times 10,000, $142.50 \times 10,000 units</td>
<td>9,200,000</td>
<td>10,925,000</td>
</tr>
<tr>
<td>Total division costs</td>
<td>2,300,000</td>
<td>575,000</td>
</tr>
<tr>
<td>Division operating income</td>
<td>920,000</td>
<td>230,000</td>
</tr>
<tr>
<td>Division income taxes at 40%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division after-tax operating income</td>
<td>$1,380,000</td>
<td>$345,000</td>
</tr>
<tr>
<td>Sum of divisional after-tax operating incomes</td>
<td>$1,380,000</td>
<td>$1,320,000</td>
</tr>
</tbody>
</table>
**22-24 (30 min.) Multinational transfer pricing, goal congruence (continuation of 22-23).**

1. After-tax operating income if Mornay Company sells all 10,000 units of Product 4A36 in the United States:

   - Revenues, $900 × 10,000 units = $9,000,000
   - Full manufacturing costs, $800 × 10,000 units = $8,000,000
   - Operating income = $1,000,000
   - Income taxes at 35% = $350,000
   - After-tax operating income = $650,000

   From Exercise 22-23, requirement 1, Mornay Company’s after-tax operating income if it transfers 10,000 units of Product 4A36 to Austria at full manufacturing cost and sells the units in Austria is $1,380,000. Therefore, Mornay should sell the 10,000 units in Austria.

2. Transferring Product 4A36 at the full manufacturing cost of the U.S. Division minimizes import duties and taxes (Exercise 22-23, requirement 2), but creates zero operating income for the U.S. Division. Acting autonomously, the U.S. Division manager would maximize division operating income by selling Product 4A36 in the U.S. market, which results in $650,000 in after-tax division operating income as calculated in requirement 1, rather than by transferring Product 4A36 to the Austrian division at full manufacturing cost. Thus, the transfer price calculated in requirement 2 of Exercise 22-23 will not result in actions that are optimal for Mornay Company as a whole.

3. The minimum transfer price at which the U.S. division manager acting autonomously will agree to transfer Product 4A36 to the Austrian division is $900 per unit. Any transfer price less than $900 will leave the U.S. Division's performance worse than selling directly in the U.S. market. Because the U.S. Division can sell as many units as it makes of Product 4A36 in the U.S. market, there is an opportunity cost of transferring the product internally equal to $350 (selling price $900 − variable manufacturing costs, $550).

   \[
   \text{Minimum transfer price per unit} = \text{Incremental cost per unit up to the point of transfer} + \text{Opportunity cost per unit to the selling division (U. S.)}
   \]

   \[
   = \$550 + \$350 = \$900
   \]

   This transfer price will result in Mornay Company as a whole paying more import duties and taxes than the answer to Exercise 22-23, requirement 2, as calculated below:

   **U.S. Division**

   - Revenues, $900 × 10,000 units = $9,000,000
   - Full manufacturing costs = $8,000,000
   - Division operating income = $1,000,000
   - Division income taxes at 35% = $350,000
   - Division after-tax operating income = $650,000
Austrian Division
Revenues, $1,150 × 10,000 units’ $11,500,000
Transferred in costs, $900 × 10,000 units 9,000,000
Import duties at 15% of transferred-in price,
   $135 × 10,000 units 1,350,000
Division operating income 1,150,000
Division income taxes at 40% 460,000
Division after-tax operating income $ 690,000

Total import duties and income taxes at transfer prices of $800 and $900 per unit for 10,000 units of Product 4A36 follow:

<table>
<thead>
<tr>
<th>Transfer Price of</th>
<th>Transfer Price of</th>
</tr>
</thead>
<tbody>
<tr>
<td>$800 per Unit</td>
<td>$900 per Unit</td>
</tr>
<tr>
<td>(Exercise 22-23,</td>
<td>(Exercise 22-23,</td>
</tr>
<tr>
<td>Requirement 2)</td>
<td>Requirement 2)</td>
</tr>
</tbody>
</table>

(a) U.S. income taxes $ 0 $ 350,000
(b) Austrian import duties 1,200,000 1,350,000
(c) Austrian income taxes 920,000 460,000

$2,120,000 $2,160,000

The minimum transfer price that the U.S. division manager acting autonomously would agree to results in Mornay Company paying $40,000 in additional import duties and income taxes.

A student who has done the calculations shown in Exercise 22-23, requirement 2, can calculate the additional taxes from a $900 transfer price more directly, as follows:

Every $1 increase in the transfer price per unit over $800 results in additional import duty and taxes of $0.04 per unit
So, a $100 increase ($900 – $800) per unit will result in additional import duty and taxes of $0.04 × 100 = $4.00
For 10,000 units transferred, this equals $4.00 × 10,000 = $40,000
**Transfer-pricing dispute.**

This problem is similar to the Problem for Self-Study in the chapter.

1. **Company as a whole will not benefit if Division C purchases from external suppliers:**
   - Purchase costs paid to external suppliers, 1,000 units × $135 = $135,000
   - Deduct: Savings in variable costs by reducing Division A output, 1,000 units × $120 = 120,000
   - Net cost (benefit) to company as a whole as a result of purchasing from external suppliers = $15,000

   Any transfer price between $120 and $135 per unit will achieve goal congruence. Division managers acting in their own best interests will take actions that are in the best interests of the company as a whole.

2. **Company as a whole will benefit if Division C purchases from external suppliers:**
   - Purchase costs paid to external suppliers, 1,000 units × $135 = $135,000
   - Deduct: Savings in variable costs, 1,000 units × $120 = 120,000
   - Savings due to A’s equipment and facilities assigned to other operations = 18,000
   - Net cost (benefit) to company as a whole as a result of purchasing from external suppliers = $ (3,000)

   Division C should purchase from external suppliers.

3. **Company as a whole will benefit if Division C purchases from external suppliers:**
   - Purchase costs paid to external suppliers, 1,000 units × $115 = $115,000
   - Deduct: Savings in variable costs by reducing Division A output, 1,000 units × $120 = 120,000
   - Net cost (benefit) to company as a whole as a result of purchasing from external suppliers = $ (5,000)

   The three requirements are summarized below (in thousands):

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase costs paid to external suppliers</td>
<td>$135</td>
<td>$135</td>
<td>$115</td>
</tr>
<tr>
<td>Relevant costs if purchased from Division A:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incremental (outlay) costs if purchased from Division A</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Opportunity costs if purchased from Division A</td>
<td>–</td>
<td>18</td>
<td>–</td>
</tr>
<tr>
<td>Total relevant costs if purchased from Division A</td>
<td>120</td>
<td>138</td>
<td>120</td>
</tr>
<tr>
<td>Operating income advantage (disadvantage) to company as a result of purchasing from Division A</td>
<td>$ 15</td>
<td>$(3)</td>
<td>$(5)</td>
</tr>
</tbody>
</table>

   Goal congruence would be achieved if the transfer price is set equal to the total relevant costs of purchasing from Division A.
22-26 (5 min.) Transfer-pricing problem (continuation of 22-25).

The company as a whole would benefit in this situation if Division C purchased from external suppliers. The $15,000 disadvantage to the company as a whole as a result of purchasing from external suppliers would be more than offset by the $30,000 contribution margin of Division A’s sale of 1,000 units to other customers:

\[
\begin{align*}
\text{Purchase costs paid to external suppliers, 1,000 units} \times \$135 &= \$135,000 \\
\text{Deduct variable cost savings, 1,000 units} \times \$120 &= 120,000 \\
\text{Net cost to the company as a result of purchasing from external suppliers} &= \$15,000 \\
\text{Division A’s sales to other customers, 1,000 units} \times \$155 &= \$155,000 \\
\text{Deduct:} \\
\text{Variable manufacturing costs, } $120 \times 1,000 \text{ units} &= \$120,000 \\
\text{Variable marketing costs, } $5 \times 1,000 \text{ units} &= 5,000 \\
\text{Total variable costs} &= 125,000 \\
\text{Contribution margin from selling units to other customers} &= \$30,000
\end{align*}
\]
General guideline, transfer pricing.

1. The minimum transfer price that the SD would demand from the AD is the net price it could obtain from selling its screens on the outside market: $100 minus $8 marketing and distribution cost per screen, or $92 per screen. The SD is operating at capacity. The incremental cost of manufacturing each screen is $65. Therefore, the opportunity cost of selling a screen to the AD is the contribution margin the SD would forego by transferring the screen internally instead of selling it on the outside market.

\[
\text{Contribution margin per screen} = \$92 - \$65 = \$27
\]

Using the general guideline,

\[
\text{Minimum transfer price per screen} = \text{Incremental cost per screen incurred up to the point of transfer} + \text{Opportunity cost per screen to the selling division}
\]

\[
= \$65 + \$27 = \$92
\]

2. The maximum transfer price the AD manager would be willing to offer SD is its own total cost for purchasing from outside, $100 plus $7 per screen, or $107 per screen.

3a. If the SD has excess capacity (relative to what the outside market can absorb), the minimum transfer price using the general guideline is: for the first 6,000 units (or 30% of output), $65 per screen because opportunity cost is zero; for the remaining 14,000 units (or 70% of output), $92 per screen because opportunity cost is $27 per screen.

3b. From the point of view of Slate’s management, all of the SD’s output should be transferred to the AD. This would avoid the $7 per screen variable purchasing cost that is incurred by the AD when it purchases screens from the outside market and it would also save the $8 marketing and distribution cost the SD would incur to sell each screen to the outside market.

3c. If the managers of the AD and the SD could negotiate the transfer price, they would settle on a price between the minimum transfer price the SD will accept (from requirement 3a) and $107 per screen (the maximum transfer price the AD would be willing to pay). Any price in this range would be acceptable to both divisions for all of the SD’s output, and would also be optimal from Slate’s point of view. This would obviously apply to the “split the difference” price as well. When the SD has excess capacity, this rule would suggest a price of \(\frac{\$65 + \$107}{2} = \$86\); for the other 70% of output that SD can sell externally, the rule indicates a price of \(\frac{\$92 + \$107}{2} = \$99.5\). From a practical standpoint, note that the latter price also works when SD has excess capacity; as a result, the firm might prefer it as a stable benchmark price, keeping in mind of course that it credits SD with too high a profit even at times of unused capacity.
This problem explores the “general transfer-pricing guideline” discussed in the chapter.

1. No, transfers should not be made to Division B if there is no unused capacity in Division A. An incremental (outlay) cost approach shows a positive contribution for the company as a whole:

\[
\begin{align*}
\text{Selling price of final product} & \quad \$300 \\
\text{Incremental cost per unit in Division A} & \quad \$120 \\
\text{Incremental cost per unit in Division B} & \quad 150 \quad 270 \\
\text{Contribution margin per unit} & \quad \$30
\end{align*}
\]

However, if there is no excess capacity in Division A, any transfer will result in diverting products from the market for the intermediate product. Sales in this market result in a greater contribution for the company as a whole. Division B should not assemble the bicycle since the incremental revenue Europa can earn, $100 per unit ($300 from selling the final product – $200 from selling the intermediate product) is less than the incremental cost of $150 to assemble the bicycle in Division B. Alternatively, Europa’s contribution margin from selling the intermediate product exceeds Europa’s contribution margin from selling the final product:

\[
\begin{align*}
\text{Selling price of intermediate product} & \quad \$200 \\
\text{Incremental (outlay) cost per unit in Division A} & \quad 120 \\
\text{Contribution margin per unit} & \quad \$80
\end{align*}
\]

Using the general guideline described in the chapter,

\[
\begin{align*}
\text{Minimum transfer price} & = \left( \frac{\text{Additional incremental cost per unit incurred up to the point of transfer}}{\text{Opportunity cost per unit to the supplying division}} \right) + (\text{Opportunity cost per unit to the supplying division}) \\
& = \$120 + (\$200 - \$120) \\
& = \$200, \text{ which is the market price}
\end{align*}
\]

The market price is the transfer price that leads to the correct decision; that is, do not transfer to Division B unless there are extenuating circumstances for continuing to market the final product. Therefore, Division B must either drop the product or reduce the incremental costs of assembly from $150 per bicycle to less than $100 (selling price, $300 – transfer price, $200).
2. If (a) A has excess capacity, (b) there is intermediate external demand for only 800 units at $200, and (c) the $200 price is to be maintained, then the opportunity costs per unit to the supplying division are $0. The general guideline indicates a minimum transfer price of: $120 + $0 = $120, which is the incremental or outlay costs for the first 200 units. B would buy 200 units from A at a transfer price of $120 because B can earn a contribution of $30 per unit [$300 – ($120 + $150)]. In fact, B would be willing to buy units from A at any price up to $150 per unit because any transfers at a price of up to $150 will still yield B a positive contribution margin.

Note, however, that if B wants more than 200 units, the minimum transfer price will be $200 as computed in requirement 1 because A will incur an opportunity cost in the form of lost contribution of $80 (market price, $200 – outlay costs of $120) for every unit above 200 units that are transferred to B.

The following schedule summarizes the transfer prices for units transferred from A to B:

<table>
<thead>
<tr>
<th>Units</th>
<th>Transfer Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–200</td>
<td>$120–$150</td>
</tr>
<tr>
<td>200–1,000</td>
<td>$200</td>
</tr>
</tbody>
</table>

For an exploration of this situation when imperfect markets exist, see the next problem.

3. Division B would show zero contribution, but the company as a whole would generate a contribution of $30 per unit on the 200 units transferred. Any price between $120 and $150 would induce the transfer that would be desirable for the company as a whole. A motivational problem may arise regarding how to split the $30 contribution between Division A and B. Unless the price is below $150, B would have little incentive to buy.

*Note:* The transfer price that may appear optimal in an economic analysis may, in fact, be totally unacceptable from the viewpoints of (1) preserving autonomy of the managers, and (2) evaluating the performance of the divisions as economic units. For instance, consider the simplest case discussed previously, where there is idle capacity and the $200 intermediate price is to be maintained. To direct that A should sell to B at A’s variable cost of $120 may be desirable from the viewpoint of B and the company as a whole. However, the autonomy (independence) of the manager of A is eroded. Division A will earn nothing, although it could argue that it is contributing to the earning of income on the final product.

If the manager of A wants a portion of the total company contribution of $30 per unit, the question is: How is an appropriate amount determined? This is a difficult question in practice. The price can be negotiated upward to somewhere between $120 and $150 so that some “equitable” split is achieved. A dual transfer-pricing scheme has also been suggested, whereby the supplier gets credit for the full intermediate market price and the buyer is charged with only variable or incremental costs. In any event, when there is heavy interdependence between divisions, such as in this case, some system of subsidies may be needed to deal with the three problems of goal congruence, management effort, and subunit autonomy. Of course, where heavy subsidies are needed, a question can be raised as to whether the existing degree of decentralization is optimal.
22-29 (30–40 min.) Pricing in imperfect markets (continuation of 22-28).

An alternative presentation, which contains the same numerical answers, can be found at the end of this solution.

1. Potential contribution from external intermediate sale is
   \[ 1,000 \times (\$195 - \$120) \] $75,000

Contribution through keeping price at $200 is
   \[ 800 \times \$80. \] $64,000

Forgone contribution by transferring 200 units
   \[ \$11,000 \] $11,000

Opportunity cost per unit to the supplying division by transferring internally:
   \[ \frac{\$11,000}{200} = \$55 \]

Transfer price = $120 + $55 = $175

An alternative approach to obtaining the same answer is to recognize that the incremental or outlay cost is the same for all 1,000 units in question. Therefore, the total revenue desired by A would be the same for selling outside or inside.

Let X equal the transfer price at which Division A is indifferent between selling all units outside versus transferring 200 units inside.

\[ 1,000 \times \$195 = (800 \times \$200) + 200X \]
\[ X = \$175 \]

The $175 price will lead to the correct decision. Division B will not buy from Division A because its total costs of $175 + $150 will exceed its prospective selling price of $300. Division A will then sell 1,000 units at $195 to the outside; Division A and the company will have a contribution margin of $75,000. Otherwise, if 800 units were sold at $200 and 200 units were transferred to Division B, the company would have a contribution of $64,000 plus $6,000 (200 units of final product \times \$30), or $70,000.

A comparison might be drawn regarding the computation of the appropriate transfer prices between the preceding problem and this problem:
Minimum transfer price = \left( \frac{\text{Additional incremental cost per unit incurred up to the point of transfer}}{} \right) + \left( \frac{\text{Opportunity cost per unit to Division A}}{} \right)

Perfect markets: \[= \$120 + (\text{Selling price} – \text{Outlay costs per unit})\]
\[= \$120 + (\$200 – \$120) = \$200\]

Imperfect markets: \[= \$120 + \frac{\text{Marginal revenues} – \text{Outlay costs}}{\text{Number of units transferred}}\]
\[= \$120 + \frac{\$35,000^a – \$24,000^b}{200} = \$175\]

\(^a\text{Marginal revenues of Division A from selling 200 units outside rather than transferring to Division B}\)
\[= (\$195 \times 1,000) – (\$200 \times 800) = \$195,000 – \$160,000 = \$35,000.\]

\(^b\text{Incremental (outlay) costs incurred by Division A to produce 200 units}\)
\[= \$120 \times 200 = \$24,000.\]

Therefore, selling price (\$195) and marginal revenues per unit (\$175 = \$35,000 \div 200) are not the same.

The following discussion is optional. These points should be explored only if there is sufficient class time:

Some students may erroneously say that the “new” market price of \$195 is the appropriate transfer price. They may claim that the general guideline says that the transfer price should be \$120 + (\$195 – \$120) = \$195, the market price. This conclusion assumes a perfect market. However, in this case there are imperfections in the intermediate market. That is, the market price is not a good approximation of alternative revenue. If a division’s sales are heavy enough to reduce market prices, marginal revenue will be less than market price.

It is true that either \$195 or \$175 will lead to the correct decision by B in this case. But suppose that B’s variable costs were \$120 instead of \$150. Then B would buy at a transfer price of \$175 (but not at a price of \$195, because then B would earn a negative contribution of \$15 per unit \[\$300 – (\$195 + \$120)\]. Note that if B’s variable costs were \$120, transfers would be desirable:

Division A contribution is:
\[\text{[800} \times (\$200 – \$120)] + \text{[200} \times (\$175 – \$120)] \text{[} = \$75,000\]

Division B contribution is:
\[\text{200} \times (\$300 – (\$175 + \$120)] \text{[} = 1,000\]

Total contribution \$76,000
Or the same facts can be analyzed for the company as a whole:

Sales of intermediate product,
\[800 \times (\$200 - \$120) = \$64,000\]
Sales of final products,
\[200 \times [300 - (\$120 + \$120)] = \$12,000\]
Total contribution \[\$76,000\]

If the transfer price were $195, B would not accept the transfer and would not earn any contribution. As shown above, Division A and the company as a whole will earn a total contribution of \$75,000 instead of \$76,000.

2. a. Division A can sell 900 units at $195 to the outside market and 100 units to Division B, or 800 at $200 to the outside market and 200 units to Division B. Note that, under both alternatives, 100 units can be transferred to Division B at no opportunity cost to A.

Using the general guideline, the minimum transfer price of \textit{the first 100 units} [901–1000] is:
\[TP_1 = \$120 + 0 = \$120\]

If Division B needs 100 additional units, the opportunity cost to A is not zero, because Division A will then have to sell only 800 units to the outside market for a contribution of \[800 \times (\$200 - \$120) = \$64,000\] instead of 900 units for a contribution of \[900 \times (\$195 - \$120) = \$67,500\]. Each unit sold to B in addition to the first 100 units has an opportunity cost to A of \([\$67,500 - \$64,000] \div 100 = \$35\].

Using the general guideline, the minimum transfer price of \textit{the next 100 units} [801–900] is:
\[TP_2 = \$120 + \$35 = \$155\]

Alternatively, the computation could be:

Increase in contribution from 100 more units, \[100 \times \$75\] \[\$7,500\]
Loss in contribution on 800 units,
\[800 \times (\$80 - \$75)\] \[\$4,000\]
Net "marginal revenue" \[\$3,500 \div 100\text{ units} = \$35\]

(Minimum) transfer price applicable to first 100 units offered by A is \$120 + \$0 \[= \$120\text{ per unit}\]
(Minimum) transfer price applicable to next 100 units offered by A is \$120 + (\$3,500 \div 100) \[= \$155\text{ per unit}\]
(Minimum) transfer price applicable to next 800 units \[= \$195\text{ per unit}\]
b. The manager of Division B will not want to purchase more than 100 units because the units at $155 would decrease his contribution ($155 + $150 > $300). Because the manager of Division B does not buy more than 100 units, the manager of Division A will have 900 units available for sale to the outside market. The manager of Division A will strive to maximize the contribution by selling them all at $195.

This solution maximizes the company's contribution:

\[
\begin{align*}
900 \times ($195 - $120) &= 67,500 \\
100 \times ($300 - $270) &= 3,000 \\
\text{Total} &= 70,500
\end{align*}
\]

which compares favorably to:

\[
\begin{align*}
800 \times ($200 - $120) &= 64,000 \\
200 \times ($300 - $270) &= 6,000 \\
\text{Total} &= 70,000
\end{align*}
\]

ALTERNATIVE PRESENTATION (by James Patell)

1. Company Viewpoint

a: Sell 1,000 units outside at $195 per unit

<table>
<thead>
<tr>
<th>Price</th>
<th>$195</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable cost per unit</td>
<td>$120</td>
</tr>
<tr>
<td>Contribution per unit</td>
<td>$75</td>
</tr>
<tr>
<td>Total contribution</td>
<td>$75,000</td>
</tr>
</tbody>
</table>

b: Sell 800 units outside at $200 per unit, transfer 200

<table>
<thead>
<tr>
<th>Transfer price</th>
<th>$200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable cost per unit</td>
<td>$120</td>
</tr>
<tr>
<td>Opportunity cost per unit</td>
<td>$80</td>
</tr>
<tr>
<td>Contribution per unit</td>
<td>$60</td>
</tr>
<tr>
<td>Total contribution</td>
<td>$64,000</td>
</tr>
</tbody>
</table>

Total contribution given up if transfer occurs*

\[
= 75,000 - 64,000 = 11,000
\]

On a per-unit basis, the relevant costs are:

\[
\begin{align*}
\text{Incremental cost per unit} \quad &\quad \text{Incurred up to} \\
\text{the point of transfer} \quad &\quad \text{Opportunity cost per unit} \quad \text{to Division A} \\
\text{Transfer price} &= \text{Incremental cost per unit} \quad + \quad \text{Opportunity cost per unit} \\
&= 120 \quad + \quad \frac{11,000}{200} \quad = \quad 175
\end{align*}
\]
By formula, costs are:

\[
\begin{align*}
\text{Incremental cost per unit incurred up to point to transfer} & \quad + \quad \text{Lost opportunity to sell 200 units at $195 per unit, for contribution of $75 per unit} \\
& \quad - \quad \text{Gain when 1st 800 units sell at $200 per unit instead of $195 per unit}
\end{align*}
\]

\[
= \$120 + \frac{200 \times \$75}{200} - \left[ \frac{($200 - $195) \times 800}{200} \right]
\]

\[
= \$120 + \$35 - \$40 = \$155
\]

*Contribution of $30 per unit by B is not given up if transfer occurs, so it is not relevant here.

2a. At most, Division A can sell only 900 units and can produce 1,000. Therefore, at least 100 units should be transferred at a transfer price no less than $120. The question is whether or not a second 100 units should be transferred:

\[\text{Company Viewpoint}\]

\[\begin{align*}
a: \text{Sell 900 units outside at $195 per unit} & \quad & b: \text{Sell 800 units outside at $200 per unit, transfer 100} \\
\text{Transfer price} & \quad \$195 & \quad \text{Transfer price} & \quad \$200 \\
\text{Variable cost per unit} & \quad 120 & \quad \text{Variable cost per unit} & \quad 120 \\
\text{Contribution} & \quad \$75 \times 900 = \$67,500 & \quad \text{Contribution} & \quad \$80 \times 800 = \$64,000
\end{align*}\]

Total contribution forgone if transfer of 100 units occurs

\[= \$67,500 - \$64,000 = \$3,500 \text{ (or } \$35 \text{ per unit)}\]

\[\text{Incremental cost per unit incurred up to point of transfer} + \text{Opportunity cost per unit to Division A} = \text{Transfer price}\]

\[\$120 + \$35 = \$155\]

2b. By formula:

\[
\begin{align*}
\text{Incremental cost per unit incurred up to point of transfer} & \quad + \quad \text{Lost opportunity to sell 100 units at $195 per unit, for contribution of $75 per unit} \\
& \quad - \quad \text{Gain when 1st 800 units sell at $200 per unit instead of $195 per unit}
\end{align*}
\]

\[
= \$120 + \frac{100 \times \$75}{100} - \left[ \frac{($200 - $195) \times 800}{100} \right]
\]

\[
= \$120 + \$75 - \$40 = \$155
\]

Transfer Price Schedule (minimum acceptable transfer price):

<table>
<thead>
<tr>
<th>Units</th>
<th>Transfer Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–100</td>
<td>$120</td>
</tr>
<tr>
<td>101–200</td>
<td>$155</td>
</tr>
<tr>
<td>201–1,000</td>
<td>$195</td>
</tr>
</tbody>
</table>
Effect of alternative transfer-pricing methods on division operating income.

1. Pounds of cranberries harvested 400,000
   Gallons of juice processed (500 gals per 1,000 lbs.) 200,000
   Revenues (200,000 gals. × $2.10 per gal.) $420,000
   Costs
     Harvesting Division
       Variable costs (400,000 lbs. × $0.10 per lb.) $40,000
       Fixed costs (400,000 lbs. × $0.25 per lb.) 100,000
       Total Harvesting Division costs 140,000
     Processing Division
       Variable costs (200,000 gals. × $0.20 per gal.) $40,000
       Fixed costs (200,000 gals. × $0.40 per gal.) 80,000
       Total Processing Division costs 120,000
     Total costs 260,000
     Operating income $160,000

2. Transfer price per pound (($0.10 + $0.25) × 2; $0.60) $0.70 $0.60

   1. Harvesting Division
      Revenues (400,000 lbs. × $0.70; $0.60) $280,000 $240,000
      Costs
        Division variable costs (400,000 lbs. × $0.10 per lb.) 40,000 40,000
        Division fixed costs (400,000 lbs. × $0.25 per lb.) 100,000 100,000
        Total division costs 140,000 140,000
      Division operating income $140,000 $100,000
      Harvesting Division manager's bonus (5% of operating income) $7,000 $5,000

   2. Processing Division
      Revenues (200,000 gals. × $2.10 per gal.) $420,000 $420,000
      Costs
        Transferred-in costs 280,000 240,000
        Division variable costs (200,000 gals. × $0.20 per gal.) 40,000 40,000
        Division fixed costs (200,000 gals. × $0.40 per gal.) 80,000 80,000
        Total division costs 400,000 360,000
      Division operating income $20,000 $60,000
      Processing Division manager’s bonus (5% of operating income) $1,000 $3,000
3. Bonus paid to division managers at 5% of division operating income is computed above and summarized below:

<table>
<thead>
<tr>
<th></th>
<th>Internal Transfers at 200% of Full Costs</th>
<th>Internal Transfers at Market Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvesting Division manager’s bonus</td>
<td>$7,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>(5% × $140,000; 5% × $100,000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processing Division manager’s bonus</td>
<td>$1,000</td>
<td>$3,000</td>
</tr>
<tr>
<td>(5% × $20,000; 5% × $60,000)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Harvesting Division manager will prefer to transfer at 200% of full costs because this method gives a higher bonus. The Processing Division manager will prefer transfer at market price for its higher resulting bonus.

Crango may resolve or reduce transfer pricing conflicts by:

- Basing division managers’ bonuses on overall Crango profits in addition to division operating income. This will motivate each manager to consider what is best for Crango overall and not be concerned with the transfer price alone.
- Letting the two divisions negotiate the transfer price between themselves. However, this may result in constant re-negotiation between the two managers each accounting period.
- Using dual transfer prices However, a cost-based transfer price will not motivate cost control by the Harvesting Division manager. It will also insulate that division from the discipline of market prices.
Goal congruence problems with cost-plus transfer-pricing methods, dual pricing system (continuation of 22-30).

1. Two examples of goal congruence problems that arise if a transfer price of 200% of full costs is mandated and Borges’ decentralization policy is adopted are:
   a. The Processing Division manager will prefer to buy cranberries from an external supplier at $0.60 per pound, incurring some extra purchasing costs and lowering Crane’s overall operating income. Crango will incur costs of $0.60 per pound and save variable costs of only $0.10 per pound.
   b. The Harvesting Division manager is forced to sell to an outside purchaser (because the Processing Division prefers to purchase from an external supplier) when it is better for Crango Products to process internally.

2. Transfer into buying division at market price
   Harvesting Division to Processing Division = $0.60 per pound of cranberries

Transfer out of selling division at 200% of full costs
   Harvesting Division to Processing Division = 2.0 × ($0.10 + $0.25) = $0.70 per pound of cranberries

As calculated in Requirement 2 of 22-30 and also shown below, under the dual transfer-pricing policy, the Harvesting Division will earn an operating income of $140,000 and the Processing Division will earn an operating income of $60,000.

<table>
<thead>
<tr>
<th></th>
<th>200% of Full Costs</th>
<th>Market Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Harvesting Division</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenues (400,000 lbs. × $0.70 per lb.)</td>
<td>$280,000</td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division variable costs (400,000 lbs. × $0.10 per lb.)</td>
<td>40,000</td>
<td></td>
</tr>
<tr>
<td>Division fixed costs (400,000 lbs. × $0.25 per lb.)</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>Total division costs</td>
<td></td>
<td>140,000</td>
</tr>
<tr>
<td>Division operating income</td>
<td></td>
<td>$140,000</td>
</tr>
</tbody>
</table>

| **Processing Division**        |                    |              |
| Revenues (200,000 gals. × $2.10 per gal.) | $420,000          |              |
| Costs                          |                    |              |
| Transferred in costs (400,000 lbs. × $0.60 per lb.) | 240,000           |              |
| Division variable costs (200,000 gals. × $0.20 per gal.) | 40,000            |              |
| Division fixed costs (200,000 gals. × $0.40 per gal.) | 80,000            |              |
| Total division costs           |                    | 360,000      |
| Division operating income      |                    | $ 60,000     |
3. Under the dual transfer pricing policy,

<table>
<thead>
<tr>
<th>Division Operating Income</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvesting Division</td>
<td>$140,000</td>
</tr>
<tr>
<td>Processing Division</td>
<td>60,000</td>
</tr>
<tr>
<td>Crango Products</td>
<td>$200,000</td>
</tr>
</tbody>
</table>

The overall company operating income from harvesting and processing 400,000 pounds of cranberries is $160,000 (see Problem 22-30, requirement 1).

A dual transfer-pricing method entails using different transfer prices for transfers into the buying division and transfers out of the supplying division. As a result, the sum of division operating incomes does not equal the total company operating income.

4. Problems which may arise if Crango Products uses the dual transfer-pricing system include:

   a. It may reduce the incentives of the supplying division to control costs since every $1 of cost of the supplying division is transferred out to the buying division at $2.00.
   b. A dual transfer-pricing system does not provide clear signals to the individual divisions about the level of decentralization top management seeks.
   c. It insulates the Harvesting Division manager from the frictions and the discipline of the marketplace because costs, not market prices, affect the revenues of the supplying division.
This is a two-country two-division transfer-pricing problem with two alternative transfer-pricing methods.

Summary data in U.S. dollars are:

**South Africa Mining Division**
- Variable costs: $600 ZAR \div 6 = $100 per lb. of raw diamonds
- Fixed costs: $1,200 ZAR \div 6 = $200 per lb. of raw diamonds
- Market price: $3,600 ZAR \div 6 = $600 per lb. of raw diamonds

**U.S. Processing Division**
- Variable costs = $220 per lb. of polished industrial diamonds
- Fixed costs = $850 per lb. of polished industrial diamonds
- Market price = $3,500 per lb. of polished industrial diamonds

1. The transfer prices are:
   a. **250% of full costs**
      - Mining Division to Processing Division
        \[ = 2.5 \times (100 + 200) = 750 \text{ per lb. of raw diamonds} \]
   b. **Market price**
      - Mining Division to Processing Division
        \[ = 600 \text{ per lb. of raw diamonds} \]

<table>
<thead>
<tr>
<th></th>
<th>250% of Full Cost</th>
<th>Market Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>South Africa Mining Division</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division revenues, $750, $600 \times 8,000</td>
<td>$6,000,000</td>
<td>$4,800,000</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division variable costs, $100 \times 8,000</td>
<td>800,000</td>
<td>800,000</td>
</tr>
<tr>
<td>Division fixed costs, $200 \times 8,000</td>
<td>1,600,000</td>
<td>1,600,000</td>
</tr>
<tr>
<td>Total division costs</td>
<td>2,400,000</td>
<td>2,400,000</td>
</tr>
<tr>
<td>Division operating income</td>
<td>$3,600,000</td>
<td>$2,400,000</td>
</tr>
</tbody>
</table>

| *U.S. Processing Division*    |                   |              |
| Division revenues, $3,500 \times 4,000 | $14,000,000 | $14,000,000 |
| Costs                         |                   |              |
| Transferred-in costs, $750, $600 \times 8,000 | 6,000,000 | 4,800,000 |
| Division variable cost, $220 \times 4,000 | 880,000 | 880,000 |
| Division fixed costs, $850 \times 4,000 | 3,400,000 | 3,400,000 |
| Total division costs          | 10,280,000 | 9,080,000 |
| Division operating income     | $3,720,000 | $4,920,000 |
2.  

<table>
<thead>
<tr>
<th>Division</th>
<th>250% of Full Cost</th>
<th>Market Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South Africa Mining Division</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division operating income</td>
<td>$3,600,000</td>
<td>$2,400,000</td>
</tr>
<tr>
<td>Income tax at 25%</td>
<td>900,000</td>
<td>600,000</td>
</tr>
<tr>
<td>Division after-tax operating income</td>
<td>$2,700,000</td>
<td>$1,800,000</td>
</tr>
</tbody>
</table>

| **U.S. Processing Division**  |                   |              |
| Division operating income    | $3,720,000        | $4,920,000   |
| Income tax at 40%            | 1,488,000         | 1,968,000    |
| Division after-tax operating income | $2,232,000       | $2,952,000   |

3.  

<table>
<thead>
<tr>
<th>Division</th>
<th>250% of Full Cost</th>
<th>Market Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South Africa Mining Division</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After-tax operating income</td>
<td>$2,700,000</td>
<td>$1,800,000</td>
</tr>
<tr>
<td><strong>U.S. Processing Division</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After-tax operating income</td>
<td>2,232,000</td>
<td>2,952,000</td>
</tr>
<tr>
<td><strong>Industrial Diamonds</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After-tax operating income</td>
<td>$4,932,000</td>
<td>$4,752,000</td>
</tr>
</tbody>
</table>

The South Africa Mining Division manager will prefer the higher transfer price of 250% of full cost and the U.S. Processing Division manager will prefer the lower transfer price equal to market price. Industrial Diamonds will maximize companywide net income by using the 250% of full cost transfer-pricing method. This method sources more of the total income in South Africa, the country with the lower income tax rate.

4.  

Factors that executives consider important in transfer pricing decisions include:

a. Performance evaluation  
b. Management motivation  
c. Pricing and product emphasis  
d. External market recognition

Factors specifically related to multinational transfer pricing include:

a. Overall income of the company  
b. Income or dividend repatriation restrictions  
c. Competitive position of subsidiaries in their respective markets
International transfer pricing, taxes, goal congruence.

1. The minimum transfer price would be $64 to cover the variable production ($60 per unit) and shipping ($4 per unit) costs, because Calcia would want, at a minimum, zero contribution margin. The opportunity cost is $0 because there are no external customers for IP-2007. The maximum transfer price would be the $75 market price that Argone would need to pay to acquire a product similar to IP-2007 from the external market in the United States.

2. To minimize income taxes, Gemini should use a transfer price of $64. Canada has a higher tax rate so goods coming from Canada should have the lowest transfer price. Calcia would not like a transfer price of $64 because it would report no operating income from the transfer. Argone would like a transfer price of $64 because it is lower than the outside market price of $75.

3a. It is easiest to see the solution to this problem if we assume a selling price for the product that Argone manufactures, for example, $120. (The actual selling price you choose is irrelevant.)

Calcia’s after-tax income on each unit from accepting the special order is:
- Revenue per unit $68.00
- Variable cost per unit 60.00
- Contribution margin per unit 8.00
- Income taxes (0.42 × $8) 3.36
- Increase in division income per unit after tax $4.64

Argone’s after-tax income on each unit if Calcia accepts the special order and Argone buys the substitute product for IP-2007 in the United States for $75 per unit is:
- Revenue per unit $120.00
- Variable cost per unit 75.00
- Contribution margin per unit 45.00
- Income taxes (0.30 × $45) 13.50
- Increase in division income per unit after tax $31.50

Gemini’s total net income on each unit from Calcia accepting the special order is therefore $4.64 + $31.50 = $36.14.

If Calcia rejects the special order and instead transfers the units internally to Argone at $64 per unit, Calcia’s after-tax income would be:
- Revenue per unit $64
- Variable cost per unit 64
- Contribution margin per unit 0
- Income taxes 0
- Increase in division income per unit after tax 0

Argone’s after-tax income on each unit is:
- Revenue per unit $120.00
- Variable cost per unit 64.00
- Contribution margin per unit 56.00
- Income taxes (0.30 × $56) 16.80
- Increase in division income per unit after tax $39.20
Gemini’s total net income on each unit as a result of Calcia rejecting the special order and transferring units of IP-2007 to Argone at $64 per unit is therefore $39.20 per unit. Since this is higher than $36.14, accepting the special order does not maximize after-tax operating income. After-tax operating income is maximized by rejecting the special order.

3b. Argone will not want Calcia to accept the special order. It is more costly to buy from the external market than from Calcia.

3c. Calcia will want to accept the special order because Calcia’s income per unit after-tax increases by $4.64 per unit by accepting the special order rather than transferring IP-2007 to Argone at $64 per unit and earning $0 operating income.

3d. Gemini should set the transfer price at $72 per unit. This will result in each division taking actions in its own best interest that is also in the best interest of Gemini as a whole acting as a decentralized organization.

The opportunity cost of transferring IP-2007 internally is $8 ($68 – $60) per unit for the first 8,000 units and $0 per unit thereafter.

Using the general guideline,

Minimum transfer price = Incremental cost per unit incurred up to the point of transfer + Opportunity cost per unit to the selling subunit

So, minimum transfer price = $64 + $8 = $72 per unit for the first 8,000 units

$64 + $0 = $64 per unit for the next 7,000 units

Gemini should use these minimum transfer prices because they are also tax-efficient.

At a transfer price of $72 per unit for the first 8,000 units, Calcia is indifferent between accepting the special order or transferring internally. Calcia earns $8 per unit if it accepts the special order. It also earns $8 per unit if it transfers IP-2007 to Argone ($72 – $64 variable cost per unit).

Argone will prefer to “buy” IP-2007 from Calcia because the transfer price of $72 is less than the $75 price it would pay to buy a product similar to IP-2007 in the United States.

The increase in Gemini’s income will be as follows:

From Calcia:
- Revenue per unit: $72.00
- Variable cost per unit: 64.00
- Contribution margin per unit: 8.00
- Income taxes (0.42 × $8): 3.36
- Increase in division income per unit after tax: $4.64

From Argone:
Revenue per unit $120.00
Transfer price per unit 72.00
Contribution margin per unit 48.00
Income taxes (0.30 × $48) 14.40
Increase in division income per unit after tax $33.60

Increase in Gemini’s income = $4.64 + $33.60 = $38.24

This net income is greater than the $36.14 net income that Gemini would earn if Calcia accepted the special order. It is less than the $39.20 that Gemini would earn if Calcia had transferred IP-2007 at $64 per unit. Of course, if the transfer price is set at $64 per unit, Calcia would accept the special order, which would lead to a lower net income of $36.14. If Gemini wants to get the benefits of decentralization, it must be willing to suffer the consequences of higher taxes that Calcia would have to pay.

Note that Gemini would not want to set the transfer price any higher than $72, the minimum transfer price that would induce Calcia to transfer internally to Argone. Why? Because setting the transfer price any higher would result in exactly the same action (transferring IP-2007 internally) but at a higher cost because of the higher taxes that Calcia would have to pay in Canada. Consider for example a transfer price of $80 per unit. The increase in Gemini’s income will be as follows:

From Calcia:
Revenue per unit $80.00
Variable cost per unit 64.00
Contribution margin per unit 16.00
Income taxes (0.42 × $16) 6.72
Increase in division income per unit after tax $9.28

From Argone:
Revenue per unit $120.00
Transfer price per unit 80.00
Contribution margin per unit 40.00
Income taxes (0.30 × $40) 12.00
Increase in division income per unit after tax $28.00

Increase in Gemini’s income $9.28 + $28.00 = $37.28, which is less than the $38.24 Gemini earns if the transfer price is set at $72 per unit. A transfer price of $72 is the most tax-efficient transfer price consistent with Gemini operating as a decentralized organization. Note also that the transfer price cannot be set above $75 per unit because then Argone would buy a product similar to IP-2007 in the United States rather than from Calcia.
22-34  (35 min.) Transfer pricing, goal congruence.

1. See column (1) of Solution Exhibit 22-34. The net cost of the in-house option is $570,000.

2. See columns (2a) and (2b) of Solution Exhibit 22-34.

SOLUTION EXHIBIT 22-34

<table>
<thead>
<tr>
<th></th>
<th>Transfer 20,000 CD players to Assembly. Sell 2,000 in outside market at $45 each</th>
<th>Buy 20,000 CD players from Hawei at $44. Sell 22,000 CD players in outside market at $45 each</th>
<th>Buy 20,000 CD players from Hawei at $51. Sell 22,000 CD players in outside market at $45 each</th>
<th>Buy 20,000 CD players from Hawei at $52. Sell 22,000 CD players in outside market at $45 each</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incremental cost of CD Division supplying 20,000 CD players to Assembly Division</strong></td>
<td>$(600,000)</td>
<td>$ 0</td>
<td>$ 0</td>
<td>$ 0</td>
</tr>
<tr>
<td>Incremental costs of buying 20,000 CD players from Hawei</td>
<td>$0; $44 × 20,000; $51 × 20,000; $52 × 20,000</td>
<td>0</td>
<td>(880,000)</td>
<td>(1,020,000)</td>
</tr>
<tr>
<td>Revenue from selling CD players in outside market $45 × 2,000; 22,000; 22,000</td>
<td>90,000</td>
<td>990,000</td>
<td>990,000</td>
<td>990,000</td>
</tr>
<tr>
<td>Incremental costs of manufacturing CD players for sale in outside market $30 × 2,000; 22,000; 22,000; 22,000</td>
<td>(60,000)</td>
<td>(660,000)</td>
<td>(660,000)</td>
<td>(660,000)</td>
</tr>
<tr>
<td>Revenue from supplying head mechanism to Hawei</td>
<td>$24 × 0; 20,000; 20,000; 20,000</td>
<td>0</td>
<td>480,000</td>
<td>480,000</td>
</tr>
<tr>
<td>Incremental costs of supplying head mechanism to Hawei</td>
<td>$18 × 0; 20,000; 20,000; 20,000</td>
<td>0</td>
<td>(360,000)</td>
<td>(360,000)</td>
</tr>
<tr>
<td>Net costs</td>
<td>$(570,000)</td>
<td>$(430,000)</td>
<td>$(570,000)</td>
<td>$ (590,000)</td>
</tr>
</tbody>
</table>

Comparing columns (1) and (2a), at a price of $44 per CD player from Hawei, the net cost of $430,000 is less than the net cost of $570,000 to Bosh Corporation if it made the CD players in-house. So, Bosh Corporation should outsource to Hawei.

Comparing columns (1) and (2b), at a price of $52 per CD player from Hawei, the net cost of $590,000 is $20,000 is greater than the net cost of $570,000 to Bosh Corporation if it made the CD players in-house. Therefore, Bosh Corporation should reject Hawei’s offer.

Now consider column (2x) of Solution Exhibit 22-34. It shows that at a price of $51 per CD player from Hawei, the net cost is exactly $570,000, the same as the net cost to Bosh Corporation of manufacturing in-house (column 1). Thus, for prices between $44 and $51, Bosh will prefer to purchase from Hawei. For prices greater than $51 (and up to $52), Bosh will prefer to manufacture in-house.
3. The CD Division can manufacture at most 22,000 CD players and it is currently operating at capacity. The incremental costs of manufacturing a CD player are $30 per unit. The opportunity cost of manufacturing CD players for the Assembly Division is (1) the contribution margin of $15 (selling price, $45 minus incremental costs $30) that the CD Division would forgo by not selling CD players in the outside market plus (2) the contribution margin of $6 (selling price, $24 minus incremental costs, $18) that the CD Division would forgo by not being able to sell the head mechanism to external suppliers of CD players such as Hawei (recall that the CD division can produce as many head mechanisms as demanded by external suppliers, but their demand will fall if the CD Division supplies the Assembly Division with CD players). Thus, the total opportunity cost to the CD Division of supplying CD players to Assembly is $15 + $6 = $21 per unit.

Using the general guideline,

Minimum transfer price = Incremental cost up to the point of transfer + Opportunity cost

= $30 + $21 = $51

Thus, the minimum transfer price that the CD Division will accept for each CD player is $51. Note that at a price of $51, Bosh is indifferent between manufacturing CD players in-house or purchasing them from an external supplier.

4a. The transfer price is set to $51 + $2 = $53 and Hawei is offering the CD players for $52 each. Now, for an outside price per CD player below $53, the Assembly Division would prefer to purchase from outside; above it, the Assembly Division would prefer to purchase from the CD Division. So, the Assembly division will buy from Hawei at $52 each and the CD Division will be forced to sell its output on the outside market.

4b. But for Bosh, as seen from requirements 1 and 2, an outside price of $52, which is greater than the $51 cut-off price, makes inhouse manufacture the optimal choice. So, a mandated transfer price of $53 causes the division managers to make choices that are sub-optimal for Bosh.

4c. When selling prices are uncertain, the transfer price should be set at the minimum acceptable transfer price. It is only if the price charged by the external supplier falls below $51 that Bosh Corporation as a whole is better off purchasing from the outside market. Setting the transfer price at $51 per unit achieves goal congruence. The CD division will be willing to sell to the Assembly Division, and the Assembly Division will be willing to buy in-house and this would be optimal for Bosh, too.
22-35 (20 min.) Transfer pricing, goal congruence, ethics.

1. The transfer price is 110% of the full cost per unit:
   \[1.10 \times ($0.50 + $2.80 + $1.50) = $5.28\]

   Because $5.00 is below the transfer price of $5.28, the fabrication division manager would choose to purchase the 10,000 pounds from Metalife.

2. The purchase is not in the best interest of Jeremiah Industries because, if produced internally, the additional 10,000 pound would only cost the company $33,000 ($3.30 of variable cost per unit \times 10,000 units). Because there is available capacity, fixed costs would be unaffected. If purchased from Metalife, the metal would cost $50,000. The cause of this goal incongruence is two-fold: setting a transfer price based on full cost treats fixed costs as variable, and setting the price above full cost (in this case 110%) artificially inflates the cost to the purchasing division.

3. $5.00 is not a valid market price because it could not be replicated on future orders. $5.50 is a more correct market price. The fabrication manager was not acting ethically in this situation because he or she was withholding pertinent information from both upper management and the recycling division manager, and was even promoting a position they knew to be false. If the transfer price had been changed to $5.00, it would not have affected the company overall, but profit incentive rewards would have been shifted away from the recycling division manager and to the fabrication manager.
Transfer pricing, utilization of capacity.

1. 

<table>
<thead>
<tr>
<th></th>
<th>Super-chip</th>
<th>Okay-chip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling price</td>
<td>$80</td>
<td>$26</td>
</tr>
<tr>
<td>Direct material cost per unit</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Direct manufacturing labor cost per unit</td>
<td>60</td>
<td>20</td>
</tr>
<tr>
<td>Contribution margin per unit</td>
<td>$15</td>
<td>$4</td>
</tr>
<tr>
<td>Contribution margin per hour</td>
<td>($15 ÷ 3; $4 ÷ 1)</td>
<td>$5</td>
</tr>
</tbody>
</table>

Because the contribution margin per hour is higher for Super-chip than for Okay-chip, CIC should produce and sell as many Super-chips as it can and use any remaining available capacity to produce Okay-chip.

The total demand for Super-chips is 15,000 units, which would take the entire capacity of 45,000 hours (15,000 × 3 hours per unit). Therefore, CIC should manufacture only Super-chips. Annual contribution margin would be $225,000 ($15 per unit × 15,000 units).

2. Options for manufacturing process-control unit:

<table>
<thead>
<tr>
<th></th>
<th>Using Circuit Board</th>
<th>Using Super-chip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling price</td>
<td>$132</td>
<td>$145</td>
</tr>
<tr>
<td>Direct material cost per unit</td>
<td>70</td>
<td>5</td>
</tr>
<tr>
<td>Direct manufacturing labor cost per unit (Super-chip)</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>Direct manufacturing labor cost per unit (process-control unit)</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Contribution margin per unit</td>
<td>$17</td>
<td>$35</td>
</tr>
</tbody>
</table>

Overall Company Viewpoint

*Alternative 1*: No Transfer of Super-chips:

- Sell 15,000 Super-chips at contribution margin per unit of $15 $225,000
- Sell 5,000 Control units at contribution margin per unit of $17 $85,000
- Total contribution margin $310,000
Alternative 2: Transfer 5,000 Super-chips to Process-Control Division:

<table>
<thead>
<tr>
<th>Description</th>
<th>Contribution Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sell 10,000 Super-chips at $15 per unit</td>
<td>$150,000</td>
</tr>
<tr>
<td>Sell 5,000 Control units at $35 per unit</td>
<td>$175,000</td>
</tr>
<tr>
<td><strong>Total contribution margin</strong></td>
<td><strong>$325,000</strong></td>
</tr>
</tbody>
</table>

CIC is better off transferring 5,000 Super-chips to the Process-Control Division.

3. The Semiconductor Division manager would not accept a transfer price below the market price of $80 per unit because the division has willing outside buyers at that price. Any lower price would reduce the division’s operating income. The Process-control Division manager would not pay more than $83 per unit ($70 currently paid for the circuit board, plus the $13 increase in selling price due to using the Super-chip). Therefore, any transfer price between $80 and $83 would ensure goal congruence.

4. If 15,000 additional labor hours were available in the Semiconductor Division, those hours could be used to manufacture 15,000 Okay-chips (at 1 labor hour per chip), or be used to manufacture 5,000 Super-chips (at 3 labor hours per chip) for transfer to the Process-control Division. The Semiconductor Division manager would require a transfer price at least equal to the opportunity cost of the lost sales of Okay-chips. Because the Semiconductor Division could manufacture and sell three Okay-chips at $26 each for every one Super-chip transferred, the minimum required transfer price would be $78 (3 × $26). The maximum price would remain at $83.