LEARNING OBJECTIVES

- Distinguish the single-rate method from the dual-rate method
- Describe the way in which the choice between budgeted and actual cost-allocation rates affects the uncertainty that users face
- Allocate support-department costs using the direct method, the step-down method, and the reciprocal method
- Allocate common costs using the stand-alone method and the incremental method
- Explain the importance of explicit agreement between contracting parties when the reimbursement amount is based on costs incurred
- Explain the way in which bundling of products affects revenue allocation
- Allocate the revenues of a bundled product to the individual products in that bundle.
AN ACCOUNTANT??

An accountant is a person who passes as an exacting expert on the basis of being able to turn out, after innumerable processes, an infinite series of incomprehensive answers, calculated with micrometric precision, from vague assumptions based on debatable figures, taken from inconclusive documents created on instruments of problematical accuracy, by persons of dubious reliability and questionable mentality, for the avowed purpose of annoying and confounding a hopelessly defenseless management, who were unfortunate enough to ask for the information in the first place.

What are overhead costs?

- Manufacturing overhead costs
  - All manufacturing costs other than direct material and direct labour costs
- For product costing these are indirect product costs
- For responsibility costing these are the indirect costs of responsibility areas

DISCLAIMER

- This document includes forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934, the Private Securities Litigation Reform Act of 1995, the Financial Services Reform Act 2002, and other relevant national and international legislation, accounting standards, textbooks and other publications.

- These forward-looking statements are identified by terms and phrases such as "anticipate", "believe", "estimate", "expect", "intend", "project", "predict", "will", and similar expressions.

- Factors that could cause actual results to differ materially from those indicated in any forward-looking statement include, but are not limited to, unanticipated weather conditions; unscheduled power generation outages; unusual maintenance or repairs; unanticipated changes in costs, environmental incidents, including costs of compliance with environmental regulations; financial and regulatory initiatives; additional competition in the relevant markets and continuing industry consolidation; financial or regulatory accounting principles; political, legal, and economic conditions and developments in the countries in which we have a presence; changes in capital markets; availability of, or cost of, capital; employee workforce factors; delays and other obstacles associated with mergers, acquisitions, and investments in joint ventures; and costs and effects of legal and administrative proceedings, settlements, investigations, and claims.

- Did I mention the weather?

- Please refer to the Generally Accepted Accounting Principles and various texts on management accounting techniques for additional information concerning factors that could cause actual results to differ materially from those in the forward-looking statements. Management and the accountants undertake no obligation to update the information contained herein.
What are overhead costs? (cont.)

- Incurred for a variety of products and cannot be traced to individual products/cost objects
- Can be traced to individual products/cost objects but it is more appropriate to treat this cost as a cost of all outputs
- Includes depreciation, factory insurance, factory electricity costs, cost of manufacturing support departments, indirect materials, indirect labour
- Non-manufacturing costs are all costs incurred outside of manufacturing

Allocating indirect costs: some general principles

- Using cost pools
  - Cost assignment can take two forms
    - Direct costs can be traced directly to products
    - Indirect costs cannot be traced to cost objects (by definition); therefore they need to be allocated
  - A cost pool is a collection of costs that are to be allocated to cost objects
    - Have a common allocation base
    - Often used to simplify the allocation process
Allocating indirect costs: some general principles (cont.)

- Determining cost allocation bases
  - A cost allocation base is some factor or variable that allows us to allocate costs in a cost pool to cost objects
    - Should be a cost driver
  - A cost driver is an activity or factor that causes a cost to be incurred

Methods Of Tracing

- Tracing is the actual assignment of costs to a cost object using an observable measure of the resources consumed by the cost object. Tracing costs to cost objects can occur in the following two ways:
  - Direct tracing is the process of identifying and assigning costs to a cost object that are specifically or physically associated with the cost object.
  - Driver tracing is the use of drivers to assign costs to cost objects.

Cost Assignment Methods

- Cost of Resources
  - Resource Drivers
    - Direct Tracing
      - Physical Observation
    - Driver Tracing
      - Activity Drivers
    - "Subjective" Allocation
      - Convenience Assumed Linkage
- Cost Objects
Allocating costs of a support department to operating departments

- **Operating (production) department**
  - directly adds value to a product or service.

- **Support (service) department**
  - provides the services that assist other internal departments in the company.

Objectives of cost allocation

- To obtain a mutually agreeable price
- To compute product-line profitability
- To predict the economics effects of planning and control
- To value inventory
- To motivate managers

Steps in allocating support costs

1. Departmentalise the firm.
2. Classify each department as a support department or a producing department.
3. Trace all overhead costs in the firm to support or producing departments.
4. Steps 1 to 3
Steps in allocating support costs

1. Allocate support department costs to the producing departments.
2. Calculate predetermined overhead rates for producing departments.
3. Allocate overhead costs to the units of individual products through the predetermined overhead rates.

Allocating overhead costs to products

- Reliable product costs are important for a range of management decisions.
- An important issue is how to allocate indirect costs to obtain a reliable estimate of a product’s cost.
- Three possible approaches:
  - A Plantwide rate
  - Departmental rates
  - Activity-based costing

Allocating overhead costs to products (cont.)

Using a plantwide rate

- A plantwide rate is a single overhead rate that is calculated for the entire production plant.
- Three steps:
  1. Identify the overhead cost driver
  2. Calculate the overhead rate per unit of cost driver
  3. Apply the manufacturing overhead cost to the product based on the predetermined overhead rate and the product’s consumption of the cost driver.
Allocating overhead costs to products (cont.)

**Departmental overhead rates** recognise that overheads in each department may be driven by different cost drivers
- **Two-stage cost allocation** for department overhead rates
- **Stage one**: Overhead costs are assigned to production departments
  - All manufacturing costs are distributed to each department, involving tracing and allocating
  - Support department costs are reassigned to overhead cost pools in the production departments

(cont.)

Allocating overhead costs to products (cont.)

**Stage two**: overhead costs are applied to products
- Manufacturing overhead rates are calculated for each production department

\[
\text{Predetermined manufacturing overhead rate} = \frac{\text{Budgeted manufacturing overhead}}{\text{Budgeted level of cost driver}}
\]

\[
\text{Applied overhead} = \text{Predetermined overhead rate} \times \text{Quantity of cost driver consumed by the product}
\]
Allocating overhead costs to products (cont.)

**Activity-based costing** can be used to allocate overhead costs to products

- **Stage one**: Overhead costs are assigned to activity cost pools for significant activities (not departments)
- **Stage two**: Activity costs are applied to products using a rate, based on the product's consumption of the activity

Activities
- A unit of work performance within the organisation

Activity-based costing compared with the two-stage cost allocation process

- **Departmental rates**
  - **Stage one**: Allocation bases used are ideally determined by causal relationships
  - **Stage two**: One cost driver per department, with cost drivers being measures of production volume

- **Activity-based costing**
  - Focuses on the costs of activities
  - Has many activity cost pools and cost drivers which may be volume or non-volume related
Evaluating the alternatives for allocating overheads

- Plantwide and departmental overhead costing systems tend to overcost high-volume relatively simple products and undercost low-volume complex products.
- A system with multiple cost drivers and overhead rates is more complicated and costly to operate, compared with a single plantwide rate, but may produce more accurate and useful information for decision making.

Issues in estimating overhead rates

**Identifying overhead cost drivers**
- What is the major factor that causes manufacturing overhead to be incurred?
- To what extent does the overhead cost vary in proportion with the cost driver?
- How easy is it to measure the cost driver?
- It is difficult to identify one factor that is a dominant cause of manufacturing costs, particularly at the plant or department level.

*Issues in estimating overhead rates (cont.)*

**Volume-based cost drivers**
- Conventional costing systems assume that overhead costs vary proportionally with production volume.
  - Based on output: number of units produced
  - Based on inputs: direct labour hours, direct labour cost, machine hours, direct material quantity
  - For plantwide rates, select a cost driver that is common to all products
  - Cost drivers that are measured in dollars should be avoided.
Issues in estimating overhead rates (cont.)

Non-volume-based cost drivers

• Not all aspects of manufacturing overhead varies with production volume
• Need to be careful in assigning volume-based cost driver to fixed costs
• Activity-based costing recognises both volume-based and non-volume-based cost drivers

(continues)

Issues in estimating overhead rates (cont.)

• Over what period should overhead rates be set?
  ▪ Yearly rates are generally used
  ▪ Monthly rates tend to fluctuate due to price changes and seasonal factors
  ▪ A normalised overhead is an overhead rate calculated over a relatively long period
    ▪ Smooths out fluctuations in overhead rates, therefore smoothing out product costs

Allocating indirect costs to responsibility centres

• Levels of cost allocation
  ▪ Corporate level: some head office costs are allocated to business units
  ▪ Within business units: administrative costs of business units may be allocated to operating units
  ▪ Manufacturing plant: indirect manufacturing costs may be allocated to production departments
• Reasons for allocating costs to responsibility centres
  ▪ Helps managers understand the economic effects of their decisions
  ▪ Encourages a particular pattern of resource usage
  ▪ Supports the product costing system
Allocating indirect costs to responsibility centres (cont.)

- **General principles**
  - Allocation bases should be cost drivers, where there is a clear and direct relationship between the amount of cost driver and the level of cost.
  - Other criteria include
    - Benefits received
    - Ability to bear additional costs
  - Using budgeted, not actual, allocation data
    - Minimises the possibility that the activities of one department will affect the costs allocated to other departments
    - Provides better information for managers to plan and control their use of indirect resources

Allocating costs of a support department to operating departments - **Single-rate and dual-rate methods**

- **Single-rate method**
  - allocates costs in each cost pool (service department) to cost objects (production departments) using the same rate per unit of a single allocation base.
  - No distinction is made between fixed and variable costs in this method.

- **Dual-rate method**:
  - segregates costs within each cost pool into two segments
    - a variable-cost pool
    - a fixed-cost pool
  - each pool uses a different cost-allocation base
  - treats fixed and variable costs more realistically, but is more complex to implement.
  - Distinguishing between fixed and variable overheads
    - Helps managers to understand the behaviour of overhead costs if fixed and variable overheads are separated
    - Variable costing allocates only variable overhead costs to products
Allocating costs of a support department to operating departments - **Single-rate and dual-rate methods**

- Under either method, allocation of support costs can be based on:
  - budgeted overhead rate and budgeted hours, or
  - Normal (normalised) costing: budgeted overhead rate and actual hours,
  - actual rates and actual hours.

**Single-rate method**
- a combined budgeted rate is used for fixed and variable costs.

**Dual-rate method**
- cost-allocation bases must be chosen for each of the variable and fixed-cost pools.

If you were to use the same option throughout:
- **budgeted** rates and **budgeted** hours of usage, or
- **budgeted** rates and **actual** hours of usage,
- then the single-rate and dual-rate methods would yield identical results.
Allocating costs of a support department to operating departments
- Budgeted usage, actual usage and capacity-level allocation bases
- Actual usage may be equal to, greater than, or less than budgeted usage.
- Allocation may be based on:
  - budgeted usage
  - actual usage
  - practical capacity
- In all three cases, regardless of actual usage, the fixed-cost allocations are the same.

Once the choice has been made regarding single or dual-rate allocation, the next issue of choosing between allocating budgeted or actual costs
- The choice between budgeted and actual cost-allocation rates affects the uncertainty that users face.
- With budgeted rates there is no uncertainty because users know the rates at the start of the period
  - This can be of benefit in short-term and long-term planning
  - A disadvantage is that there is an incentive for operating managers to underestimate their planned usage, thus being assigned a lower percentage of allocated costs. This can be overcome in part by assessing a higher charge for exceeding budgeted usage

Allocating costs based on actual usage give a more accurate allocation based on actual costs and usage.
- Actual allocations have several disadvantages:
  - a lack of timely information,
  - reduced incentives for support to manage costs, and
  - increased accounting costs.
Allocating costs of a support department to operating departments

Estimating the amount of a cost driver: the effects of capacity
- Denominator volume: an estimate of the quantity of the cost driver used to determine overhead rates
  - Expected use of cost driver, based on the budgeted volume or normal volume
  - Normal volume: volume that will satisfy demand over the normal business cycle (could be several years)
  - Expected supply of cost driver, based on theoretical capacity or practical capacity
    - Theoretical capacity: maximum capacity that can be achieved
    - Practical capacity: allows for normal downtime

Allocating costs of a support department to operating departments - Allocation based on the supply of capacity
- When practical capacity is used to allocate costs, the single-rate and the dual-rate methods allocate, respectively, only the actual fixed-cost resources used, or the budgeted fixed-cost resources to be used.
- Using practical capacity to allocate costs:
  - focuses attention on managing unused capacity
  - avoids burdening the user divisions with the cost of unused capacity.

Allocating costs of a support department to operating departments

<table>
<thead>
<tr>
<th>Month</th>
<th>Actual repairs</th>
<th>Expected repairs</th>
<th>Actual repairs as a % of expected repairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>200,000</td>
<td>250,000</td>
<td>80%</td>
</tr>
<tr>
<td>Feb</td>
<td>210,000</td>
<td>300,000</td>
<td>70%</td>
</tr>
<tr>
<td>Mar</td>
<td>220,000</td>
<td>400,000</td>
<td>55%</td>
</tr>
<tr>
<td>Apr</td>
<td>230,000</td>
<td>500,000</td>
<td>46%</td>
</tr>
<tr>
<td>May</td>
<td>240,000</td>
<td>600,000</td>
<td>40%</td>
</tr>
<tr>
<td>June</td>
<td>250,000</td>
<td>700,000</td>
<td>36%</td>
</tr>
<tr>
<td>July</td>
<td>260,000</td>
<td>800,000</td>
<td>33%</td>
</tr>
<tr>
<td>Aug</td>
<td>270,000</td>
<td>900,000</td>
<td>30%</td>
</tr>
<tr>
<td>Sep</td>
<td>280,000</td>
<td>1,000,000</td>
<td>28%</td>
</tr>
<tr>
<td>Oct</td>
<td>290,000</td>
<td>1,100,000</td>
<td>26%</td>
</tr>
<tr>
<td>Nov</td>
<td>300,000</td>
<td>1,200,000</td>
<td>25%</td>
</tr>
<tr>
<td>Dec</td>
<td>310,000</td>
<td>1,300,000</td>
<td>24%</td>
</tr>
</tbody>
</table>
Allocating costs of multiple support departments

- Informs user departments of the cost of the services that they are using, to assist them with planning and control of that usage
- Allocation methods include
  - **Direct**: support department costs are allocated directly to production departments
  - **Step-down (Sequential)**: partially recognises the services provided by one support department to another
  - **Reciprocal services**: fully recognises the provision of services between support departments

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**Direct method:**

- allocates support costs only to operating departments
- no interaction between support departments prior to allocation.

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**Flow of costs - direct method**

<table>
<thead>
<tr>
<th>Service Departments</th>
<th>Producing Departments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Systems</td>
<td>Machining</td>
</tr>
<tr>
<td>Human Resources</td>
<td>Assembly</td>
</tr>
<tr>
<td>Plant Maintenance</td>
<td></td>
</tr>
</tbody>
</table>
Flow of costs - direct method

Service Departments
- Information Systems
- Human Resources
- Plant Maintenance

Producing Departments
- Machining
- Assembly

Cost Object (Products)
Allocating costs of multiple support departments

Data used in cost allocation illustrations:

<table>
<thead>
<tr>
<th>SUPPORT DEPARTMENTS</th>
<th>OPERATING DEPARTMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Maintenance</td>
<td>Machining Department</td>
</tr>
<tr>
<td>$3,000,000</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>$1,500,000</td>
<td>Assembly Department</td>
</tr>
<tr>
<td>$1,500,000</td>
<td></td>
</tr>
</tbody>
</table>

Direct method:
Allocating costs of multiple support departments

Direct method

✔ An advantage of the direct method is that it is easy and convenient to use.

✘ A disadvantage is that it does not recognise the costs for interdepartmental services provided by one service department to another.

Instead, any costs incurred to provide services to other service departments are passed directly to the producing departments.

Step-down (sequential) method:

• allocates support costs to other support departments and to operating departments that partially recognises the mutual services provided among all support departments.

• allocates the service departments’ costs sequentially, firstly to the major support department user and then to the remaining service departments and to the producing departments.

• The step-down (sequential) method follows a “step-down” process following a pre-determined ranking.

• one-way interaction between support departments prior to allocation.

Step-down (sequential) method:

1. Rank the Service Departments

   - Ranking is a subjective process
     - Order of percentage of service rendered to other departments
     - Order of $ amount of service rendered measured in terms of the amount of direct costs of each support department
       - I.e. Support department with largest costs is ranked first, the next largest second etc.

2. Distribute each department in sequence until all support costs have been allocated.
Flow of costs - step-down (sequential) method

Service Departments

Information Systems

Human Resources

Plant Maintenance

Producing Departments

Machining

Assembly

Cost Object (Products)

Allocating costs of multiple support departments

Step-down method:
Sequential method

✔ An advantage of the sequential method is that it gives some recognition of interdepartmental services

✘ A disadvantage of the sequential method is that it provides only partial recognition of interdepartmental services

Allocating costs of multiple support departments

Reciprocal method:

• allocates support department costs to operating departments by fully recognising the mutual services provided among all support departments
• full two-way interaction between support departments prior to allocation.

Allocating costs of multiple support departments

Reciprocal method:

• The reciprocal (linear algebra) method uses a series of linear algebraic equations, which are solved simultaneously, to allocate service department costs both interdepartmentally and to the producing departments
Flow of costs - Reciprocal method

Service Departments
- Information Systems
- Plant Maintenance

Producing Departments
- Machining
- Assembly

Cost Object (Products)
Allocating costs of multiple support departments (Reciprocal Method)

Solve as simultaneous linear equations:

\[ \begin{align*}
A &= 6,300,000 + 0.1B \\
B &= 1,452,150 + 0.2A
\end{align*} \]

\[ \begin{align*}
A &= 6,300,000 + 0.1(1,452,150 + 0.2A) \\
A &= 6,300,000 + 145,215 + 0.02A \\
A &= 6,445,215 + 0.02A \\
A - 0.02A &= 6,445,215 \\
0.98A &= 6,445,215 \\
A &= 6,445,215 \div 0.98 \\
A &= 6,576,750 \\
B &= 1,452,150 + 0.2(6,576,750) \\
B &= 1,452,150 + 1,315,350 \\
B &= 2,767,500
\end{align*} \]
Allocating costs of multiple support departments

Reciprocal method:

- Overview of methods:
  - Reciprocal is the most precise
  - Direct and step-down are simple to compute and understand
  - Direct method is widely used.
Allocating common costs

- **Common cost** – the cost of operating a facility, activity, or like cost object, that is shared by two or more users at a lower cost than the individual cost of the activity to each user.

Allocating common costs

**Stand-alone cost-allocation method:**

- uses information pertaining to each user of a cost object as a separate entity to determine the cost-allocation weights
- individual costs are added together and allocation percentages are calculated from the whole, and applied to the common cost.

### Meeting at Sydney Campus

- Airfare Darwin to Sydney Direct (Return) $2,064.00 48%
- Airfare Darwin to Melbourne Direct (Return) $2,196.00 52%

### Additional meeting at Melbourne Campus

- Airfare Darwin to Melbourne Direct (Return) $4,260.00 100%

### Airfare Darwin to Sydney via Melbourne (Return) $3,022.00 → Common Cost

**Common Cost Applied (Stand-alone method)**

- To Melbourne Campus $1,557.82 → $3,022 x 52%
- To Sydney Campus $1,464.18 → $3,022 x 48%

$3,022.00
Incremental cost-allocation method

- Ranks the individual users of a cost object in the order of users most responsible for a common cost and then uses this ranking to allocate the cost among the users.
- The first ranked user is the primary user and is allocated costs up to the costs of the primary user as a stand-alone user (typically gets the highest allocation of the common costs).
- The second ranked user is the first incremental user and is allocated the additional cost that arises from two users instead of only the primary user.
- Subsequent users are handled in the same manner as the second ranked user.

Cost allocations and contracts

- Many commercial contracts include clauses based on cost accounting information.
- There must be explicit agreement about the definitions of cost, and what can be included and excluded.
- Disputes can be reduced by making cost-allocation rules as explicit as possible.
Revenue allocation and bundled products

- Revenue allocation occurs when revenues are related to a particular revenue object, but cannot be traced to it in an economically feasible manner.
- Revenue object – anything for which a separate measurement of revenue is desired.
- Bundled product – a package of two or more products or services that are sold for single price, but individual components of the bundle may also be sold as separate items at their own 'stand-alone' prices.

Revenue-allocation methods

Stand-alone revenue-allocation method

- Stand-alone (separate) revenue allocation method uses product-specific information on the products in the bundle as weights for allocating the bundled revenues to the individual products. Three types of weights may be used:
  - selling prices
  - unit costs
  - physical units.

Incremental revenue-allocation method

- Incremental revenue-allocation method ranks individual products in a bundle according to criteria determined by management, and then uses this ranking to allocate bundled revenues to individual products (similar to earlier discussed incremental cost-allocation method):
  - the first-ranked product is the primary product
  - the second-ranked product is the first incremental product
  - the third-ranked product is the second incremental product, and so on.
Revenue-allocation methods

Other revenue-allocation methods:
- Another method of revenue allocation is management judgement, where that judgement is not explicitly based on a specific formula.