Introduction To Management Accounting Notes - Lecture notes, lectures 1 - 10 - part 1, compleet

Introduction to Management Accounting (University of Sheffield)

Introduction to management accounting (102)

Nature and scope of management accounting

Definition of management accounting: Wilson and Chua 1993

"Encompassing techniques and processes that are intended to provide financial and non-financial information to people within an organisation to make better decisions and thereby achieve organisational control and enhance organisational effectiveness".

Definition of accounting:

"Process of identifying, measuring and communicating economic information to permit informed judgements and decisions by users of the information"

Users may be:

- External parties - an outside organisation (financial accounting)
- Internal parties – within an organisation (management accounting)

Purpose of accounting systems

1) Formulating overall strategies and long range plans – internal non routine reporting
2) Resource allocation decisions eg product and cost emphasis and pricing – internal routine reporting
3) Cost planning and control of operations and activities – internal routine reporting
4) Performance measurement and evaluation of people – internal non routine reporting
5) Meeting external regulatory and legal reporting requirements – external reporting

Distinction between financial accounting and management accounting

	Financial	Management
Nature of reports	General	Specific
Amount of detail	Broad overview	Considerable detail
Regulations	Subject to accounting regulations	No specific regulations
Reporting intervals	Annual	Frequency as required
Horizon time	Backward	Backward and forward
Range and quality of information	Quantifiable information in monetary terms	Financial and non-financial information

Management accounting is less constrained than financial accounting

Cost accounting vs cost management

Cost accounting – provides information for both management accounting and financial accounting. It also measures and reports financial and non-financial data that relates to the cost of acquiring or consuming resources by an organisation.

Cost management – describes activities of managers in short run and long run planning and control of costs. It also includes the continuous reduction of costs. It is a key part of general management strategies and their implementation.

Value of management accounting to a business

Role of a management accounting:

Planning – formulate plans to different activities and coordinate plans into budget for business as a whole

Controlling – produce performance reports that compare actual outcomes with planned outcomes

Organising – develops accounting reporting systems that are closely related to organisational structure

Communicating – aid communications functions by installing and maintaining an effective communication and reporting system (eg budget and performance reporting process)

Motivating – budget and performance reports produced by accountants have an important influence on motivation of managers and employees

Decision making – providing guidance for decision making and problem solving in order to achieve optimal results or maximise investors value

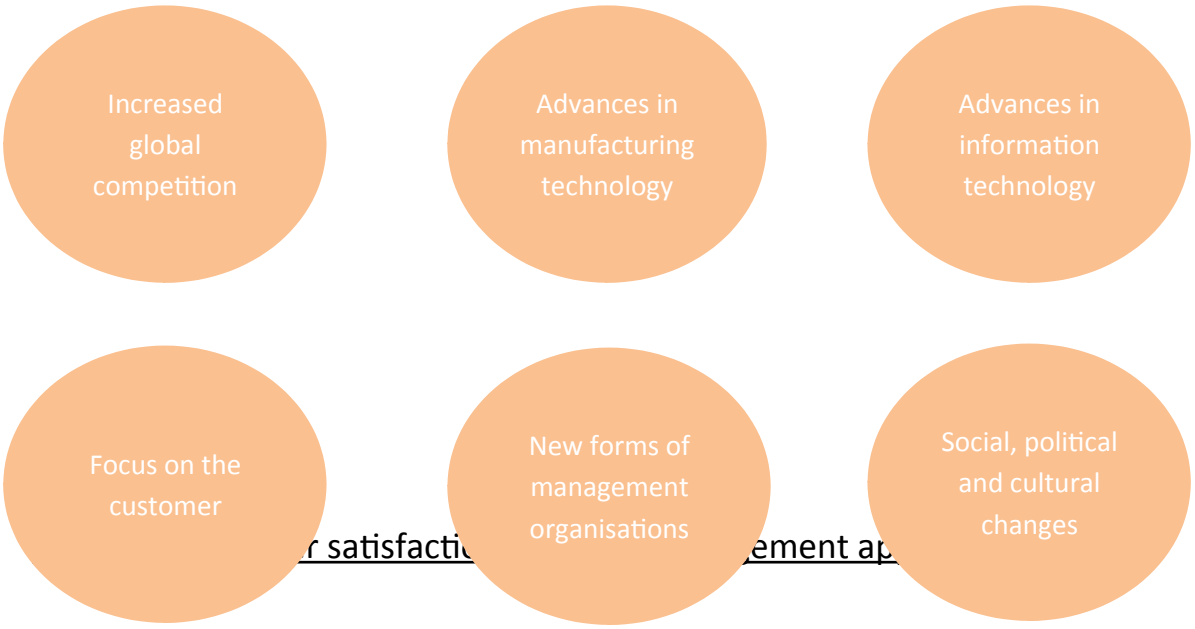
Example of a performance report:

	Budget £	Actual £	Variance £
Revenue	57000	60000	3000 F
Cost of goods sold	40000	43400	3400 U
Wages	6700	7000	300 U
General	1300	900	400 F
Fixed costs	5000	5000	-
Operating income	4000	3700	300 U

The fact the variance is overall £300 unfavorable means it may entice the company to investigate why this may have occurred or ask the question Did the purchasing department pay more than expected for merchandise?

The figures show that cost of goods sold were 72% of revenue instead of 70%, thus meaning a lower gross margin.

Contemporary business environments



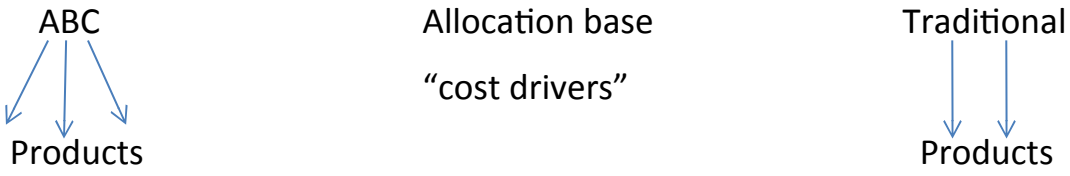
r satisfacti ement ap

1. **Key success factors**

- Cost efficiency – increased emphasis on accurate product costs and cost management
- Quality – total quality management and quality measures
- Time – reduce cycle time and focus on non-value added activities
- Innovation – responsiveness in meeting customer requirements
- Product comparisons
- Feedback on customer satisfaction – in order to continually improve themselves

<u>ABC costing and management</u>

This is a product costing method that is useful in all industries where overheads is higher relative to other costs.



<u>Life cycle costing</u>

This identifies and monitors costs through product life cycles:

- Research and development costs
- Product design and testing costs
- Manufacturing, inspecting, packaging and warehousing costs
- Marketing, promotion, and distribution costs
- Sales and service costs

<u>Total quality management</u>

2. Continuous improvement

- Static historical standards are no longer appropriate
- Benchmarking

3. Employee empowerment

- Delegate more responsibility to people closest to operating processes and customers

4. Value chain analysis

- Suppliers, R&D, design, production, marketing, distribution, customer service, customers
- Internal customer perspective

5. Social responsibility and corporate ethics

- CSR
- Sustainable development

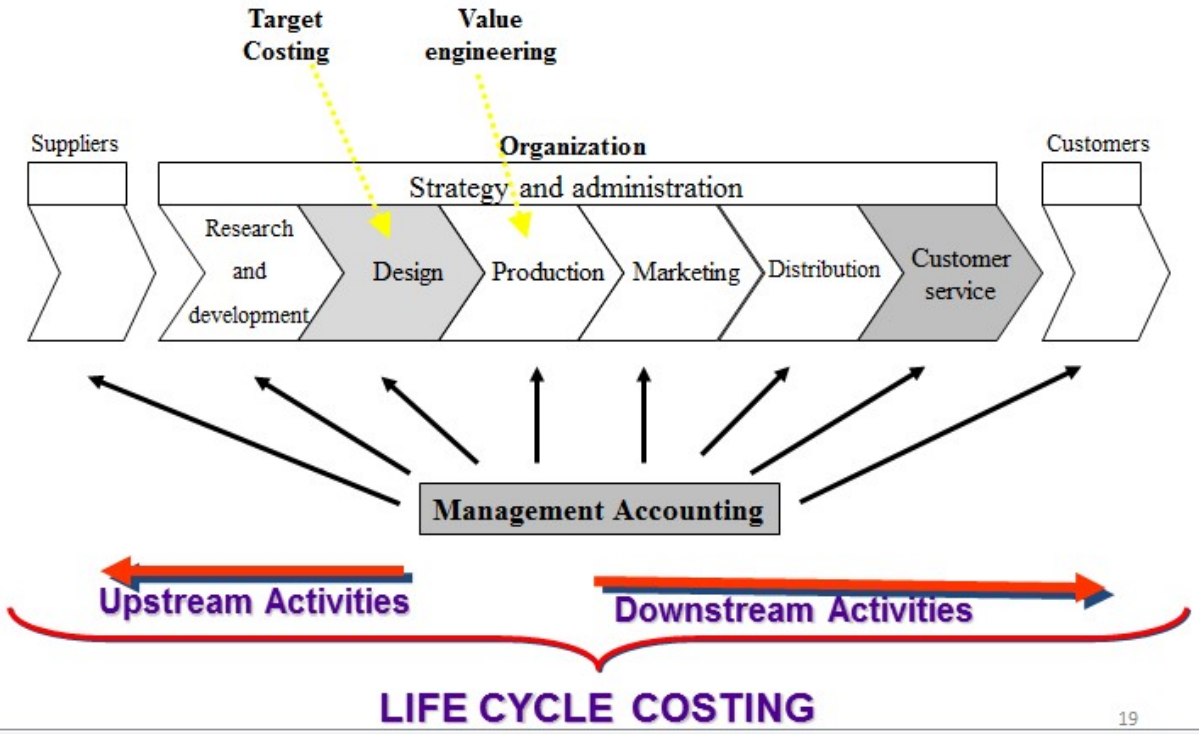
Benchmarking

Identify an activity that needs to be improved.

Find an organization that is the most efficient at this activity.

Study its process, and **utilize that process**.

Value chain



Target costing

Identify product opportunity

Determine price competitive

Determine if product can be made cost sufficiently low to provide desired profit

Strategic management accounting

"Provision of information to support strategic decisions in organisations" (Innes 1998)

Review of literature by Lord (1996) identified the following strands:

1. **Extension from internal focus** of management accounting to include external information about **competitors**.

2. The relationship between the **strategic position chosen by the firm** and the expected emphasis on management accounting

3. **Gaining competitive advantage** through exploiting linkages in the **value chain**

4. Formulating and supporting the overall strategy of an organization **by developing an integrated framework of performance measurement**

What is a cost?

A cost is a resource sacrificed or foregone to achieve a specific objective. It is the expenditure incurred.

Cost accumulation and classification

Direct cost – cost object are those that are related to a given cost object (eg production dept) and that can be traced to it in an economically feasible way

Indirect cost – are related to the particular cost object but can't be traced.

Eg a company may have:

2 production depts. – assembly (£70000) and finishing (£50000)

2 service depts. – maintenance (£40000) and personnel (£24000)

Assume that the maintenance dept costs are allocated equally among the production dept but by how much? We would assume equally so £20000 each.

Manufacturing costs are often combined as follows:

Direct materials Direct labour Factory overheads

Prime cost Conversion Cost

Manufacturing costs

Production costs – are those costs that are attached to products and included in stock valuation. Eg raw materials, labour or production overheads

Period costs – are NOT attached to products and are not included in stock valuation. Eg marketing and admin expenses

Treatment would be as follows:

Manufacturing cost	product code	unsold	Recorded as an asset in balance sheet and expense in income statement when sold
		Sold	
Non manufacturing cost	product code		Recorded as an expense in current account period

For example

Production cost (cost of goods sold) = £200,000

Period cost (marketing and admin) = £70,000

We will assume that 60% of output is sold for £250,000 with no opening stock

Sales		£250,000
Cost of goods sold		
Production cost	200,000	
Less closing stock (40%)	80,000	
Cost of goods sold (60%)		120,000
Gross profit		130,000
Less period costs (100%)		70,000
Net profit		60,000

Cost behaviour patterns

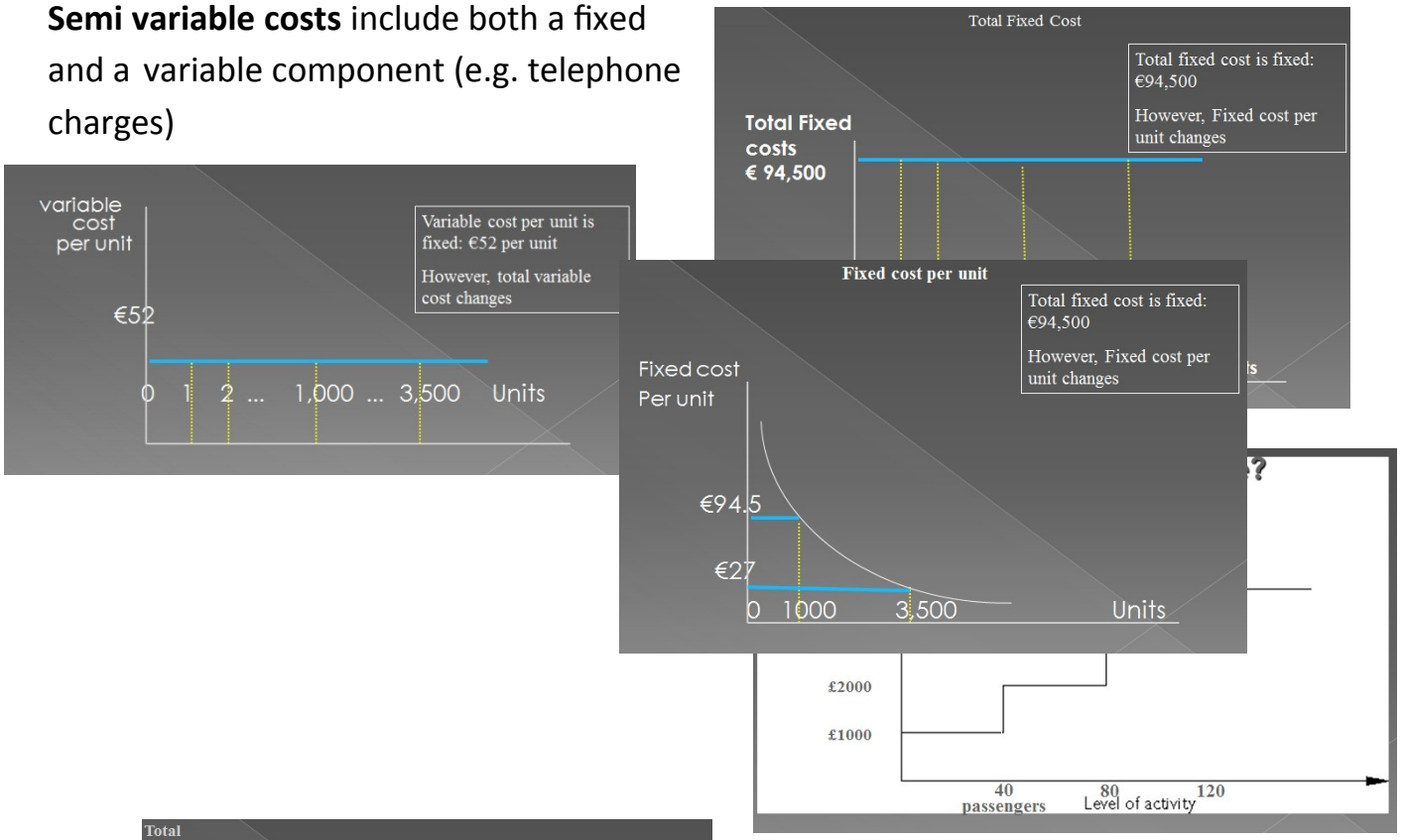
Costs are either variable, fixed, semi variable or semi fixed.

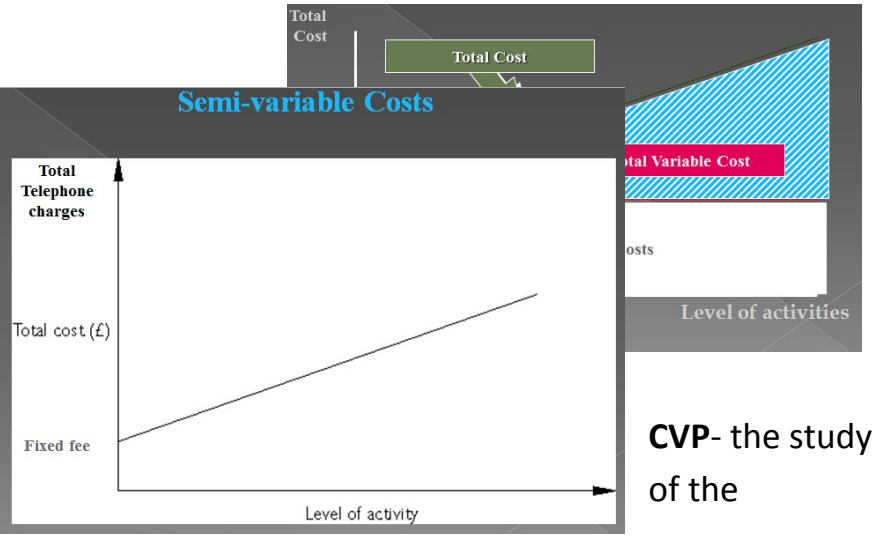
Variable costs will vary in direct proportion with activity

Fixed costs remain constant over the range of activities

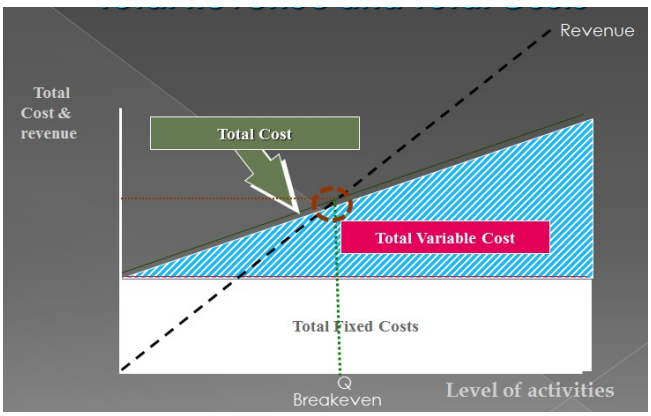
Semi fixed costs are fixed within specified activity levels, but they eventually increase or decrease by some constant amount at critical activity levels

Semi variable costs include both a fixed and a variable component (e.g. telephone charges)





CVP- the study of the



interrelationships between costs and volume and how they impact profit, that is a basic planning tool available to managers

CVP analysis examines:

the behaviour of total revenues, total costs, and operating profit as changes occur in the output level, selling price, variable costs per unit, or fixed costs.

CVP aids management in . . .

- setting prices for products and services.
- introducing a new product or service.
- replacing a piece of equipment.
- make or buy decisions.
- performing strategic “what if?” analyses.

1. Changes in the level of revenues and costs arise only because of changes in the number of product (or service) units produced and sold.
2. Total costs can be divided into a fixed component and a component that is variable with respect to the level of output.
3. When graphed, the behaviour of total revenues and total costs is linear (straight-line) in relation to output units within the relevant range (and time period).
4. The unit selling price, unit variable costs, and fixed costs are known and constant.
5. The analysis either covers a single product or assumes that the sales mix when multiple products are sold will remain constant as the level of total units sold changes.
6. All revenues and costs can be added and compared without taking into account the time value of money.

Cost volume profit (CVP) analysis

This looks at break-even points, where the formula is as follows:

Profit = Revenue – Total Costs Revenue= Total Cost + Profit

This would then be subdivided to:

Revenue = Fixed cost + Variable Cost + Profit

(units sold x price)= fixed costs + (units sold x variable cost per unit) + Profit

CVP Model

(QxP) = F + (QxV) + N (QxP)-(QxV)= F+N Qx(P-V)=F+N

So we would assume that the profit was zero in order to see how many units would need to be produced in order to break even making neither a profit or loss and so we would define the formula as follows:

$Q=\frac{FC}{MC(P-V)}$ This would give the unit contribution margin

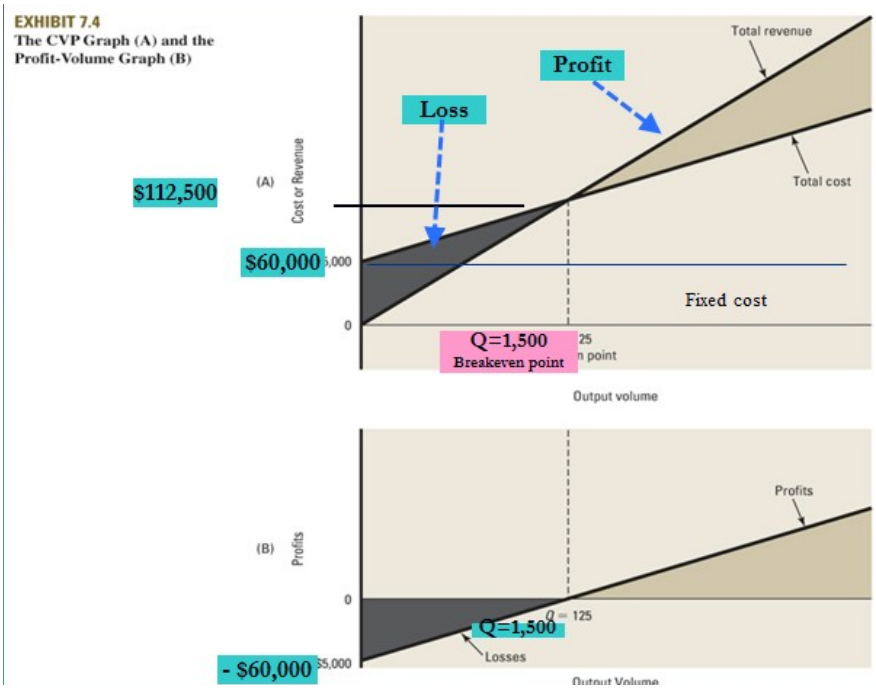
For example:

$Q=\frac{£60{,}000}{(75-35)}$ = 1500 units to be produced to make neither profit/loss

To work out break-even revenue we would take the break-even point and times it by the selling price

BEP X SP = BEP REVENUE 1500 units x £75 = £112,500

Graph showing break-even graph



Marginal costing for short term decisions

Types are as follows:

- Trade-offs between fixed and variable costs
- Accept or reject a special order
- Dropping a product or closing down a loss making dept
- Limited factor analysis/theory of constraints
- Make or buy decisions / outsourcing decisions

But we must also consider not only financial factors, but non-financial factors as well. Financial factors would be revenues and costs, whereas non-financial factors may be staff motivation, environment, government policies etc.

Cost planning – trade-offs between fixed and variable costs example

Management is considering buying a new piece of equipment that will: reduce variable costs but also increase fixed costs by $27,000 per year.

Annual sales are currently 2,700 units at $75 per unit.

Annual fixed costs are currently $60,000.

How much will unit variable cost have to fall to maintain the current level of profit ($48,000), assuming sales volume and other factors remain the same?

Total revenue = 2,700 X $75 = 202,500

TR – (TFC + TVC) = Profit TR – (TFC + Profit) = TVC

202,500 – (60,000 + 48,000) = 94,500

Variable cost per unit = 94,500 / 2700 = 35

So using the new variable cost per unit:

Total sales = Total VC + Total FC + Profit

(Q x P) = (Q x V) + F + N

(Q x V) = (Q x P) – (F + N)

$v = p - \frac{f+n}{q}$ $v = \$75 - \frac{87000+48000}{27000} = \$25$

Special pricing decisions

Typically these may be one off orders or orders below prevailing market price.

You would usually take any order below the market price as long as it still made positive contribution to enable that the costs are covered.

Other factors

- Do we have spare capacity for this order? Will staff work overtime?
- What will the reactions be of the other customers?
- What are their intentions of the reduction in cost? Is it a one off? Or will they sell in the sae market and compete?
- Are there any hidden costs?

Marginal costing statement

	sales
less	(variable costs)
=	contribution
Less	(fixed costs)
=	profit (loss)

Never drop a dept or product if it still makes contribution as it could lead to the company making a bigger loss as that proportion of fixed costs has to be shared to the remaining depts/ products which would subsequently lead to those making a loss.

Outsource decision example

Direct Materials (DM)	£10
Direct Labour (DL) (2 hours)	£12
Variable overheads (VO Head)	£4
	£26
Budgeted annual fixed costs	£80,000

The normal activity level for a period is 4000 units.

The company has received a quotation from an outside supplier to supply the product at £30 per unit. If the part is outsourced, the fixed cost for the period

will be reduced by £30,000. However £2 per unit will be incurred on transport cost.

Here we would analyze whether it is cheaper to make or buy the product and so take the cheaper option, this would be known as sensitive analysis.

Product mix decisions under capacity constraints

This is where there might be a limiting or scarce factor that could restrict output. We would concentrate on the product/service that yields the largest contribution per limiting factor.

For example:

A company is only able to yield 12,000 machine hours

Products	**X**	**Y**	**Z**
Estimated sales demand (units)	2,000	2,000	2,000
Required machine hours	12,000	4,000	2,000
Contribution per unit	£12	£10	£6
Machine hours per unit	6	2	1
Contribution per machine hour	£2	£5	£6

So we would make the most of product **Z**

From this we can work how the ratio of hours used by a production plan:

Product Z – 2000 hours, making 2000 units

Product Y – 4000 hours, making 2000 units

Product X – 6000 hours, making 1000 units

Absorption costing

Overheads – all costs which are not direct materials, direct labour or direct expenses.

They are usually divided by function:

- Production overheads
- Selling and distribution overheads
- Research and development
- Administration overheads

They can be:

- Fixed
- Variable
- Semi variable

There are 4 main steps to dealing with overheads in a traditional system:

1. Collection
2. Classification
3. Allocation and apportionment
4. Absorption

Assuming we have already done steps 1 and 2. We then must think how we decide to share the overheads amongst the depts.

Allocation= whole items of cost can be charged to a cost centre

Apportionment = overheads must be shared between more than one cost centre

Example 1

We have 3 service dept and 1 production dept

1. Trace all the costs to all depts
2. Allocate service dept to production dept
3. Allocate production dept to products

	Regular (dept 1)	**Deluxe (dept 2)**
Units demanded	2000	3000
Direct labour	30	60
Direct materials	60	70

Indirect materials	12,500
Rent	60,000
Repairs	30,000
Total	102,500

	Dept 1	**Dept 2**	**Dept 3**	**Total**
Indirect materials	5000	7500	0	12,500
Area	1500	1000	500	3000
Value of plant	1200	1000	800	3000
Number of staff	10	15	5	30

Allocation:

Over head	Basis	Regular (1)	Deluxe (2)	Canteen (3)
Indirect material	Allocate	5000	7500	0
Rent	Area	30,000	20,000	10,000
Repairs	Plant value	12,000	10,000	8000
Total		47,000	37,500	18,000
Reapportion Canteen	Staff	7200	10,800	(18,000)
Total		54,200	48,300	0

From these figures we can then work out the overhead absorption rate:

For dept 1 = $\frac{54200}{2000 units} = £27.10$

For dept 2 = $\frac{48300}{3000 units} = £16.10$

Now we can calculate total costs for each product:

	Regular	Deluxe
Direct material	60	70
Direct labour	30	60
Total direct cost	90	130
OAR	27.10	16.10
Total cost	117.10	146.10

Analysis

1. List the overheads
2. Identify the cost centres
3. Allocate to cost centre to all depts
4. Decide basis of apportionment and apportion the overheads
5. Total overheads to all cost centres
6. Reallocate and reapportion service dept to production dept

Example 2

We are already given the first 3 steps of the process:

Dept 1 production = 7500

Dept 2 production = 20,000

Stores = 3000

Maintenance = 2000

Total = 32,500

We can use the same materials and labour figures from the previous example, however maintenance has no service to store, but production dept use it equally.

	Prod 1	Prod 2	Stores	Maintenance
Overhead	7500	20,000	3000	2000
Reapportion stores	1000	1000	(3000)	1000
Total	8500	21,000	0	3000
Reapportion maintenance	1500	1500	0	(3000)
Total	10,000	22,500	0	0

Absorption

This is the charging of overheads to cost units passing through production depts. We may also wish to find the base and the rate for this.

Bases = should reflect demand made by cost unit on production facilities for example labour hours, machine hours, cost of direct materials, number of cost units or prime costs.

Overhead absorption rate = $\frac{total\,overhead}{overhead\,base} = \frac{£\,10{,}000}{10{,}000\,units} = £\,10\,per\,unit$

We may calculate the overhead absorption rate for the whole factory (blanket rate) or for each individual dept (departmental rate)

Different bases will lead to different rates

ABC costing systems

Emergence of ABC

Traditional systems were appropriate when:

- Direct costs were dominant costs
- Indirect costs were relatively small

- Information costs were very high
- Lack of intense global competition
- Limited range of products were produced

Developed the new costing system to reflect objective costs:

- New technology means that overhead costs can be higher than direct labour costs
- Therefore traditional methods of accounting for overheads are inappropriate

ABC required different way of collecting and classifying costs so information systems need to change. It collects overheads into **cost pools (or cost centres)**. It then charges costs to products or services according to consumption of activity (**cost driver**) which causes the cost. ABC attempts to absorb overhead costs more accurately in order to reflect the resources consumed by producing the product or service.

Terminology:

Activity- action or aggregation of actions performed within an organisation

Resource – economic element needed or consumed in activity

Cost driver – activity or characteristics that consumes resources

Cost pool/centre – used to describe location to which overhead cost are initially assigned

Costs from activity cost pools are assigned to **cost objects** using **cost drivers**.

<u>Example of using ABC</u>

We will use the previous cost figures from the 2 types of suitcase

Building £20,000

	Regular (dept 1)	**Deluxe (dept 2)**
Units demanded	2000	3000
Direct labour	30	60
Direct materi		

Setup £70,000

Packaging £50,000

Inspection £60,000

Total costs £200,000

Step 1

	Estimated cost driver level		
Cost driver	**Regular**	**Deluxe**	**Total**
Number of setups	300	400	700
Number of inspection	150	350	500
Packaging hours	600	1400	2000
Machine hours	4000	6000	10,000

Step 2

Activity	Cost driver level	Activity cost rate
Set up cost £70,000	700 total setups	= £100 per set up
Inspection cost £60,000	500 total inspections	= £120 per inspection
Packaging cost £50,000	2000 packaging hours	=£25 per packaging hour
Building cost £20,000	10,000 machine hours	=£2 per machine hour

Step 3

Regular

Setup £100 x 300 setups = £30,000

Inspection £120 x 150 inspections = £18,000

Packaging £25 x 600 hours = £15,000

Machine £2 x 4000 hours = £8,000

The total = £71,000

From this we can calculate the absorption rate £71,000 ÷ 10,000 units = £7.10

Deluxe

Set up £100 x 400 setups = £40,000

Inspections £120 x 350 inspections = £42,000

Packaging £25 x 1400 hours = £35,000

Machine £2 x 6000 hours = £12,000

The total = £129,000

From this we can calculate the absorption rate £129,000÷5000 units = £25.80

We can then use these calculations to work out the total cost for each product

	Regular	Deluxe
Direct materials	60	70
Direct labour	30	60
Manufacturing overheads	7.10	25.80
Product unit cost	£97.10	£158.80

Varying levels of sophistication for cost assignment

Simplistic

- Inexpensive to operate
- Extensive use of arbitrary cost allocation
- Low levels of accuracy
- High cost of errors

Highly sophisticated

- Expensive to operate
- Extensive use of cause and effect cost allocations
- High levels of accuracy
- Low cost of errors

When is ABC needed?

1. Cost of measuring the activity and their costs are reduced. Perhaps because of computerised scheduling systems on production floor
2. Stronger competition increases cost of errors cause by incorrect pricing
3. Product diversity is increased in volume, size of complexity

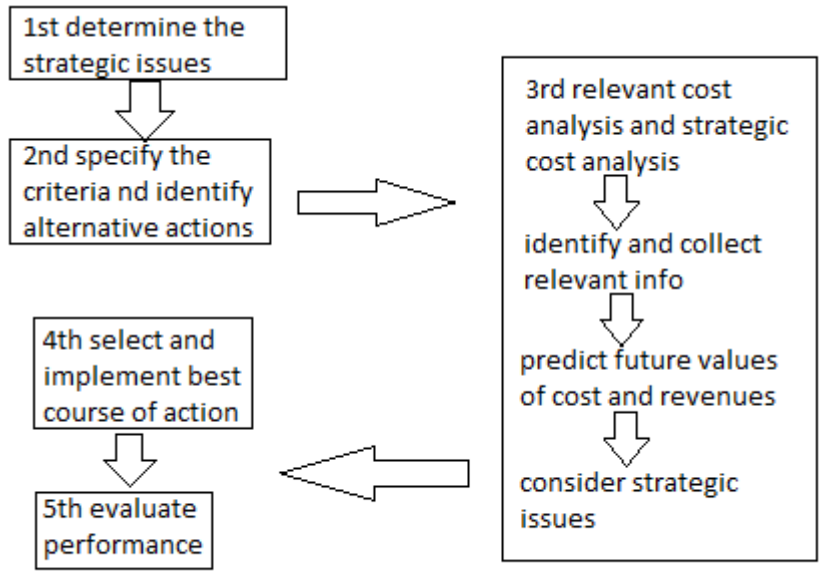
Benefits	Limitations
- More accurate and informative production costs - More accurate measurements of activity driving costs - Helps managers identify and control cost of unused capacity	- Some costs may require allocations to depts and products based on arbitrary volume measures - Some costs that can be identified with specific products are omitted

	- Expensive to develop and implement and also time consuming

Undeniably ABC is conceptually superior. But the high costs of implementing ABC systems means that many firms will continue to use traditional methods.

Costing as a decision making tool

1) Variable/marginal costs
2) Relevant costs



Relevant cost: cost to be incurred at some future time and that differ for each option available for the decision maker

Full (absorption) costing

This includes: direct material, direct labour and manufacturing overheads (variable and fixed). Decision making and what if decisions are difficult because of the commingling of fixed and variable overheads. Required for GAAP and IAS

Marginal (variable) costing

This includes only the variable: direct material, direct labour and manufacturing overheads. It lends itself well to decision making and what if analysis but is not allowed for GAAP.

Difference between absorption and variable costing

Under absorption costing fixed manufacturing overheads like rent and depreciation are inventoried until sold. Whereas in variable costing they have a period expense in the income statement.

Full costing income statement

Sales		100,000
Less cost of goods sold	(20,000 v +10,000 f)	(30,000)
Gross margin		70,000
Less selling and admin		
Selling	(10,000 v + 8000 f) = 18000	
Admin	(5000 v + 7000 f) = 12000	(30,000)
Net income		40,000

Variable costing income statement

The format uses a contribution margin approach and all costs manufacturing, selling and admin are classified as either fixed or variable.

Marginal costing is the variable cost of one unit of product/service. It takes into account cost behaviour and argues that fixed overheads shouldn't be absorbed into a products cost. Fixed costs should be met from a contribution by product sold. It attract attention to efficient control of variable costs and maximisation of revenue. For example

If FC were £100 and VC were £1 per unit. Using absorption costing:

To produce 100 units total costs = (100 x £1) + £100 = £200. So £2 per unit.

To produce 50 units total costs = (50 x £1) + £100 = £150. So £3 per unit.

Here we can see that sometimes absorption costing is confusing and unhelpful.

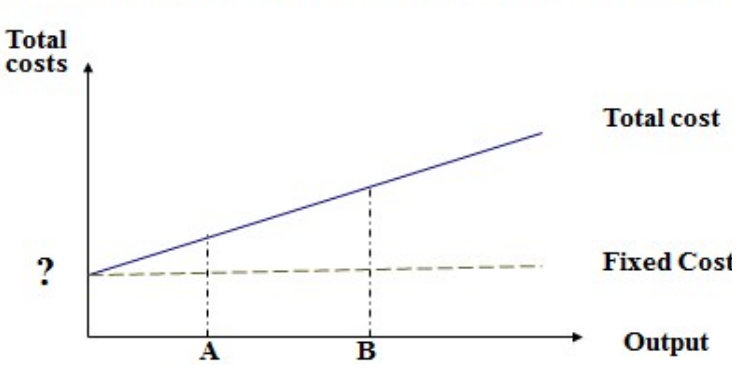
Example of Marginal costing income statement

Sales		100,000
Less variables		
Variable cost of goods sold	20,000	
Variable selling	10,000	
Variable admin	5000	(35,000)
Contribution margin		65,000
Less fixed		

Fixed manufacturing costs	1000	
Fixed selling	8000	
Fixed admin	7000	(25,000)
Net income		40,000

If all products are sold (no unsold inventory at the end of period) then net income in variable costing is the same as net income in full costing.

Identifying cost/cost behaviour



In practise we need to analyse past cost and activity of data using a **graphical method**. However the **high/ low method** crude technique using only lowest and highest value for a set of data. It determines the rate of cost change (variable cost) and can then estimate the fixed element.

Example

Units	10	30
Total cost	£50	£70
Variable cost	1	1
Fixed cost	40	40

The activity level rises by 20 units.

The total cost rises by £20. Indicating the variable cost is £1 per unit. From this we can work out the fixed cost.

For 10 units: £50 – (10x£1) = £40

For 30 units: £70 – (30 x £1) = £40

High low method

Activity Level 000s	Costs £ 000s	
48	700	→ lowest
49	820	
50	970	
57	1,050	
59	900	
65	880	
66	1,020	
67	1,180	
75	1,170	
86	1,060	
92	1,100	
94	1,310	→ Highest

From this we can work out the VC.

So … 610,000/46,000 = £13.26 variable cost per unit.

Now we can make a costing statement to find fixed costs.

	At 48,000 units	At 94,000 units
Total cost	£700,000	£1,310,000
Less variable cost	(48,000 x £13.26) = 636,500	(94,000 x £13.26) = 1,246,500
= Fixed cost	63,500	635,000

From this we can see that the high low method is more reliable.

Relevant cost and revenues

Historical cost: are irrelevant (are unavoidable) to a decision but are used as a basis for predicting future costs

Sunk cost: are past costs which are unavoidable

Differential profit (net relevant profit): difference in total operating profit when choosing between 2 alternatives

Differential cost (net relevant cost): difference in total cost between 2 alternatives

Relevant financial inputs for decision making are future cash flows that will differ between the various alternative being considered. Therefore only relevant (incremental) cash flows should be considered.

Required for special studies:

- Special selling price decisions
- Out sourcing (make or buy decision)
- Discontinuation decision
- Product mix decision when capacity constraint exists
- Decision on replacement of equipment
- Compare before or after additional processing

A decision model is a formal method for making a choice, often involving quantitative and qualitative analysis. Decisions should not be based only on items that can be expressed in quantitative terms. Qualitative factors must also be considered.

Special order

Monthly capacity 50000 miles Monthly production + sales 35000 units at £40

	Total £	Per unit £
Direct labour (fixed)	420,000	12
Variable costs	350,000	10
Manufacturing fixed overheads	280,000	8
Marketing and distribution	105,000	3
Total cost	1,155,000	33
Sales (35000 x £40)	1,400,000	40
Profit	245,000	7

	Don't	Do	Difference
Labour	420,000	420,000	----
Variable cost	350,000	380,000	30,000
Manufacturing fixed	280,000	280,000	----
Selling cost	---	3000	3000
Marketing and distribution	105,000	105,000	----
Total cost	1,155,000	1,188,000	33,000
Sales	1,400,000	1,460,000	60,000
Profit	245,000	272,000	27,000

We should accept the order as it would make the company an extra £27,000.

When bidding for a one off special order in competition with other suppliers, only the incremental revenues and costs of undertaking the offer are to be considered. Since relevant revenues exceed relevant costs the order is acceptable subject to:

- Normal selling price of £40 not being affected
- No better opportunity available for the period
- Resource have no alternative uses
- Fixed costs are unavoidable for the period under consideration

The identification of relevant costs depends on circumstances.

<u>Example 2 (long term order)</u>

Capacity of 50,000, demand 35,000 so 15,000 units to spare at £25 a unit, involving £1 selling cost per unit, so technically £24. If no other opportunity is accepted:

- labour decreases by 30%,
- manufacturing costs decrease by £20,000 a month,
- marketing costs down by £20,000 and

- unutilised factory rented at £25,000 a month

We can now make a costing statement comparing whether or not to accept.

	Don't accept	Do accept	Difference
Units sold	35,000	50,000	15,000
Labour	294,000	420,000	126,000
Variable cost	350,000	500,000	150,000
Fixed cost	210,000	280,000	70,000
Marketing and distribution	85,000	105,000	20,000
Extra	----	15,000	15,000
Total costs	939,000	1,320,000	381,000
Rent revenue	25,000	----	25,000
Sales revenue	1,400,000	1,775,000	(375,000)
Profit	486,000	455,000	(31,000)

Can see that the company is better off £31000 a month if reduces capacity and doesn't accept the order. In longer terms, all above cost and revenues are relevant.

Should be made at price exceeds incremental costs, but also meet the following conditions:

- sufficient capacity
- bid price should affect future selling price
- customer shouldn't expect repeat at short run incremental cost
- order will utilise unused capacity for only a short period and capacity will then be released for use on more profitable opportunity

<u>Outsourcing (make or buy decisions)</u>

Example A: a firm develops a new product which requires a component to be either manufactured or bought. The costing's as follows:

	£	
Material	2.50	
Labour	1.25	
Variable overhead	1.75	
Share of fixed overhead	<u>3.50</u>	This assumes there will be no increase
Total cost	9.00	

It can be bought for £7.75, but production capacity would be unused. Should you make or buy?

Analysis: VC= £5.50

Outsource = £7.75

Therefore it is more profitable to produce ourselves. If VC is lower than O.S then manufacturing the product generates more profit.

What if the factory was at full capacity and machine time would have to be diverted from another product?

Additional info: alternative product provides £20 contribution per unit and uses 4 machine hours per unit. The component under discussion uses 1 machine hour per unit.

Manufacturing cost per unit	£
VC	5.50
Opportunity cost	5.00
Relevant cost	10.50

Now it is cheaper to outsource. Rule: where there is a limiting factor you have to include the opportunity cost of foregone contribution

Example B: Outsourcing involves obtaining goods or services from outside supplies instead of from the organisation. The division currently manufactures 10,000 components per annum. Costs are as follows:

	Total	Per Unit
Material	120,000	12
Labour	100,000	10
Variable overhead	10,000	1
Fixed overhead	80,000	8
Share of non-manufacturing costs	50,000	5
Total costs	360,000	36

A supplier has offered to supply 10,000 at £30 per unit for a minimum of 3 years. If outsourced, direct labour will be redundant, direct material and

variable overheads are avoidable and fixed overheads would be reduced by 10,000 per annum. BUT, non-manufacturing costs remain unchanged. Capacity has no alternative uses.

	Make	Buy	Difference
Material	120,000	-----	120,000
Labour	100,000	-----	100,000
Variable overhead	10,000	-----	10,000
Fixed overhead	80,000	70,000	(10,000)
Non-manufacturing costs	50,000	50,000	-----
Outside purchase cost	-------	300,000	(300,000)
Total cost	360,000	420,000	(60,000)

Cheaper by £60,000 to make.

Column 3 shows relevant costs of making are £240,000, compared with £300,000 from outsourcing.

Where the released internal capacity arising from outsourcing can be used to generate rental income or a profit contribution, there is an opportunity costs associated with making the components. This is measured by foregone profit contribution (making another product) or rental income (letting surplus space to another firm).

Assume that the released capacity from outsourcing enables profit contribution of £90,000 to be generated.

Relevant cost of making will now be:

Relevant cost	240,000
Opportunity cost	90,000
Total relevant cost of making	330,000

Outsourcing is not the cheaper alternative

	Make	Buy	Difference
Materials	120,000	----	120,000
Labour	100,000	----	100,000
Variable overhead	10,000	----	10,000

Fixed overhead	80,000	70,000	(10,000)
Non-manufacturing overhead	50,000	50,000	----
Opportunity cost	90,000	----	90,000
Outsource purchase cost	------	300,000	(300,000)
Total cost	450,000	420,000	30,000

Discontinuation decisions

This is the decision of whether to drop a product. Example 3 a company produces 3 products.

£000	X	Y	Z	Total
Sales	32	50	45	127
Total cost	(36)	(38)	(34)	(108)
Profit/loss	(4)	12	11	19

Fixed cost is £36 evenly allocated to 3 products (36,000 /3 = 12,000 to each)

Influential directors wish to drop production of X

£000	X	Y	Z	Total
Sales	32	50	45	127
Less variable cost	(24)	(26)	(22)	(72)
Contribution	8	24	23	55
Less fixed cost				36
Profit				19

Proof

Cont Y	24,000
Cont X	23,000
Total cont	47,000
Less fixed costs	(36,000)
Profit	11,000

If you drop X, profit will be reduced by 5000. So shouldn't drop X as it still makes positive contribution.

General Rule: if activities make positive contribution towards fixed costs, with contribution production.

Example 4: whether to drop a division: assuming the periodic profitability analysis of sales territories reports that:

£000	Southern	Northern	Western	Total
Sales	900	1000	900	2800
Less VC	(466)	(528)	(598)	(1592)
Less FC	(266)	(318)	(358)	(942)
Profit/Loss	168	154	56	266

Assume a special study indicates £250,000 of western fixed costs and all variable costs are avoidable. Therefore £108,000 of western fixed costs are unavoidable is discontinued.

£000	Keep	Discontinue	Difference
Sales	2800	1900	900
VC	1592	994	594
FC	942	692	250
Total costs	2534	1686	848
Reported profit	266	214	52

Column 3 shows that relevant revenue arising from keeping Western are £90,000 and the relevant costs are £848,000 therefore contribution of £52 towards fixed costs and profit.

Product –mix decision under capacity constraints

Limiting or scare factors are factors that restrict output. Objective is to concentrate on the product/service that yields the most contribution per limiting factor.

Example 5: a company produces 2 products and has 3000 available machine hours. The decision criterion is to aim for the higher contribution margin per unit of constraining factor. When multiple constraints exist, optimisation technique such as linear programming can be used in decision making.

Per Unit	Product 1	Product 2
Sales Price	20	100
Variable expenditure	(4)	(95)
Contribution	16	5
Contribution margin	80%	5%

1 unit of production: product 1 requires 8 machine hours, and product 2 requires 2 machine hours.

Which product produced under capacity constrained?

£16/8hrs = £2 per hr £5/2hrs = £2.50 per hour

So we would produce product number 2.

Which product produces if not any constraints?

Product 1 because it has a higher contribution margin.

Which product should be emphasised?

Product with higher contribution margin per unit of constraining resource.

Decision on replacement of equipment

Original purchases cost of old machine, it's written down value (WDV) and depreciation are irrelevant for decision making.

Example

WDV of existing machine (remaining 3 years life)	90,000
Cost of new machine (expected life of years and zero scrap value)	70,000

Operating costs (£3 per unit in old machine, £2 per unit new machine)

Output of both machines is 20,000 unit per annum.

Disposal value of old machine now	40,000
Disposal value of old and new machine (3 years time)	0

Total cost over 3 years

	Retain	Buy	Difference
Variable operating costs:			
20,000 units x £3 per unit	180,000		

20,000 units x £2 per unit		120,000	(60,000)
Old machine BV (irrelevant):			
3 year annual dep charge	90,000		
Lump sum written off		90,000	----------
Old machine disposal value		40,000	(40,000)
Initial purchase price of new machine		70,000	(70,000)
Total cost	270,000	240,000	(30,000)

This shows it's cheaper to buy new machine

NOTE that dep charge is not a relevant cost

Column 1 + 2 or just 3 can be presented but more meaningful column 3.

Saving on variable opportunity cost (3 years)	60,000
Sales proceeds of existing machine	40,000
	100,000
Less purchase cost of new machine	(70,000)
Savings from purchasing new machine	30,000

Once you learnt about discounting the NPV, and the impact of time value of money on calculating and should be taken into account.

Sell before or after additional processing

EG A malfunctioning equipment causes 400 tops not to be of an acceptable colour. They can be sold to an outlet for £1800 (£4.50 each) or run for printing again and sell for £3600 (£9 each).

The cost of running a top through the printer a 2nd time is the ink and supplies (£0.95) and labour cost (£0.85) per unit.

In addition, set up, inspection and material handling costs for batch increases by £200 (50p each). More profitable to run through printing.

Analysis of reprinting 400 defective tops

	Reprint	Sell as is

Revenue		
400 x £9	3600	
400 x £4.50		1800
Relevant costs		
Supplies and ink (400 x £0.95)	380	
Labour (400 x £0.85)	340	
Set up, inspection and handling	200	
Total revenue costs	920	
Contribution margin	2680	1800

So we would reprint the tops.

Limiting factors

This is something that constrains the firms productive capacity in the short term. Eg labour, material, machine, space. The firm would seek alternatives to remedy the problem in the long term. For example:

Labour – more employees or retrain existing employees to be versatile.

Material – seek alternative supplier, or create a closer relationship with existing supplier

Machine – buy more machines or change the production process

Space – reorganise the layout, expand the premises, or relocate.

When we only have 1 limiting factor, we can find out the contribution per unit per limiting factor. This would be contribution = sales – variable cost. Then divide the contribution by the amount of limiting factor per unit.

Where a limiting factor exists, profit is maximised when the greatest possible contribution to profit is obtained each time the scarce resource is used.

Example 1 – manufacturing firm produces 3 products, A,B and C.

	A	B	C

Selling price	25	20	23
Variable costs	10	8	12
Weekly demand	25	20	30
Manufacturing hour per unit	4	3	4
Required machine hour	100	60	120

Total machine hours used – 280 hours

This level of demand has surprised the owner and it is outstripping capacity which is only 148 hours on the machines per week.

What information would be useful for the management and in what ways?

In the short term, producing a production schedule that would maximise profits would be useful for the company.

Firstly we would calculate the contribution per limiting factor per unit, then find our priority.

	A	B	C
Contribution per unit	15	12	11
Machine hour per unit	4	3	4
Contribution per machine hour	3.75	4	2.75
Order of priority	2	1	3

Thus in order to maximise contribution under the constraint of 148 machine hours, we would prefer to use our machine hours in the following order:

B then A then C.

We would now prepare a schedule as follows:

	Units		Hours
Product B	20	x 3 hrs	60 hours
Product A	22	x 4 hrs	88 hours

Here we were unable to satisfy the full demand for product A, which also means that we were unable to provide any hours for product C.

Total contribution can now be calculated:

Product B 20units x £12 = £240

Product A 22units x £15 = £330

Weekly contribution £570

This maximises weekly contribution given the specified constraint.

What is the potential weekly contribution, if weekly demand for all product could be met?

A	25 units x £15 = 375	Here we can see that we are losing £375 (945-570) a week as there is not enough machine hours available. It also means we have a shortfall of 3 units of product A, losing £45, and a shortfall of all of C losing £330.
B	20 units x £12 = 240	
C	30 units x £11 = 330	
Potential weekly contribution	945	

Machine hours required to meet demand for all products

A	25 units x 4 hours = 100 hours	
B	20 units x 3 hours = 60 hours	Shows we have a shortfall off 132 (280-148) machine hours
C	30 units x 4 hours = 120 hours	
	280 hours	

Example 2 is a service provider, which is a small firm offering sales and repair

The repair engineer is on long term sick leave, leaving the owner to cover the repair jobs. There is a maximum of £20,000 worth of her time that can be devoted to this task. Which types of repairs should the owner devote her time to in order to maximise profitability?

The repairs data for last year follows : £000

	Fax	Computer	Photocopier
Revenues	40	60	90
VC materials	5	10	9
VC labour	15	15	30
V overheads	5	15	15

Total VC	25	40	54
Contribution (total 71)	15	20	36

From the info it can be said that the limiting factor is the labour cost:

	Fax	Computer	Photocopier
Contribution	15	20	36
Labour cost	15	15	30
Contribution per labour cost	1	1.33	1.2
Order of priority	3	1	2

We have to use last year's data as no demand figures are given:

	Limiting factor allocation	Balance of limiting factor
Computer	15000	5000
Photocopier	5000	----
Fax	----	----

From this we can now calculate total contribution to be earnt:

Computer	15000 x 1.33 = 19950
Photocopier	5000 x 1.20 = 6000
Total contribution	25950

What should she do? Get more labour or come up with a new strategy

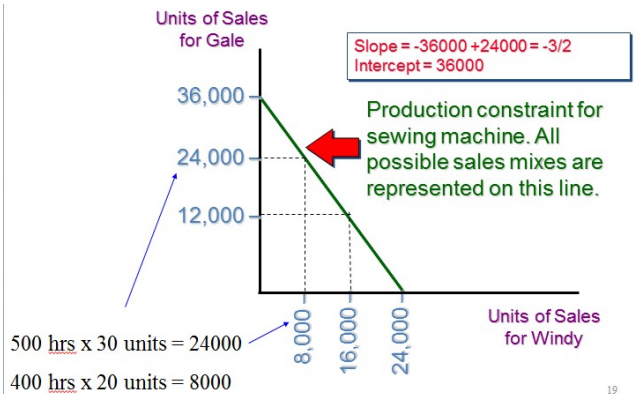
Multiple product and limited resources (2 limiting factors)

The windy and gale jackets are manufactured in the same plant. Both require an automated sewing machine, for which there are only 3. These can run up to 20 hours a day, 5 days a week, totalling 1200 hours a month at their maximum.

Data is given:

	Windy	Gale
Contribution margin per unit	8	4
Sewing time per unit	3 mins	2 mins
Number of units produced per hour	20	30
Maximum production for each	160	120
1200 @ 20	24000	

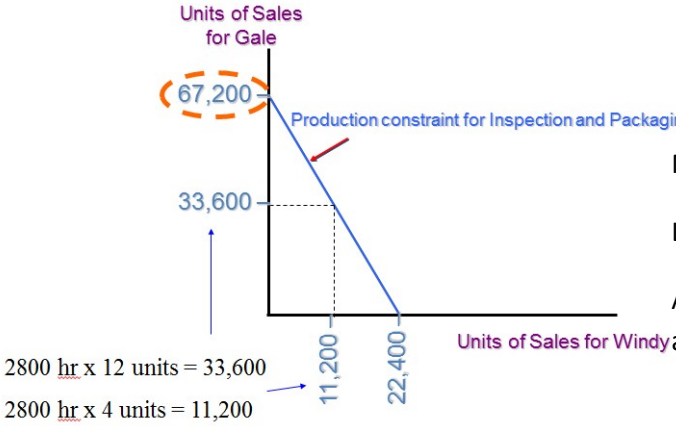
1200@ 30 36000

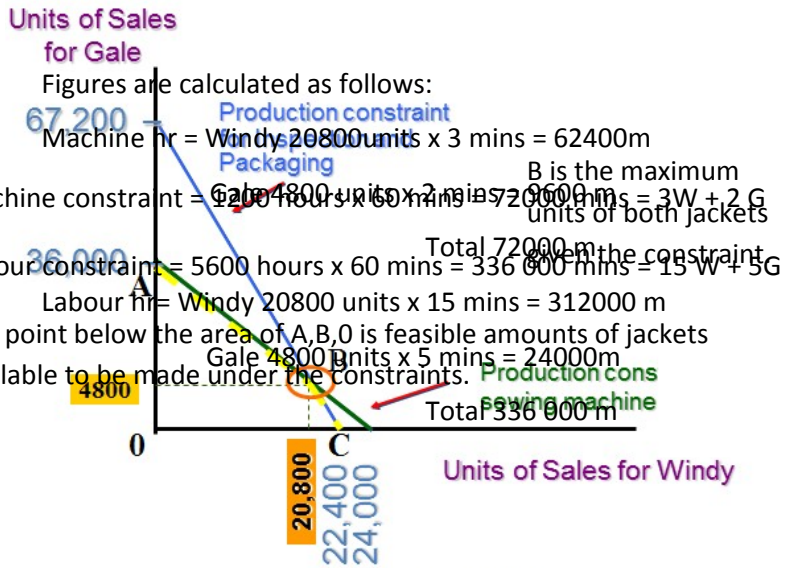


Completed jackets are inspected, labels added and packaged using 40 workers. Each worker works 35 hours a

So we have 2 production constraints to calculate

	Windy	Gale
Contribution margin per unit	8	4
Inspection, labels and packaging	15 mins	5 mins
Number of jackets produced p/h	4	12
Contribution margin per labour hr	32	48
Maximum production for each product:		
5600 hrs @ 4	22,400	
5600 hrs @ 12		67,200





Figures are calculated as follows:

Machine hr = Windy 20800units x 3 mins = 62400m

Machine constraint = 1200 hours x 60 mins = 72000 mins = 3W + 2 G

Gale 4800 units x 2 mins = 9600 m

Total 72000 m

B is the maximum units of both jackets given the constraint

Labour constraint = 5600 hours x 60 mins = 336 000 mins = 15 W + 5G

Labour hr = Windy 20800 units x 15 mins = 312000 m

Gale 4800 units x 5 mins = 24000m

Total 336 000 m

Any point below the area of A,B,0 is feasible amounts of jackets available to be made under the constraints.

Job costing and process costing systems

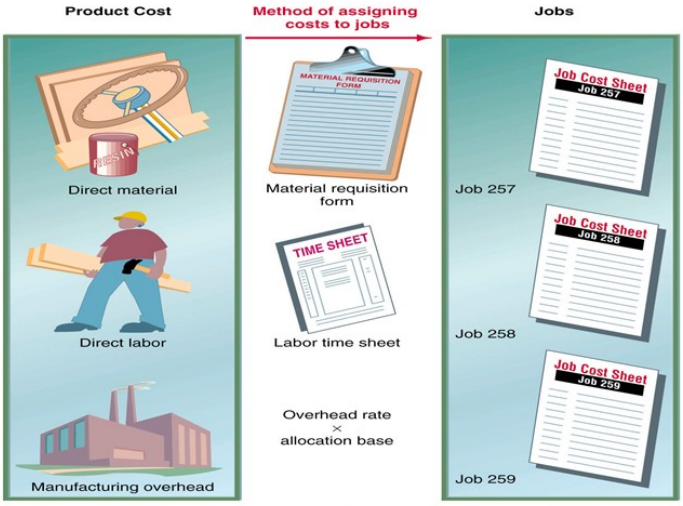
There are 2 basic systems:

- job costing – the cost object is an individual unit, batch or lot of a distinct product or service called a job
- process costing system – the cost object is masses of identical or similar units or products or services

General approach to job costing

There are 6 steps used to assign actual costs to individual jobs:

1) identify chosen cost object
2) identify direct costs of the job
3) select cost allocation base
4) identify indirect costs of the job
5) compute the rate per unit
6) compute the cost of the job – adding all the direct costs and indirect costs assigns to it



Example

Saman in planning to sell a batch of 25 special machines (JOB 100) for £104,800.

1) The cost object is JOB 100
2) Identify the direct costs
   Direct materials : £45000
   Direct labour : £14000
3) Cost allocation base – machine hour. They use 500 machine hours totalling 2480 machine hour by all jobs.
4) Identify indirect costs :

   Actual manufacturing overhead costs: £65100
5) Compute the rate per unit: indirect cost 65100 / 2480 hr = £26.25 per machine hour
6) Allocate to job: £26.25 per machine hour x 500 hrs = £13,125

So what is the gross margin of the product?

Revenue	104,800
Less cost of goods sold	(72,125)
Gross margin	32,675

$\frac{32,675}{104,800} = 31.2\%$ Gross margin ratio

Joint product and by-product cost method

Concept – in some industries, a number of products are produced from a single raw material input

Joint product – a product resulting from a process with a common input

Split off point – the stage of processing where the joint products are separated

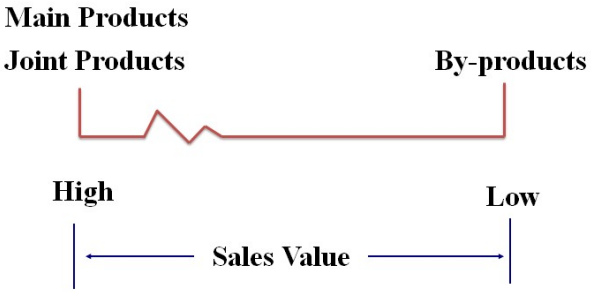
Joint cost – the cost of processing joint products prior to the split off point

Separate costs – are all cost incurred beyond the split off point that are assigne to more than 1 individual product

Joint products - Have relatively high sales value at split off point

Main product – is the result of a joint process that yields only 1 product with relatively high sales value

By-product – are incidental products resulting from the process of another product



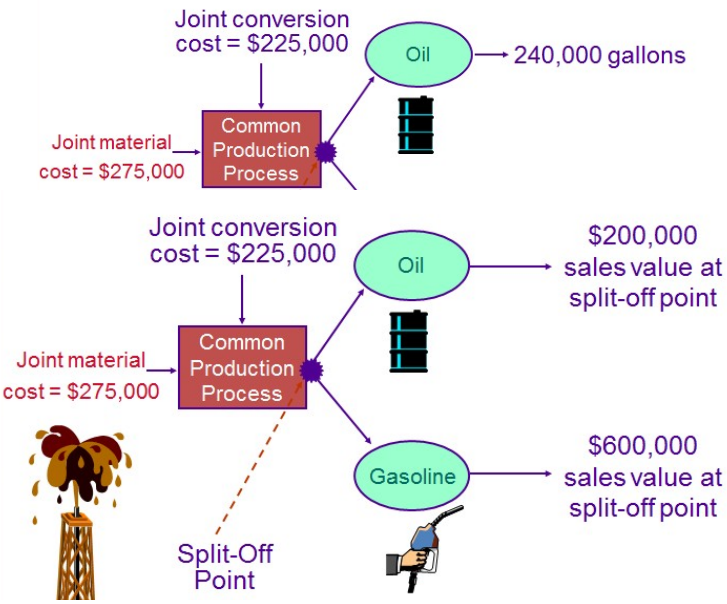
Joint cost allocation method

This can take 3 forms:

- Physical measure
- Sales value at split off point
- Net realisable value

Physical measure

	Product		
	Oil	Gasoline	Total
Output	240,000	360,000	600,000
Proportionate share:			
240k / 600k	40%		
360k/ 600k		60%	
Allocated joint cost			
500k x 40%	200,000		
500k x 60%		300,000	



Sales value at split off point

	Product		
	Oil	Gasoline	Total
Output	200,000	600,000	800,000
Proportionate share:			
200k/800k	25%		
600k/800k		75%	
Allocated joint cost:			
500k x 25%	125,000		
500k x 75%		375,000	

Net realisable value

If the product requires further processing beyond the split off point before they're marketable, it may be necessary to estimate the NRV at the split off point.

Estimated NRV = final sales value – additional processing costs

	Product		
	Oil	Gasoline	Total
Sales value	500,000	1,200,000	1,700,000
Less Additional processing cost	(200,000)	(500,000)	(700,000)
	300,000	700,000	1,000,000
Proportionate share:			
300,000 / 1,000,000	30%		
700,000 / 1,000,000		70%	
Allocated joint cost			
500,000 x 30%	150,000		
500,000 x 70%		350,000	