**CHAPTER 7 ALLOCATION OF SUPPORT – DEPARTMENT COSTS, COMMON COSTS, AND REVENUES**

How a company allocates its overhead and internal support costs – costs related to marketing, advertising, and other internal services – among its various production departments or projects, can have a big impact on how profitable those departments or projects are.

While the allocation won’t affect the firm’s profit as a whole, if the allocation isn’t done properly, it can make some departments and projects (and their managers) look better or worse than they should profit – wise. The method of allocating costs for a project affects not just the firm but also the consumer. Based on the method used, consumers may spend more, or less, for the same service.

**Allocating Support Department Costs Using the Single – Rate and Dual – Rate Methods**

Companies distinguish operating departments (and operating divisions) from support departments. An **operating department**, also called a **production department**, directly adds value to a product or service. A **support department**, also called a **service** **department**, provides the services that assist other internal departments (operating departments and other support departments) in the company. Examples of support departments are information systems and plant maintenance. Managers face two questions when allocating the costs of a support department to operating departments or divisions: (1) Should fixed costs of support departments be allocated to operating divisions? (2) If fixed costs are allocated, should variable and fixed costs be allocated in the same way? With regard to the first question, most companies believe that fixed costs of support departments should be allocated because the support department needs to incur fixed costs to provide operating divisions with the services they require. Depending on the answer to the second question, there are two approaches to allocating support-department costs: the *single – rate cost – allocation method* and the *dual – rate cost – allocation method*.

**Single – Rate and Dual – Rate Methods**

The **single – rate method** makes no distinction between fixed and variable costs. It allocates costs in each cost pool (support department in this section) to cost objects (operating divisions in this section) using the same rate per unit of a single allocation base. By contrast, the **dual – rate method** partitions the cost of each support department into two pools, a variable cost pool and a fixed-cost pool, and allocates each pool using a different cost – allocation base. When using either the single-rate method or the dual-rate method, managers can allocate support – department costs to operating divisions based on either a *budgeted* rate or the eventual *actual* cost rate. The latter approach is neither conceptually preferred nor widely used in practice (we explain why in the next section). Accordingly, we illustrate the single rate and dual-rate methods next based on the use of *budgeted* rates.

Consider the central computer department of Sand Hill Company (SHC). This support department has two users, both operating divisions: the microcomputer division and the peripheral equipment division. The following data relate to the 2012 budget:

|  |  |
| --- | --- |
| Practical capacity | 18,750 hours |
| Fixed costs of operating the computer facility in the 6,000 – hour to 18,750 – hour relevant range | $3,000,000 |
| Budgeted long-run usage (quantity) in hours: |  |
| Microcomputer division | 8,000 hours |
| Peripheral equipment division | 4,000 hours |
| Total | 12,000 hours |
| Budgeted variable cost per hour in the 6,000 – hour to 18,750 – hour relevant range $200 per hour used |  |
| Actual usage in 2012 in hours: |  |
| Microcomputer division | 9,000 hours |
| Peripheral equipment division | 3,000 hours |
| Total | 12,000 hours |

The budgeted rates for central computer department costs can be computed based on either the demand for computer services or the supply of computer services. We consider the allocation of central computer department costs based first on the demand for (or usage of) computer services and then on the supply of computer services.

**Allocation Based on the Demand for (or Usage of) Computer Services**

We present the single – rate method followed by the dual – rate method.

**Single – Rate Method**

In this method, a combined budgeted rate is used for fixed and variable costs. The rate is calculated as follows:

|  |  |
| --- | --- |
| Budgeted usage | 12,000 hours |
| Budgeted total cost pool: $3,000,000 + (12,000 hours \* $200/hour) | $5,400,000 |
| Budgeted total rate per hour: $5,400,000 ÷ 12,000 hours | $450 per hour used |
| Allocation rate for microcomputer division | $450 per hour used |
| Allocation rate for peripheral equipment division | $450 per hour used |

Note that the budgeted rate of $450 per hour is substantially higher than the $200 budgeted *variable* cost per hour. That’s because the $450 rate includes an allocated amount of $250 per hour (budgeted fixed costs, $3,000,000 ÷ budgeted usage, 12,000 hours) for the *fixed* costs of operating the facility.

Under the single-rate method, divisions are charged the budgeted rate for each hour of *actual* use of the central facility. Applying this to our example, SHC allocates central computer department costs based on the $450 per hour budgeted rate and actual hours used by the operating divisions. The support costs allocated to the two divisions under this method are as follows:

|  |  |
| --- | --- |
| Microcomputer division: 9,000 hours \* $450 per hour | $4,050,000 |
| Peripheral equipment division: 3,000 hours \* $450 per hour | $1,350,000 |

**Dual – Rate Method**

When the dual-rate method is used, allocation bases must be chosen for both the variable and fixed cost pools of the central computer department. As in the single – rate method, variable costs are assigned based on the *budgeted* variable cost per hour of $200 for *actual* hours used by each division. However, fixed costs are assigned based on *budgeted* fixed costs per hour and the *budgeted* number of hours for each division. Given the budgeted usage of 8,000 hours for the microcomputer division and

4,000 hours for the peripheral equipment division, the budgeted fixed-cost rate is $250 per hour ($3,000,000 ÷ 12,000 hours), as before. Since this rate is charged on the basis of the *budgeted* usage, however, the fixed costs are effectively allocated in advance as a lump – sum based on the relative proportions of the central computing facilities expected to be used by the operating divisions.

The costs allocated to the microcomputer division in 2012 under the dual – rate method would be as follows:

|  |  |
| --- | --- |
| Fixed costs: $250 per hour \* 8,000 (budgeted) hours | $2,000,000 |
| Variable costs: $200 per hour \* 9,000 (actual) hours | 1,800,000 |
| Total costs | $3,800,000 |

The costs allocated to the peripheral equipment division in 2012 would be as follows:

|  |  |
| --- | --- |
| Fixed costs: $250 per hour \* 4,000 (budgeted) hours | $1,000,000 |
| Variable costs: $200 per hour \* 3,000 (actual) hours | 600,000 |
| Total costs | $1,600,000 |

Note that each operating division is charged the same amount for variable costs under the single – rate and dual – rate methods ($200 per hour multiplied by the actual hours of use). However, the overall assignment of costs differs under the two methods because the single – rate method allocates fixed costs of the support department based on actual usage of computer resources by the operating divisions, whereas the dual-rate method allocates fixed costs based on budgeted usage.

We next consider the alternative approach of allocating central computer department costs based on the capacity of computer services supplied.

**Allocation Based on the Supply of Capacity**

We illustrate this approach using the 18,750 hours of practical capacity of the central computer department. The budgeted rate is then determined as follows:

|  |  |
| --- | --- |
| Budgeted fixed – cost rate per hour, $3,000,000 ÷ 18,750 hours | $160 per hour |
| Budgeted variable – cost rate per hour | 200 per hour |
| Budgeted total – cost rate per hour | $360 per hour |

Using the same procedures for the single – rate and dual – rate methods as in the previous section, the support cost allocations to the operating divisions are as follows:

**Single – Rate Method**

|  |  |
| --- | --- |
| Microcomputer division: $360 per hour \* 9,000 (actual) hours | $3,240,000 |
| Peripheral equipment division: $360 per hour \* 3,000 (actual) hours | 1,080,000 |
| Fixed costs of unused computer capacity:  $160 per hour \* 6,750 hoursa | 1,080,000 |
| a6,750 hours = Practical capacity of 18,750 – (9,000 hours used by microcomputer division + 3,000 hours used by peripheral equipment division). | |

**Dual – Rate Method**

|  |  |
| --- | --- |
| Microcomputer division |  |
| Fixed costs: $160 per hour \* 8,000 (budgeted) hours | $1,280,000 |
| Variable costs: $200 per hour \* 9,000 (actual) hours | 1,800,000 |
| Total costs | $3,080,000 |
| Peripheral equipment division |  |
| Fixed costs: $160 per hour \* 4,000 (budgeted) hours | $ 640,000 |
| Variable costs: $200 per hour \* 3,000 (actual) hours | 600,000 |
| Total costs | $1,240,000 |
| Fixed costs of unused computer capacity:  $160 per hour \* 6,750 hoursb | $1,080,000 |
| b6,750 hours = Practical capacity of 18,750 hours – (8,000 hours budgeted to be used by microcomputer division + 4,000 hours budgeted to be used by peripheral equipment division). | |

When practical capacity is used to allocate costs, the single – rate method allocates only the actual fixed – cost resources used by the microcomputer and peripheral equipment divisions, while the dual – rate method allocates the budgeted fixed – cost resources to be used by the operating divisions. Unused central computer department resources are highlighted but usually not allocated to the divisions.

The advantage of using practical capacity to allocate costs is that it focuses management’s attention on managing unused capacity. Using practical capacity also avoids burdening the user divisions with the cost of unused capacity of the central computer department. In contrast, when costs are allocated on the basis of the demand for computer services, all $3,000,000 of budgeted fixed costs, including the cost of unused capacity, are allocated to user divisions. If costs are used as a basis for pricing, then charging user divisions for unused capacity could result in the downward demand spiral

**Single – Rate versus Dual – Rate Method**

There are benefits and costs of both the single – rate and dual – rate methods. One benefit of the single-rate method is the low cost to implement it. The single – rate method avoids the often – expensive analysis necessary to classify the individual cost items of a department into fixed and variable categories. Also, by conditioning the final allocations on the actual usage of central facilities, rather than basing them solely on uncertain forecasts of expected demand, it offers the user divisions some operational control over the charges they bear.

A problem with the single – rate method is that it makes the allocated fixed costs of the support department appear as variable costs to the operating divisions. Consequently, the single – rate method may lead division managers to make outsourcing decisions that are in their own best interest but that may be inefficient from the standpoint of the organization as a whole. Consider the setting where allocations are made on the basis of the demand for computer services. In this case, each user division is charged $450 per hour under the single – rate method (recall that $250 of this charge relates to the allocated fixed costs of the central computer department). Suppose an external vendor offers the microcomputer division computer services at a rate of $340 per hour, at a time when the central computer department has unused capacity. The microcomputer division’s managers would be tempted to use this vendor because it would lower the division’s costs ($340 per hour instead of the $450 per hour internal charge for computer services). In the short run, however, the fixed costs of the central computer department remain unchanged in the relevant range (between 6,000 hours of usage and the practical capacity of 18,750 hours). SHC will therefore incur an additional cost of $140 per hour if the managers were to take this offer – the difference between the $340 external purchase price and the true internal variable cost of $200 of using the central computer department.

The divergence created under the single – rate method between SHC’s interests and those of its division managers is lessened when allocation is done on the basis of practical capacity. The variable cost per hour perceived by the operating division managers is now $360 (rather than the $450 rate when allocation is based on budgeted usage). However, any external offer above $200 (SHC’s true variable cost) and below $360 (the single – rate charge per hour) will still result in the user manager preferring to outsource the service at the expense of SHC’s overall profits.

A benefit of the dual-rate method is that it signals to division managers how variable costs and fixed costs behave differently. This information guides division managers to make decisions that benefit the organization as a whole, as well as each division. For example, using a third-party computer provider that charges more than $200 per hour would result in SHC’s being worse off than if its own central computer department were used, because the latter has a variable cost of $200 per hour. Under the dual-rate method, neither division manager has an incentive to pay more than $200 per hour for an external provider because the internal charge for computer services is precisely that amount. By charging the fixed costs of resources budgeted to be used by the divisions as a lump – sum, the dual – rate method succeeds in removing fixed costs from the division managers’ consideration when making marginal decisions regarding the outsourcing of services. It thus avoids the potential conflict of interest that can arise under the single – rate method.

Recently, the dual-rate method has been receiving more attention. Resource Consumption Accounting (RCA), an emerging management accounting system, employs an allocation procedure akin to a dual-rate system. For each cost/resource pool, cost assignment rates for fixed costs are based on practical capacity supplied, while rates for proportional costs (i.e., costs that vary with regard to the output of the resource pool) are based on planned quantities.

**Budgeted Versus Actual Costs, and the Choice of Allocation Base**

The allocation methods previously outlined follow specific procedures in terms of the support department costs that are considered as well as the manner in which costs are assigned to the operating departments. In this section, we examine these choices in greater detail and consider the impact of alternative approaches. We show that the decision whether to use actual or budgeted costs, as well as the choice between actual and budgeted usage as allocation base, has a significant impact on the cost allocated to each division and the incentives of the division managers.

**Budgeted Versus Actual Rates**

In both the single – rate and dual – rate methods, we use budgeted rates to assign support department costs (fixed as well as variable costs). An alternative approach would involve using the actual rates based on the support costs realized during the period. This method is much less common because of the level of uncertainty it imposes on user divisions. When allocations are made using budgeted rates, managers of divisions to which costs are allocated know with certainty the rates to be used in that budget period. Users can then determine the amount of the service to request and – if company policy allows – whether to use the internal source or an external vendor. In contrast, when actual rates are used for cost allocation, user divisions are kept unaware of their charges until the end of the budget period.

Budgeted rates also help motivate the manager of the support (or supplier) department (for example, the central computer department) to improve efficiency. During the budget period, the support department, not the user divisions, bears the risk of any unfavorable cost variances. That’s because user divisions do not pay for any costs or inefficiencies of the supplier department that cause actual rates to exceed budgeted rates.

The manager of the supplier department would likely view the budgeted rates negatively if unfavorable cost variances occur due to price increases outside of his or her control. Some organizations try to identify these uncontrollable factors and relieve the support department manager of responsibility for these variances. In other organizations, the supplier department and the user division agree to share the risk (through an explicit formula) of a large, uncontrollable increase in the prices of inputs used by the supplier department. This procedure avoids imposing the risk completely on either the supplier department (as when budgeted rates are used) or the user division (as in the case of actual rates).

For the rest of this chapter, we will continue to consider only allocation methods that are based on the budgeted cost of support services.

**Budgeted Versus Actual Usage**

In both the single-rate and dual-rate methods, the variable costs are assigned on the basis of budgeted rates and actual usage. Since the variable costs are directly and causally linked to usage, charging them as a function of the actual usage is appropriate. Moreover, allocating variable costs on the basis of budgeted usage would provide the user departments with no incentive to control their consumption of support services.

What about the fixed costs? Consider the budget of $3,000,000 fixed costs at the central computer department of SHC. Recall that budgeted usage is 8,000 hours for the microcomputer division and 4,000 hours for the peripheral equipment division. Assume that actual usage by the microcomputer division is always equal to budgeted usage. We consider three cases: when actual usage by the peripheral equipment division equals (Case 1), is greater than (Case 2), and is less than (Case 3) budgeted usage.

**Fixed Cost Allocation Based on Budgeted Rates and Budgeted Usage**

This is the dual-rate procedure outlined in the previous section. When budgeted usage is the allocation base, regardless of the actual usage of facilities (i.e., whether Case 1, 2, or 3 occurs), user divisions receive a preset lump – sum fixed cost charge. If rates are based on expected demand ($250 per hour), the microcomputer division is assigned $2,000,000 and the peripheral equipment division, $1,000,000. If rates are set using practical capacity ($160 per hour), the microcomputer division is charged $1,280,000, the peripheral equipment division is allocated $640,000, and the remaining $1,080,000 is the unallocated cost of excess capacity.

The advantage of knowing the allocations in advance is that it helps the user divisions with both short-run and long-run planning. Companies commit to infrastructure costs (such as the fixed costs of a support department) on the basis of a long-run planning horizon; budgeted usage measures the long – run demands of the user divisions for support department services.

Allocating fixed costs on the basis of budgeted long-run usage may tempt some managers to underestimate their planned usage. Underestimating will result in their divisions bearing a lower percentage of fixed costs (assuming all other managers do not similarly underestimate their usage). To discourage such underestimates, some companies offer bonuses or other rewards – the “carrot” approach – to managers who make accurate forecasts of long-run usage. Other companies impose cost penalties – the “stick” approach – for underestimating long-run usage. For instance, a higher cost rate is charged after a division exceeds its budgeted usage.

**Fixed Cost Allocation Based on Budgeted Rates and Actual Usage**

Column 2 of Exhibit 7 – 1 provides the allocations when the budgeted rate is based on expected demand ($250 per hour), while column 3 shows the allocations when practical capacity is used to derive the rate ($160 per hour). Note that each operating division’s

**Exhibit 7 – 1** Effect of Variations in Actual Usage on Fixed Cost Allocation to Operating Divisions

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Case** | **(1)** | | **(2)** | | **(3)** | | **(4)** | |
| **Actual Usage** | | **Budgeted Rate Based on Expected Demand**a | | **Budgeted Rate Based on**  **Practical Capacity**b | | **Allocation of Budgeted**  **Total Fixed Cost** | |
| **Micro. Div.** | **Periph. Div.** | **Micro. Div.** | **Periph. Div.** | **Micro. Div.** | **Periph. Div.** | **Micro. Div.** | **Periph. Div.** |
| 1 | 8,000 hours | 4,000 hours | $2,000,000 | $1,000,000 | $1,280,000 | $ 640,000 | $2,000,000c | $1,000,000d |
| 2 | 8,000 hours | 7,000 hours | $2,000,000 | $1,750,000 | $1,280,000 | $1,120,000 | $1,600,000e | $1,400,000f |
| 3 | 8,000 hours | 2,000 hours | $2,000,000 | $ 500,000 | $1,280,000 | $ 320,000 | $2,400,000g | $ 600,000h |

fixed cost allocation varies based on its actual usage of support facilities. However, variations in actual usage in one division do not affect the costs allocated to the other division. The microcomputer division is allocated either $2,000,000 or $1,280,000, depending on the budgeted rate chosen, independent of the peripheral equipment division’s actual usage. Therefore, combining actual usage as the allocation base with budgeted rates provides user divisions with advanced knowledge of rates, as well as control over the costs charged to them.

Note, however, that this allocation procedure for fixed costs is exactly the same as that under the single-rate method. As such, the procedure shares the disadvantages of the single – rate method discussed in the previous section, such as charging excessively high costs, including the cost of unused capacity, when rates are based on expected usage. Moreover, even when rates are based on practical capacity, recall that allocating fixed cost rates based on actual usage induces conflicts of interest between the user divisions and the firm when evaluating outsourcing possibilities.

**Allocating Budgeted Fixed Costs Based on Actual Usage**

Finally, consider the impact of having actual usage as the allocation base when the firm assigns total budgeted fixed costs to operating divisions (rather than specifying budgeted fixed cost rates, as we have thus far). If the budgeted fixed costs of $3,000,000 are allocated using budgeted usage, we are back in the familiar dual-rate setting. On the other hand, if the actual usage of the facility is the basis for allocation, the charges would equal the amounts in Exhibit 7 – 1, column 4. In Case 1, the fixed-cost allocation equals the budgeted amount (which is also the same as the charge under the dual – rate method). In Case 2, the fixed-cost allocation is $400,000 less to the microcomputer division than the amount based on budgeted usage ($1,600,000 versus $2,000,000). In Case 3, the fixed-cost allocation is $400,000 more to the microcomputer division than the amount based on budgeted usage ($2,400,000 versus $2,000,000). Why does the microcomputer division receive $400,000 more in costs in Case 3, even though its actual usage equals its budgeted usage? Because the total fixed costs of $3,000,000 are now spread over 2,000 fewer hours of actual total usage.

In other words, the lower usage by the peripheral equipment division leads to an increase in the fixed costs allocated to the microcomputer division. When budgeted fixed costs are allocated based on actual usage, user divisions will not know their fixed cost allocations until the end of the budget period. This method therefore shares the same flaw as those that rely on the use of actual cost realizations rather than budgeted cost rates.

To summarize, there are excellent economic and motivational reasons to justify the precise forms of the single – rate and dual – rate methods considered in the previous section, and in particular, to recommend the dual – rate allocation procedure.

**Allocating Costs of Multiple Support Departments**

We just examined general issues that arise when allocating costs from one support department to operating divisions. In this section, we examine the special cost-allocation problems that arise when two or more of the support departments whose costs are being allocated provide reciprocal support to each other as well as to operating departments. An example of reciprocal support is a firm’s human resource department providing recruiting, training, and performance management services to all employees of a firm, including those who work in the legal department, while also utilizing the services of the legal department for compliance activities, drafting of contracts, checking stock option plan documents, etc.

More accurate support-department cost allocations result in more accurate product, service, and customer costs.

Consider Castleford Engineering, which operates at practical capacity to manufacture engines used in electric-power generating plants. Castleford has two support departments and two operating departments in its manufacturing facility:

|  |  |
| --- | --- |
| **Support Departments** | **Operating Departments** |
| Plant (and equipment) maintenance | Machining |
| Information systems | Assembly |

The two support departments at Castleford provide reciprocal support to each other as well as support to the two operating departments. Costs are accumulated in each department for planning and control purposes. Exhibit 7 – 2 displays the data for this example. To understand the percentages in this exhibit, consider the plant maintenance department. This support department provides a total of 20,000 hours of support work: 20% (4,000 ÷ 20,000 = 0.20) for the information systems department, 30% (6,000 ÷ 20,000 = 0.30) for the machining department, and 50% (10,000 ÷ 20,000 = 0.50) for the assembly department.

We now examine three methods of allocating the costs of reciprocal support departments: *direct*, *step – down*, and *reciprocal*. To simplify the explanation and to focus on concepts, we use the single-rate method to allocate the costs of each support department using budgeted rates and budgeted hours used by the other departments.

**Direct Method**

The **direct method** allocates each support department’s costs to operating departments only. The direct method does not allocate support-department costs to other support departments. Exhibit 7 – 3 illustrates this method using the data in Exhibit 7 – 2.

**Exhibit 7 – 2** Data for Allocating Support – Department Costs at Castleford Engineering for 2012

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **SUPPORT**  **DEPARTMENTS** | | **OPERATING**  **DEPARTMENTS** | |  |
| **Plant**  **Maintenance** | **Information**  **Systems** | **Machining** | **Assembly** | **Total** |
| Budgeted overhead costs before any interdepartmental cost allocations | $6,300,000 | $1,452,150 | $4,000,000 | $2,000,000 | $13,752,150 |
| Support work furnished: |  |  |  |  |  |
| By plant maintenance |  |  |  |  |  |
| Budgeted labor – hours | – | 4,000 | 6,000 | 10,000 | 20,000 |
| Percentage | – | 20% | 30% | 50% | 100% |
| By information systems |  |  |  |  |  |
| Budgeted computer hours | 500 | – | 4,000 | 500 | 5,000 |
| Percentage | 10% | – | 80% | 10% | 100% |

**Exhibit 7 – 3** Direct Method of Allocating Support – Department Costs at Castleford Engineering for 2012

**SUPPORT DEPARTMENTS OPERATING DEPARTMENTS**

Machining

Department

Plant Maintenance

$6,300,000

Information Systems

$1,452,150

$2,362,500

$3,937,500

$1,290,800

Assembly

Department

$161,350

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **SUPPORT**  **DEPARTMENTS** | | **OPERATING**  **DEPARTMENTS** | |  |
| **Plant**  **Maintenance** | **Information**  **Systems** | **Machining** | **Assembly** | **Total** |
| Budgeted overhead costs before any interdepartmental cost allocations | $6,300,000 | $1,452,150 | $4,000,000 | $2,000,000 | $13,752,150 |
| Allocation of plant maintenance  (3/8, 5/8)a | (6,300,000) |  | 2,362,500 | 3,937,500 |  |
| Allocation of information systems  (8/9, 1/9)b | \_\_\_\_\_\_\_ | (1,452,150) | 1,290,800 | 161,350 |  |
| Total budgeted overhead of operating departments | $ 0 | $ 0 | $7,653,300 | $6,098,850 | $13,752,150 |
| a Base is (6,000 + 10,000), or 16,000 hours; 6,000 ÷ 16,000 = 3/8; 10,000 ÷ 16,000 = 5/8.  b Base is (4,000 + 500), or 4,500 hours; 4,000 ÷ 4,500 = 8/9; 500 ÷ 4,500 = 1/9. | | | | | |

The base used to allocate plant maintenance costs to the operating departments is the budgeted total maintenance labor-hours worked in the operating departments: 6,000 + 10,000 = 16,000 hours. This amount excludes the 4,000 hours of budgeted support time provided by plant maintenance to information systems. Similarly, the base used for allocation of information systems costs to the operating departments is 4,000 + 500 = 4,500 budgeted hours of computer time, which excludes the 500 hours of budgeted support time provided by information systems to plant maintenance.

An equivalent approach to implementing the direct method involves calculating a budgeted rate for each support department’s costs. For example, the rate for plant maintenance department costs is $6,300,000 ÷ 16,000 hours, or $393.75 per hour. The machining department is then allocated $2,362,500 ($393.75 per hour x 6,000 hours) while the assembly department is assigned $3,937,500 ($393.75 per hour x 10,000 hours). For ease of explanation throughout this section, we will use the fraction of the support – department services used by other departments, rather than calculate budgeted rates, to allocate support – department costs.

The direct method is widely practiced because of its ease of use. The benefit of the direct method is simplicity. There is no need to predict the usage of support-department services by other support departments. A disadvantage of the direct method is that it ignores information about reciprocal services provided among support departments and can therefore lead to inaccurate estimates of the cost of operating departments. We now examine a second approach, which partially recognizes the services provided among support departments.

**Step – Down Method**

Some organizations use the **step-down method**, also called the **sequential allocation method**, which allocates support – department costs to other support departments and tooperating departments in a sequential manner that partially recognizes the mutual servicesprovided among all support departments.

Exhibit 7 – 4 shows the step – down method. The plant maintenance costs of $6,300,000 are allocated first. Exhibit 7 – 2 shows that plant maintenance provides 20% of its services to information systems, 30% to machining, and 50% to assembly. Therefore, $1,260,000 is allocated to information systems (20% of $6,300,000), $1,890,000 to machining (30% of $6,300,000), and $3,150,000 to assembly (50% of $6,300,000). The information systems costs now total $2,712,150: budgeted costs of the information systems department before any interdepartmental cost allocations, $1,452,150, plus $1,260,000 from the allocation of plant maintenance costs to the information systems department. The $2,712,150 is then only allocated between the two operating departments based on the proportion of the information systems department services provided to machining and assembly. From Exhibit 7 – 2, the information systems department provides 80% of its services to machining and 10% to assembly, so $2,410,800 (8/9 x $2,712,150) is allocated to machining and $301,350 (1/9 x $2,712,150) is allocated to assembly.

**Exhibit 7 – 4** Step – Down Method of Allocating Support – Department Costs at Castleford Engineering for 2012

Plant Maintenance

$6,300,000

$1,890,000

Assembly

Department

Machining

Department

$3,150,000

$1,260,000

Information Systems

$1,260,000 + $1,452,150

= $2,712,150

$2,410,800

$301,350

Note that this method requires the support departments to be ranked (sequenced) in the order that the step – down allocation is to proceed. In our example, the costs of the plant maintenance department were allocated first to all other departments, including the information systems department. The costs of the information systems support department were allocated second, but only to the two operating departments. If the information systems department costs had been allocated first and the plant maintenance department costs second, the resulting allocations of support-department costs to operating departments would have been different. A popular step – down sequence begins with the support department that renders the highest percentage of its total services to *other support departments*. The sequence continues with the department that renders the next – highest percentage, and so on, ending with the support department that renders the lowest percentage.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **SUPPORT**  **DEPARTMENTS** | | **OPERATING**  **DEPARTMENTS** | |  |
| **Plant**  **Maintenance** | **Information**  **Systems** | **Machining** | **Assembly** | **Total** |
| Budgeted overhead costs before any interdepartmental cost allocations | $6,300,000 | $1,452,150 | $4,000,000 | $2,000,000 | $13,752,150 |
| Allocation of plant maintenance  (2/10, 3/10, 5/10)a | (6,300,000) | 1,260,000 | 1,890,000 | 3,150,000 |  |
|  |  | 2,712,150 |  |  |  |
| Allocation of information systems (8/9, 1/9)b | \_\_\_\_\_\_\_ | (2,712,150) | 2,410,800 | 301,350 | \_\_\_\_\_\_\_\_\_ |
| Total budgeted overhead of operating departments | $ 0 | $ 0 | $8,300,800 | $5,451,350 | $13,752,150 |
| aBase is (4,000 + 6,000 + 10,000), or 20,000 hours; 4,000 ÷ 20,000 = 2/10; 6,000 ÷ 20,000 = 3/10; 10,000 ÷ 20,000 = 5/10.  b Base is (4,000 + 500), or 4,500 hours; 4,000 ÷ 4,500 = 8/9; 500 ÷ 4,500 = 1/9. | | | | | |

An alternative approach to selecting the sequence of allocations is to begin with the support department that renders the highest dollar amount of services to other support departments. The sequence ends with the allocation of the costs of the department that renders the lowest dollar amount of services to other support departments. In our example, costs of the plant maintenance department were allocated first because it provides 20% of its services to the information systems department, whereas the information systems department provides only 10% of its services to the plant maintenance department (see Exhibit 7 – 2).

Under the step – down method, once a support department’s costs have been allocated, no subsequent support-department costs are allocated back to it. Once the plant maintenance department costs are allocated, it receives no further allocation from other (lower ranked) support departments. The result is that the step-down method does not recognize the total services that support departments provide to one another. The reciprocal method fully recognizes all such services, as you will see next.

**Reciprocal Method**

The **reciprocal method** allocates support-department costs to operating departments by fully recognizing the mutual services provided among all support departments. For example, the plant maintenance department maintains all the computer equipment in the information systems department. Similarly, information systems provide database support for plant maintenance. The reciprocal method fully incorporates interdepartmental relationships into the support – department cost allocations.

One way to understand the reciprocal method is as an extension of the step – down method. This approach is illustrated in Exhibit 7 – 5. As in the step – down procedure, plant maintenance costs are first allocated to all other departments, including the information systems support department: information systems, 20%; machining, 30%; assembly, 50%. The costs in the information systems department then total $2,712,150 ($1,452,150 + $1,260,000 from the first – round allocation), as in Exhibit 7 – 4. Under the step – down method, these costs are allocated directly to the operating departments alone. But the reciprocal method recognizes that a portion of the information systems department costs arises because of the support it provides to plant maintenance. Accordingly, the $2,712,150 is allocated to all departments supported by the information systems department, including the plant maintenance department: plant maintenance, 10%; machining, 80%; and assembly, 10% (see Exhibit 7 – 2). The plant maintenance costs that had been brought down to $0 now have $271,215 from the information systems department allocation. In the next step, these costs are again reallocated to all other departments, including information systems, in the same ratio that the plant maintenance costs were previously assigned. Now the information systems department costs that had been brought down to $0 have $54,243 from the plant maintenance department allocations. These costs are again allocated in the same ratio that the information systems department costs were previously assigned. Successive rounds result in smaller and smaller amounts being allocated to and reallocated from the support departments until eventually all support-department costs are allocated to the operating departments. The final budgeted overhead costs for the operating departments under the reciprocal method are given by the amounts of Exhibit 7 – 5.

An alternative way to implement the reciprocal method is to formulate and solve linear equations. This process requires three steps.

**Step 1: Express Support Department Costs and Reciprocal Relationships in the Form of Linear Equations.** We will use the term complete reciprocated costs or artificial coststo mean the support department’s own costs plus any interdepartmental cost allocations.Let PM be the complete reciprocated costs of plant maintenance and IS be the complete reciprocated costs of information systems. We can then express the data in Exhibit 6 – 2 as follows:

*PM* = $6,300,000 + 0.1*IS* (1)

*IS* = $1,452,150 + 0.2*PM* (2)

The 0.1*IS* term in equation 1 is the percentage of the information systems services *used by* plant maintenance. The 0.2*PM* term in equation 2 is the percentage of plant maintenanceservices *used by* information systems.

**Step 2: Solve the Set of Linear Equations to Obtain the Complete Reciprocated Costs of Each Support Department.** Substituting equation 1 into 2,

*IS* = $1,452,150 + [0.2($6,300,000 + 0.1*IS*)]

*IS* = $1,452,150 + $1,260,000 + 0.02*IS*

0.98*IS* = $2,712,150

*IS* = $2,767,500

Substituting this into equation 1,

*PM* = $6,300,000 + 0.1($2,767,500)

*PM* = $6,300,000 + $276,750 = $6,576,750

The complete reciprocated costs or artificial costs for plant maintenance and information systems are $6,576,750 and $2,767,500, respectively. Note that these are the same amounts that appear at the bottom of Exhibit 7 – 5 as the total support department costs allocated and reallocated during the iterative process. By setting up the system of simultaneous equations, we are able to solve for these amounts directly. When there are more than two support departments with reciprocal relationships, software such as Excel or Matlab is required to compute the complete reciprocated costs of each support department. Since the calculations involve finding the inverse of a matrix, the reciprocal method is also sometimes referred to as the **matrix method**.

**Step 3: Allocate the Complete Reciprocated Costs of Each Support Department to All Other Departments (Both Support Departments and Operating Departments) on the Basis of the Usage Percentages (Based on Total Units of Service Provided to All Departments).**

**Exhibit 7 – 5** Reciprocal Method of Allocating Support – Department Costs Using Repeated Iterations at Castleford Engineering for 2012

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **SUPPORT**  **DEPARTMENTS** | | **OPERATING**  **DEPARTMENTS** | |  |
| **Plant**  **Maintenance** | **Information**  **Systems** | **Machining** | **Assembly** | **Total** |
| Budgeted overhead costs before any interdepartmental cost allocations | $6,300,000 | $1,452,150 | $4,000,000 | $2,000,000 | $13,752,150 |
| First allocation of plant maintenance (2/10, 3/10, 5/10)a | (6,300,000) | 1,260,000 | 1,890,000 | 3,150,000 |  |
|  |  | 2,712,150 |  |  |  |
| First allocation of information systems (1/10, 8/10, 1/10)b | 271,215 | (2,712,150) | 2,169,720 | 271,215 |  |
| Second allocation of plant maintenance (2/10, 3/10, 5/10)a | (271,215) | 54,243 | 81,364 | 135,608 |  |
| Second allocation of information systems (1/10, 8/10, 1/10)b | 5,424 | (54,243) | 43,395 | 5,424 |  |
| Third allocation of plant maintenance (2/10, 3/10, 5/10)a | (5,424) | 1,085 | 1,627 | 2,712 |  |
| Third allocation of information systems (1/10, 8/10, 1/10)b | 109 | (1,085) | 867 | 109 |  |
| Fourth allocation of plant maintenance (2/10, 3/10, 5/10)a | (109) | 22 | 33 | 54 |  |
| Fourth allocation of information systems (1/10, 8/10, 1/10)b | 2 | (22) | 18 | 2 |  |
| Fourth allocation of plant maintenance (2/10, 3/10, 5/10)a | (2) | 0 | 1 | 1 |  |
| Total budgeted overhead of operating departments | $ 0 | $ 0 | $8,187,025 | $5,565,125 | $13,752,150 |
| Total support department amounts allocated and reallocated (the numbers in parentheses in the first two columns):  Information Systems: $2,712,150 + $54,243 + $1,085 + $22 = $2,767,500  Plant Maintenance: $6,300,000 + $271,215 + $5,424 + $109 + $2 = $6,576,750  a Base is (4,000 + 6,000 + 10,000), or 20,000 hours; 4,000 ÷ 20,000 = 2/10; 6,000 ÷ 20,000 = 3/10; 10,000 ÷ 20,000 = 5/10.  b Base is (500 + 4,000 + 500), or 5,000 hours; 500 ÷ 5,000 = 1/10; 4,000 ÷ 5,000 = 8/10; 500 ÷ 5,000 = 1/10. | | | | | |

Consider the information systems department. The complete reciprocated costs of $2,767,500 are allocated as follows:

|  |  |
| --- | --- |
| To plant maintenance (1/10) \* $2,767,500 | $ 276,750 |
| To machining (8/10) \* $2,767,500 | 2,214,000 |
| To assembly (1/10) \* $2,767,500 | 276,750 |
| Total | $2,767,500 |

Exhibit 7 – 6 presents summary data pertaining to the reciprocal method. Castleford’s $9,344,250 complete reciprocated costs of the support departments exceed the budgeted amount of $7,752,150.

|  |  |  |  |
| --- | --- | --- | --- |
| **Support Department** | **Complete Reciprocated Costs** | **Budgeted Costs** | **Difference** |
| Plant maintenance | $6,576,750 | $6,300,000 | $ 276,750 |
| Information systems | 2,767,500 | 1,452,150 | 1,315,350 |
| Total | $9,344,250 | $7,752,150 | $1,592,100 |

Each support department’s complete reciprocated cost is greater than the budgeted amount to take into account that the support costs will be allocated to all departments using its services and not just to operating departments. This step ensures that the reciprocal method fully recognizes all interrelationships among support departments, as well as relationships between support and operating departments. The difference between complete reciprocated costs and budgeted costs for each support department reflects the costs allocated among support departments. The total costs allocated to the operating departments under the reciprocal method are still only $7,752,150.

**Exhibit 7 – 6** Reciprocal Method of Allocating Support-Department Costs Using Linear Equations at Castleford Engineering for 2012

**SUPPORT DEPARTMENTS OPERATING DEPARTMENTS**

Assembly

Department

Machining

Department

Information Systems

($1,315,350 +$1,452,150

= $2,767,500)

Plant Maintenance

($276,750 +$6,300,000

= $6,576,750)

$1,973,025

$276,750 $1,315,350 $3,288,375

$2,214,000

$276,750

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **SUPPORT**  **DEPARTMENTS** | | **OPERATING**  **DEPARTMENTS** | |  |
| **Plant**  **Maintenance** | **Information**  **Systems** | **Machining** | **Assembly** | **Total** |
| Budgeted overhead costs before any interdepartmental cost allocations | $6,300,000 | $1,452,150 | $4,000,000 | $2,000,000 | $13,752,150 |
| Allocation of plant maintenance  (2/10, 3/10, 5/10)a | (6,576,750) | 1,315,350 | 1,973,025 | 3,288,375 |  |
| Allocation of information systems  (1/10, 8/10, 1/10)b | 276,750 | (2,767,500) | 2,214,000 | 276,750 |  |
| Total budgeted overhead of operating departments | $ 0 | $ 0 | $8,187,025 | $5,565,125 | $13,752,150 |
| a Base is (4,000 + 6,000 + 10,000), or 20,000 hours; 4,000 ÷ 20,000 = 2/10; 6,000 ÷ 20,000 = 3/10; 10,000 ÷ 20,000 = 5/10.  b Base is (500 + 4,000 + 500), or 5,000 hours; 500 ÷ 5,000 = 1/10; 4,000 ÷ 5,000 = 8/10; 500 ÷ 5,000 = 1/10. | | | | | |

**Overview of Methods**

Assume that Castleford reallocates the total budgeted overhead costs of each operating department in Exhibits 7 – 3 through 7 – 6 to individual products on the basis of budgeted machine-hours for the machining department (18,000 hours) and budgeted direct labor hours for the assembly department (25,000 hours). The budgeted overhead allocation rates (to the nearest dollar) for each operating department by allocation method are as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Support Department**  **Cost – Allocation Method** | **Total Budgeted Overhead Costs After Allocation of All Support – Department Costs** | | **Budgeted Overhead Rate per Hour for**  **Product – Costing Purposes** | |
| **Machining** | **Assembly** | **Machining**  **(18,000 machine – hours)** | **Assembly**  **(25,000 labor – hours)** |
| Direct | $7,653,300 | $6,098,850 | $425 | $244 |
| Step – down | 8,300,800 | 5,451,350 | 461 | 218 |
| Reciprocal | 8,187,025 | 5,565,125 | 455 | 223 |

These differences in budgeted overhead rates under the three support-department cost allocation methods can, for example, affect the amount of costs Castleford is reimbursed for engines it manufactures under cost-reimbursement contracts. Consider a cost – reimbursement contract for a project that uses 200 machine – hours in the machining department and 50 direct labor-hours in the assembly department. The overhead costs allocated to this contract under the three methods would be as follows:

Direct: $97,200 ($425 per hour x 200 hours + $244 per hour x 50 hours)

Step-down: 103,100 ($461 per hour x 200 hours + $218 per hour x 50 hours)

Reciprocal: 102,150 ($455 per hour x 200 hours + $223 per hour x 50 hours)

The amount of cost reimbursed to Castleford will differ depending on the method used to allocate support-department costs to the contract. Differences among the three methods’ allocations increase (1) as the magnitude of the reciprocal allocations increases and (2) as the differences across operating departments’ usage of each support department’s services increase. Note that while the final allocations under the reciprocal method are in between those under the direct and step-down methods in our example, this is not true in general. To avoid disputes in cost-reimbursement contracts that require allocation of support department costs, managers should always clarify the method to be used for allocation. For example, Medicare reimbursements and federal contracts with universities that pay for the recovery of indirect costs typically mandate use of the step-down method, with explicit requirements about the costs that can be included in the indirect cost pools.

The reciprocal method is conceptually the most precise method because it considers the mutual services provided among all support departments. The advantage of the direct and step – down methods is that they are simple to compute and understand relative to the reciprocal method. However, as computing power to perform repeated iterations (as in Exhibit 7 – 5) or to solve sets of simultaneous equations increases, more companies find the reciprocal method easier to implement.

Another advantage of the reciprocal method is that it highlights the complete reciprocated costs of support departments and how these costs differ from budgeted or actual costs of the departments. Knowing the complete reciprocated costs of a support department is a key input for decisions about whether to outsource all the services that the support department provides.

Suppose all of Castleford’s support-department costs are variable over the period of a possible outsourcing contract. Consider a third party’s bid to provide, say, all the information systems services currently provided by Castleford’s information systems department. Do not compare the bid to the $1,452,150 costs reported for the information systems department. The complete reciprocated costs of the information systems department, which include the services the plant maintenance department provides the information systems department, are $2,767,500 to deliver 5,000 hours of computer time to all other departments at Castleford. The complete reciprocated costs for computer time are $553.50 per hour ($2,767,500 ÷ 5,000 hours). Other things being equal, a third party’s bid to provide the same information services as Castleford’s internal department at less than $2,767,500, or $553.50 per hour (even if much greater than $1,452,150) would improve Castleford’s operating income.

To see this point, note that the relevant savings from shutting down the information systems department are $1,452,150 of information systems department costs *plus* $1,315,350 of plant maintenance department costs. By closing down the information systems department, Castleford will no longer incur the 20% of reciprocated plant maintenance department costs (equal to $1,315,350) that were incurred to support the information systems department. Therefore, the total cost savings are $2,767,500 ($1,452,150 + $1,315,350). Neither the direct nor the step-down methods can provide this relevant information for outsourcing decisions.

We now consider common costs, another special class of costs for which management accountants have developed specific allocation methods.

**Allocating Common Costs**

A **common cost** is a cost of operating a facility, activity, or like cost object that is shared by two or more users. Common costs exist because each user obtains a lower cost by sharing than the separate cost that would result if such a user were an independent entity.

The goal is to allocate common costs to each user in a reasonable way. Consider Jason Stevens, a graduating senior in Seattle who has been invited to a job interview with an employer in Albany. The round – trip Seattle – Albany airfare costs $1,200. A week later, Stevens is also invited to an interview with an employer in Chicago. The Seattle – Chicago round – trip airfare costs $800. Stevens decides to combine the two recruiting trips into a Seattle – Albany – Chicago – Seattle trip that will cost $1,500 in airfare. The $1,500 is a common cost that benefits both prospective employers. Two methods of allocating this common cost between the two prospective employers are the stand – alone method and the incremental method.

**Stand – Alone Cost – Allocation Method**

The **stand – alone cost – allocation method** determines the weights for cost allocation by considering each user of the cost as a separate entity. For the common-cost airfare of $1,500, information about the separate (stand-alone) round-trip airfares ($1,200 and $800) is used to determine the allocation weights:

Albany employer: $1,200 x $1,500 = 0.60 x $1,500 = $900

$1,200 + $800

Chicago employer: $800 x $1,500 = 0.40 x $1,500 = $600

$800 + $1,200

Advocates of this method often emphasize the fairness or equity criterion. The method is viewed as reasonable because each employer bears a proportionate share of total costs in relation to the individual stand – alone costs.

**Incremental Cost – Allocation Method**

The **incremental cost – allocation method** ranks the individual users of a cost object in the order of users most responsible for the common cost and then uses this ranking to allocate cost among those users. The first – ranked user of the cost object is the *primary user* (also called the *primary party*) and is allocated costs up to the costs of the primary user as a standalone user. The second – ranked user is the *first – incremental user* (*first – incremental party*) and is allocated the additional cost that arises from two users instead of only the primary user. The third – ranked user is the *second – incremental user* (*second – incremental party*) and is allocated the additional cost that arises from three users instead of two users, and so on.

To see how this method works, consider again Jason Stevens and his $1,500 airfare cost. Assume the Albany employer is viewed as the primary party. Stevens’ rationale is that he had already committed to go to Albany before accepting the invitation to interview in Chicago. The cost allocations would be as follows:

|  |  |  |
| --- | --- | --- |
|  | **Party Costs Allocated** | **Cumulative Costs Allocated** |
| Albany (primary) | $1,200 | $1,200 |
| Chicago (incremental) | 300($1,500 – $1,200) | $1,500 |
| Total | $1,500 |  |

The Albany employer is allocated the full Seattle – Albany airfare. The unallocated part of the total airfare is then allocated to the Chicago employer. If the Chicago employer had been chosen as the primary party, the cost allocations would have been Chicago $800 (the stand – alone round – trip Seattle – Chicago airfare) and Albany $700 ($1,500 – $800). When there are more than two parties, this method requires them to be ranked from first to last (such as by the date on which each employer invited the candidate to interview).

Under the incremental method, the primary party typically receives the highest allocation of the common costs. If the incremental users are newly formed companies or subunits, such as a new product line or a new sales territory, the incremental method may enhance their chances for short-run survival by assigning them a low allocation of the common costs. The difficulty with the method is that, particularly if a large common cost is involved, every user would prefer to be viewed as the incremental party!

One approach to sidestep disputes in such situations is to use the stand-alone cost allocation method. Another approach is to use the *Shapley value*, which considers each party as first the primary party and then the incremental party. From the calculations shown earlier, the Albany employer is allocated $1,200 as the primary party and $700 as the incremental party, for an average of $950 [($1,200 + $700) ÷ 2]. The Chicago employer is allocated $800 as the primary party and $300 as the incremental party, for an average of $550 [($800 + 300) ÷ 2]. The Shapley value method allocates, to each employer, the average of the costs allocated as the primary party and as the incremental party: $950 to the Albany employer and $550 to the Chicago employer.

As our discussion suggests, allocating common costs is not clear-cut and can generate disputes. Whenever feasible, the rules for such allocations should be agreed on in advance. If this is not done, then, rather than blindly follow one method or another, managers should exercise judgment when allocating common costs. For instance, Stevens must choose an allocation method for his airfare cost that is acceptable to each prospective employer. He cannot, for example, exceed the maximum reimbursable amount of airfare for either firm. The next section discusses the role of cost data in various types of contracts, another area where disputes about cost allocation frequently arise.

**Bundled Products and Revenue Allocation Methods**

Allocation issues can also arise when revenues from multiple products (for example, different software programs or cable and internet packages) are bundled together and sold at a single price. The methods for revenue allocation parallel those described for common – cost allocations.

**Bundling and Revenue Allocation**

*Revenues* are inflows of assets (almost always cash or accounts receivable) received for products or services provided to customers. Similar to cost allocation, **revenue allocation** occurs when revenues are related to a particular *revenue object* but cannot be traced to it in an economically feasible (cost-effective) way. A **revenue object** is anything for which a separate measurement of revenue is desired. Examples of revenue objects include products, customers, and divisions. We illustrate revenue-allocation issues for Dynamic Software Corporation, which develops, sells, and supports three software programs:

1. WordMaster, a word-processing program, released 36 months ago
2. DataMaster, a spreadsheet program, released 18 months ago
3. FinanceMaster, a budgeting and cash-management program, released six months ago with a lot of favorable media attention

Dynamic Software sells these three products individually as well as together as bundled products.

A **bundled product** is a package of two or more products (or services) that is sold for a single price but whose individual components may be sold as separate items at their own “stand – alone” prices. The price of a bundled product is typically less than the sum of the prices of the individual products sold separately. For example, banks often provide individual customers with a bundle of services from different departments (checking, safety – deposit box, and investment advisory) for a single fee. A resort hotel may offer, for a single amount per customer, a weekend package that includes services from its lodging (the room), food (the restaurant), and recreational (golf and tennis) departments. When department managers have revenue or profit responsibilities for individual products, the bundled revenue must be allocated among the individual products in the bundle.

Dynamic Software allocates revenues from its bundled product sales (called “suite sales”) to individual products. Individual-product profitability is used to compensate software engineers, outside developers, and product managers responsible for developing and managing each product.

How should Dynamic Software allocate suite revenues to individual products? Consider information pertaining to the three “stand – alone” and “suite” products in 2012:

|  |  |  |
| --- | --- | --- |
|  | **Selling Price** | **Manufacturing Cost per Unit** |
| Stand – alone |  |  |
| WordMaster | $125 | $18 |
| DataMaster | 150 | 20 |
| FinanceMaster | 225 | 25 |
| Suite |  |  |
| Word + Data | $220 |  |
| Word + Finance | 280 |  |
| Finance + Data | 305 |  |
| Word + Finance + Data | 380 |  |

Just as we saw in the section on common-cost allocations, the two main revenue-allocation methods are the stand-alone method and the incremental method.

**Stand – Alone Revenue – Allocation Method**

The **stand – alone revenue – allocation method** uses product – specific information on the products in the bundle as weights for allocating the bundled revenues to the individual products. The term *stand – alone* refers to the product as a separate (nonsuite) item. Consider the Word + Finance suite, which sells for $280. Three types of weights for the stand – alone method are as follows:

1. **Selling prices.** Using the individual selling prices of $125 for WordMaster and $225 for FinanceMaster, the weights for allocating the $280 suite revenues between the products are as follows:

WordMaster: $125 x $280 = 0.357 x $280 = $100

$125 + $225

FinanceMaster: $225 x $280 = 0.643 x $280 = $180

$125 + $225

1. **Unit costs.** This method uses the costs of the individual products (in this case, manufacturing cost per unit) to determine the weights for the revenue allocations.

FinanceMaster:$25 x $280 = 0.581 x $280 = $163

$18 + $25

WordMaster: $18 x $280 = 0.419 x $280 = $117

$18 + $25

1. **Physical units.** This method gives each product unit in the suite the same weight when allocating suite revenue to individual products. Therefore, with two products in the Word + Finance suite, each product is allocated 50% of the suite revenues.

FinanceMaster: 1 x $280 = 0.50 x $280 = $140

1 + 1

WordMaster: 1 x $280 = 0.50 x $280 = $140

1 + 1

These three approaches to determining weights for the stand – alone method result in very different revenue allocations to the individual products:

|  |  |  |
| --- | --- | --- |
| **Revenue – Allocation Weights** | **WordMaster** | **FinanceMaster** |
| Selling prices | $100 | $180 |
| Unit costs | 117 | 163 |
| Physical units | 140 | 140 |

Which method is preferred? The selling prices method is best, because the weights explicitly consider the prices customers are willing to pay for the individual products. Weighting approaches that use revenue information better capture “benefits received” by customers than unit costs or physical units. The physical – units revenue – allocation method is used when any of the other methods cannot be used (such as when selling prices are unstable or unit costs are difficult to calculate for individual products).

**Incremental Revenue – Allocation Method**

The **incremental revenue – allocation method** ranks individual products in a bundle according to criteria determined by management – such as the product in the bundle with the most sales – and then uses this ranking to allocate bundled revenues to individual products. The first – ranked product is the *primary product* in the bundle. The second ranked product is the *first – incremental product*, the third-ranked product is the *second – incremental product*, and so on.

How do companies decide on product rankings under the incremental revenue allocation method? Some organizations survey customers about the importance of each of the individual products to their purchase decision. Others use data on the recent stand – alone sales performance of the individual products in the bundle. A third approach is for top managers to use their knowledge or intuition to decide the rankings.

Consider again the Word + Finance suite. Assume WordMaster is designated as the primary product. If the suite selling price exceeds the stand-alone price of the primary product, the primary product is allocated 100% of its *stand – alone* revenue. Because the suite price of $280 exceeds the stand-alone price of $125 for WordMaster, WordMaster is allocated revenues of $125, with the remaining revenue of $155 ($280 – $125) allocated to FinanceMaster:

|  |  |  |
| --- | --- | --- |
|  | **Product Revenue Allocated** | **Cumulative Revenue Allocated** |
| WordMaster | $125 | $125 |
| FinanceMaster | 155 ($280 – $125) | $280 |
| Total | $280 |  |

If the suite price is less than or equal to the stand-alone price of the primary product, the primary product is allocated 100% of the suite revenue. All other products in the suite receive no allocation of revenue.

Now suppose FinanceMaster is designated as the primary product and WordMaster as the first-incremental product. Then, the incremental revenue-allocation method allocates revenues of the Word + Finance suite as follows:

|  |  |  |
| --- | --- | --- |
|  | **Product Revenue Allocated** | **Cumulative Revenue Allocated** |
| FinanceMaster | $225 | $225 |
| WordMaster | 55 ($280 – $225) | $280 |
| Total | $280 |  |

If Dynamic Software sells equal quantities of WordMaster and FinanceMaster, then the Shapley value method allocates to each product the average of the revenues allocated as the primary and first – incremental products:

WordMaster: ($125 + $ 55) ÷ 2 = $180 ÷ 2 =$ 90

FinanceMaster: ($225 + $155) ÷ 2 = $380 ÷ 2 = 190

Total $280

But what if, in the most recent quarter, the firm sells 80,000 units of WordMaster and 20,000 units of FinanceMaster. Because Dynamic Software sells four times as many units of WordMaster, its managers believe that the sales of the Word + Finance suite are four times more likely to be driven by WordMaster as the primary product. The *weighted* *Shapley value method* takes this fact into account. It assigns four times as much weight to the revenue allocations when WordMaster is the primary product as when FinanceMaster is the primary product, resulting in the following allocations:

WordMaster: ($125 \* 4 + $ 55 \* 1) ÷ (4 + 1) = $555 ÷ 5 = $111

FinanceMaster: ($225 \* 1 + $155 \* 4) ÷ (4 + 1) = $845 ÷ 5 = 169

Total $280

When there are more than two products in the suite, the incremental revenue-allocation method allocates suite revenues sequentially. Assume WordMaster is the primary product in Dynamic Software’s three-product suite (Word + Finance + Data). FinanceMaster is the first-incremental product, and DataMaster is the second-incremental product. This suite sells for $380. The allocation of the $380 suite revenues proceeds as follows:

|  |  |  |
| --- | --- | --- |
| **Product** | **Revenue Allocated** | **Cumulative Revenue Allocated** |
| WordMaster | $125 | $125 |
| FinanceMaster | 155 ($280 – $125) | $280 (price of Word + Finance suite) |
| DataMaster | 100 ($380 – $280) | $380 (price of Word + Finance + Data suite) |
| Total | $380 |  |

Now suppose WordMaster is the primary product, DataMaster is the first-incremental product, and FinanceMaster is the second – incremental product.

|  |  |  |
| --- | --- | --- |
| **Product** | **Revenue Allocated** | **Cumulative Revenue Allocated** |
| WordMaster | $125 | $125 |
| FinanceMaster | 95 ($220 – $125) | $220 (price of Word + Data suite) |
| DataMaster | 160 ($380 – $220) | $380 (price of Word + Data + Finance suite) |
| Total | $380 |  |

The ranking of the individual products in the suite determines the revenues allocated to them. Product managers at Dynamic Software likely would differ on how they believe their individual products contribute to sales of the suite products. In fact, each product manager would claim to be responsible for the primary product in the Word + Finance + Data suite!

Because the stand – alone revenue – allocation method does not require rankings of individual products in the suite, this method is less likely to cause debates among product managers.