STANDARD COSTING AND VARIANCE ANALYSIS

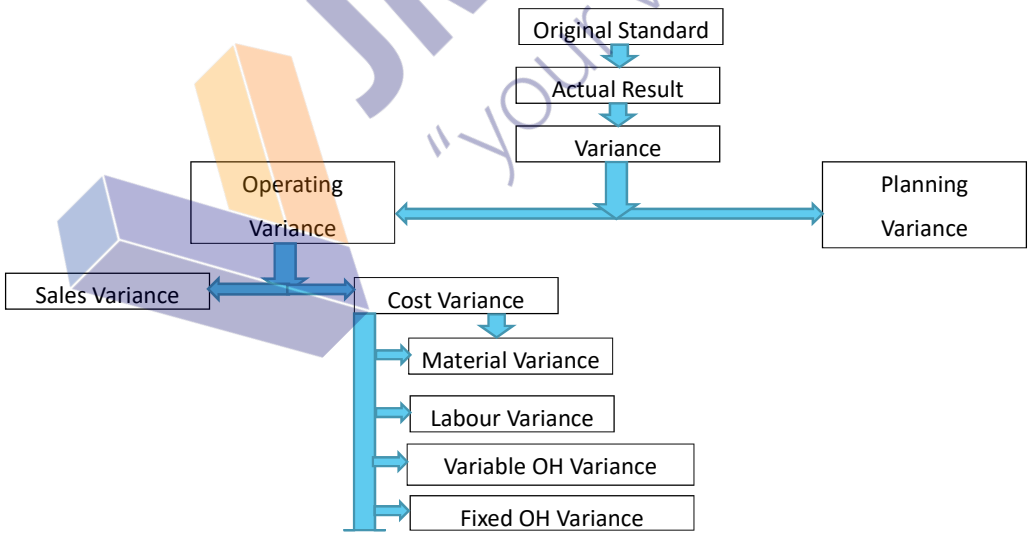
Standard costing and variance analysis

- Planning and Operation Variances
- Advanced variance analysis
- Operational statement
- Standard costing in modern business environment

Standard Cost

- A standard cost is a predetermined estimated unit cost of a product or service. Therefore, a standard cost represents a target cost.
- It is useful for planning, control and motivation.
- It is used to value inventories and cost production for cost accounting purposes.
- It acts as a control device by establishing standards (planned costs), highlighting activities that are not conforming to plan and thus alerting management to areas which may be out of control and in need of corrective action.

Variance Analysis



Planning Variance

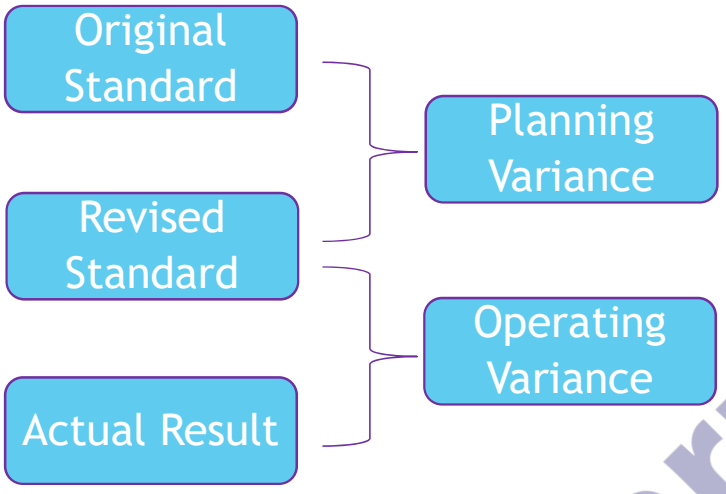
- Planning variances (or revision variances) are variances which have arisen because of inaccurate planning or faulty standards.
- A planning variance compares an original standard with a revised standard that should or would have been used if planners had known in advance what was going to happen.
- A planning variance is deemed not controllable by management.

  i.e. management may not be held responsible.

Planning Variance

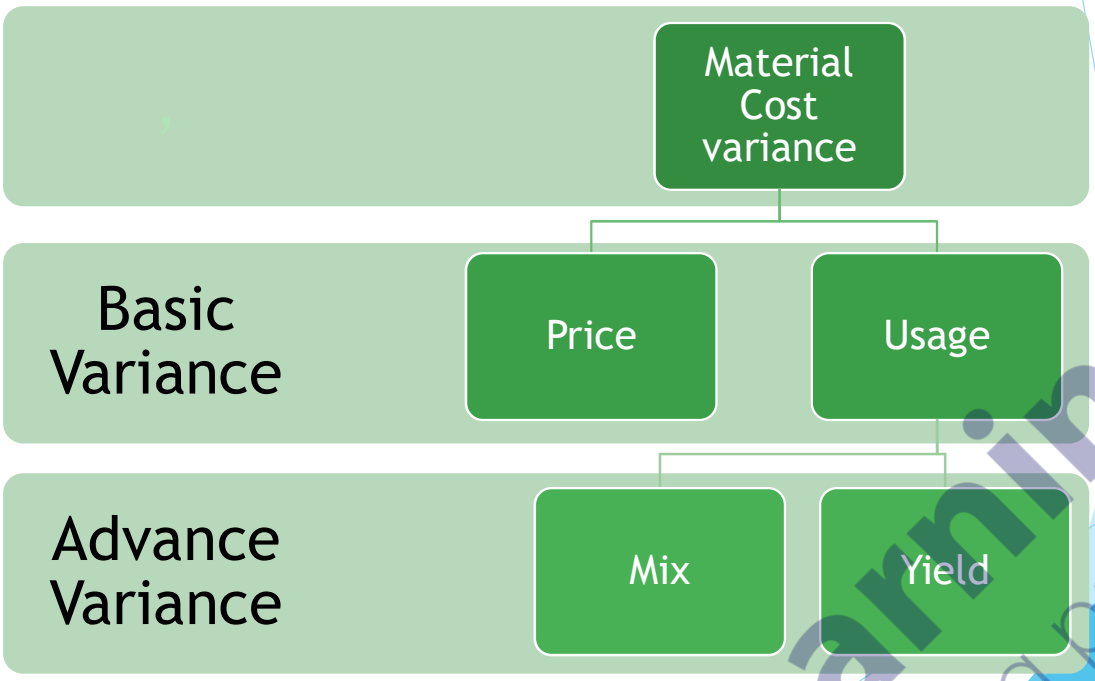
- There must be a good reason for deciding that the original standard cost is unrealistic. Deciding in retrospect that expected costs should be different from the standard should not be an arbitrary decision, aimed perhaps at shifting the blame for bad results due to poor operational management or poor cost estimation.
- A good reason for a change in the standard might be:
  - a change in one of the main materials used to make a product or provide a service
  - an unexpected increase in the price of materials due to a rapid increase in world market prices (e.g. the price of oil or other commodities)
  - a change in working methods and procedures that alters the expected direct labour time for a product or service
  - an unexpected change in the rate of pay to the workforce.
- These types of situations do not occur frequently. The need to report planning and operational variances should therefore be an occasional, rather than a regular, event.

Planning Variance



Material Cost Variance

Advanced Material Cost Variance



Material Mix Variance

- The mix variance is calculated as the difference between the actual total quantity used in the standard mix and the actual quantities used in the actual mix, valued at standard costs.
- The standard mix shows the proportion of a material that we expect to use in a given mix.
- The mix variance identifies the amount by which the actual proportion differs from the standard mix.
- A favorable material mix variance would suggest that a higher proportion of a cheaper material is being used, hence reducing the overall average cost per unit.
- An adverse material mix variance indicates that more of the expensive material was used in the actual input than indicated by the standard mix.

Material Yield Variance

- The yield variance is calculated as the difference between the standard input for what was actual output, and the actual total quantity input (in the standard mix), valued at standard costs.
- The yield variance identifies if the inputs (in total) are greater or less than expected for a given output.
- A **favourable material yield variance** indicates that more output was produced from the quantity of material used than expected by the standard.
- The increase in yield is likely to be the result of employing more skilled labour, or introducing more efficient working practices.
- An **adverse material yield variance** suggests that less output has been achieved for a given input, i.e. the total input in volume is more than expected for the output achieved.

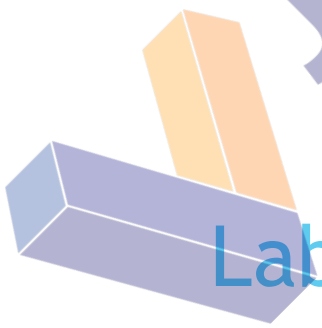
How to calculate material cost adv. variance

Material Mix Variance					
Material	AQAM	AQSM	Qty. Variance	Std Price	Usage mix variance
Rice flour	XXXX	XXXX	XXXX	XX	XXX A
Corn flour	XXXX	XXXX	XXXX	XX	XXX F
	XXXX	XXXX	XXXX		XXX F

Material Yield Variance					
Material	SQSM	AQSM	Qty. Vaiance	Std Price	Usage yield variance
Rice flour	XXXX	XXXX	XXXX	XX	XXX F
Corn flour	XXXX	XXXX	XXXX	XX	XXX A
	XXXX	XXXX	XXXX		XXX A

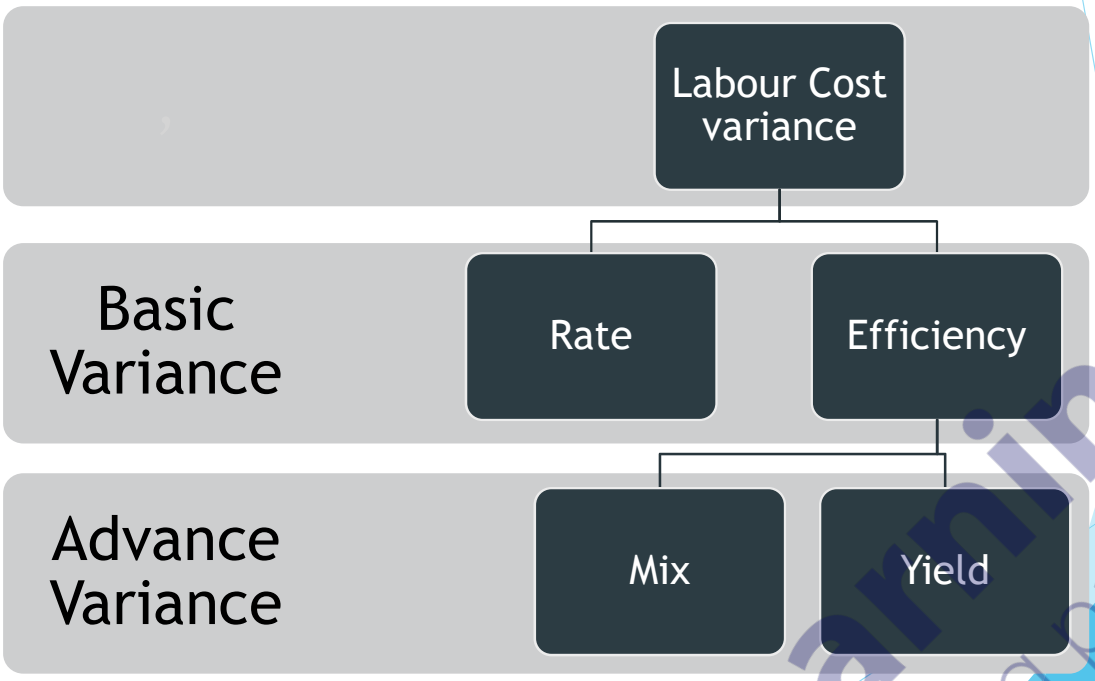
When to calculate material mix and yield variance

- It is only appropriate to calculate and interpret material mix and yield variances if quantities in the standard mix can be varied.
- It has also been argued that calculating yield variances for each material is not useful, as yield is related to output overall rather than to particular materials in the input mix.
- A further complication is that mix variances for individual materials are inter-related and so an explanation of the increased use of one material cannot be separated from an explanation of the decreased use of another.



Labour Cost Variance

Advanced Labour Cost Variance



Labour Mix Variance

- The mix variance is calculated as the difference between the actual total hours worked in the standard mix and the actual hours worked in the actual mix, valued at standard rate.
- The standard mix shows the composition of a labour grades (skilled/unskilled) that we expect to deploy in a given mix.
- The mix variance identifies the amount by which the actual labour grades differs from the standard grades.
- A favorable labour mix variance would suggest that a higher proportion of a cheaper labour grades (unskilled) is being used, hence reducing the overall average cost per unit.
- An adverse labour mix variance indicates that more of the expensive labour grades (skilled) was used in the actual input than indicated by the standard mix.

Labour Yield Variance

- The yield variance is calculated as the difference between the standard hours input for what was actual output, and the actual total hours input (in the standard mix), valued at standard rate.
- The yield variance identifies if the inputs (in total) are greater or less than expected for a given production.
- A **favorable labor yield variance** indicates that more output was produced from the labor hours used than expected by the standard.
- The increase in yield is likely to be the result of employing more skilled labour, or introducing more efficient working practices.
- An **adverse labor yield variance** suggests that less production has been achieved for a given input hours, i.e. the total input hours in volume is more than expected for the production achieved.

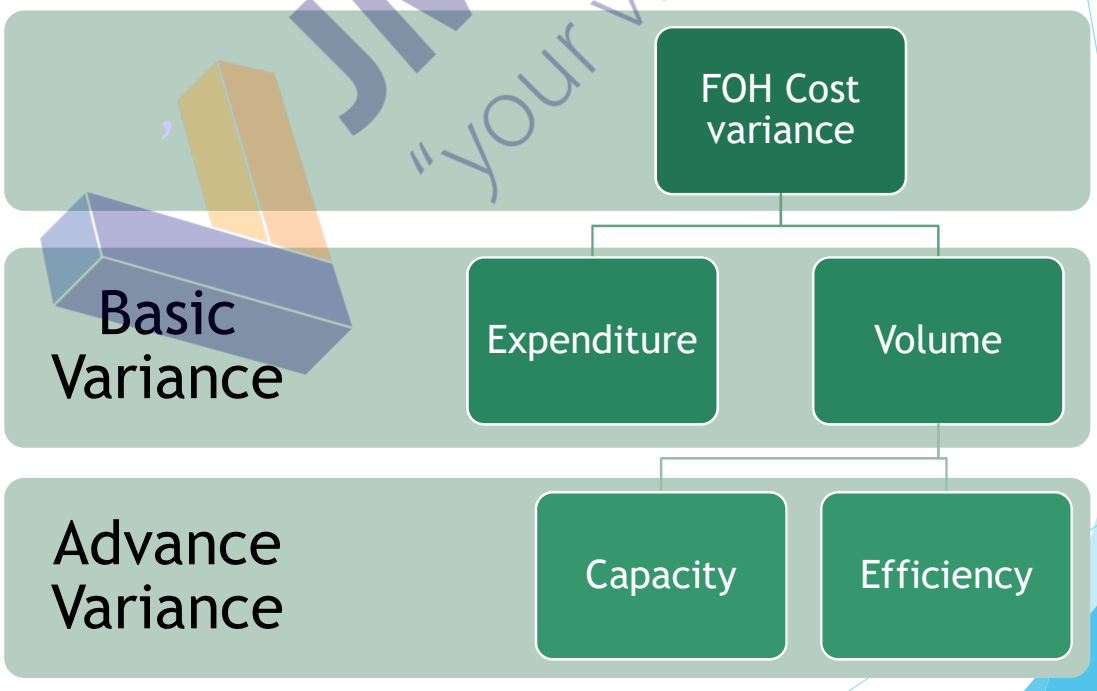
How to calculate labour cost adv. variance

Labour Mix Variance					
Labour category	AHAM	AHSM	Hrs. Variance	Std Rate	Efficiency mix variance
Skilled	XXXX	XXXX	XXXX	XX	XXX A
Un-skilled	XXXX	XXXX	XXXX	XX	XXX F
	XXXX	XXXX	XXXX		XXX F

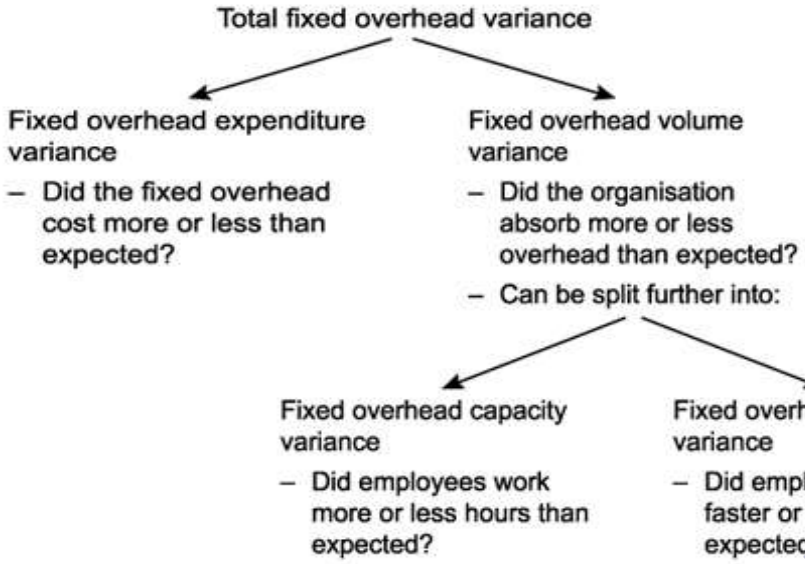
Labour Yield Variance					
Labour category	SHSM	AHSM	Hrs. Variance	Std Rate	Efficiency yield variance
Skilled	XXXX	XXXX	XXXX	XX	XXX F
Un-skilled	XXXX	XXXX	XXXX	XX	XXX A
	XXXX	XXXX	XXXX		XXX A

Fixed Overhead Cost Variance

Fixed Overhead Cost Variance



Fixed Overhead Cost Variance



Fixed Overhead Cost Variance

- **Fixed overhead total variance** is the difference between fixed overhead incurred and fixed overhead absorbed. In other words, it is the under- or over-absorbed fixed overhead.
- **Fixed overhead expenditure variance** is the difference between the budgeted fixed overhead expenditure and actual fixed overhead expenditure.
- **Fixed overhead volume variance** is the difference between actual and budgeted (planned) volume multiplied by the standard absorption rate per unit. (Budgeted Vs Standard)
- **Fixed overhead efficiency variance** is the difference between the number of hours that actual production should have taken, and the number of hours actually taken (that is, worked) multiplied by the standard absorption rate per hour. (Standard Vs Actual)
- **Fixed overhead capacity variance** is the difference between budgeted (planned) hours of work and the actual hours worked, multiplied by the standard absorption rate per hour. (Budgeted Vs Actual)

How to calculate FOH Cost variance

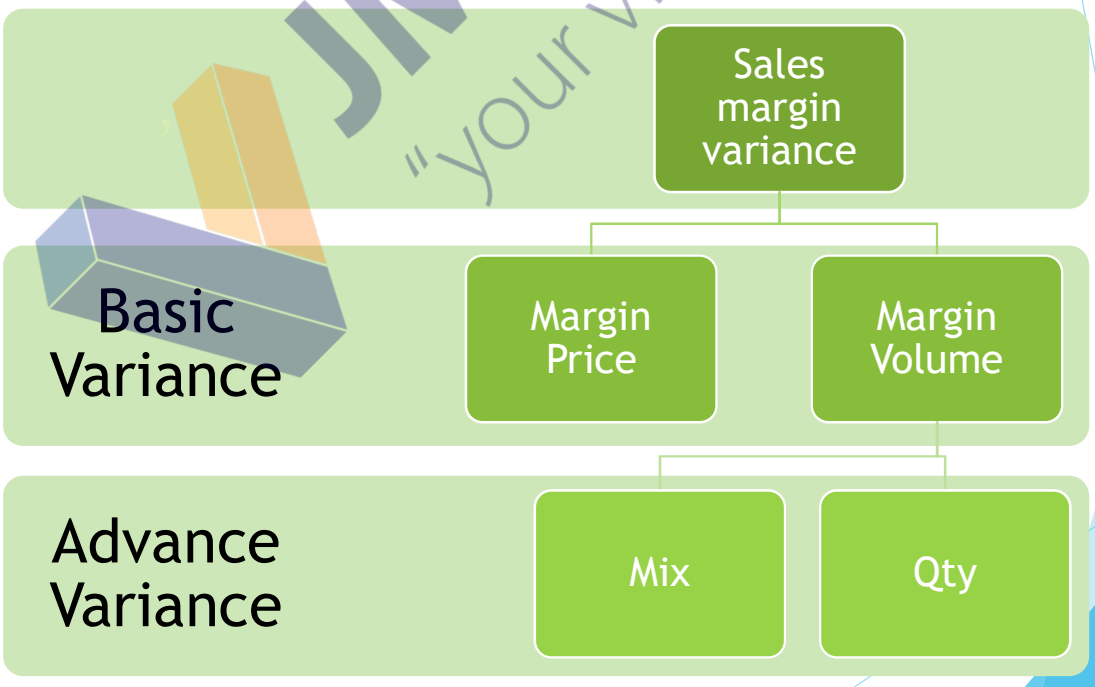
FOH Cost Variance	=	Budgeted FOH	-	FOH Absorbed	
FOH Expenditure Variance	=	Budgeted FOH	-	Actual FOH	
FOH Volume Variance	=	Budgeted Units	-	Actual Units	X Standard rate per unit
FOH Capacity Variance	=	Budgeted Hrs	-	Actual Hrs	X OAR
FOH Efficiency Variance	=	Standard Hrs of actual production	-	Actual Hrs	X OAR

Fixed Overhead Cost Variance

Variance	Favorable	Adverse
Fixed overhead expenditure	Savings in costs incurred changes in prices relating to fixed overhead expenditure	Increase in cost of services used excessive use of services change in type of services used
Fixed overhead volume efficiency	Labor force working more efficiently	Labor force working less efficiently lost production through strike
Fixed overhead volume capacity	Labor force working overtime	Machine breakdown, strikes, labor shortage

Sales Margin Advance Variances

Advanced Sales Margin Variance



When to calculate sales margin advance variances?

- If customers are unlikely to buy one product instead of another from the same company, then separate sales volume variances can be calculated.
- If, on the other hand, customers might substitute one product for another, then the concept of sales **mix** is important and separate sales volume variances can be replaced by a combined sales mix variance.
- Accordingly there should be more than one product in the product portfolio and it can be substituted each other.

Sales Mix and Qty variance

- Where a company sells several different products that have different profit margins, the sales volume variance can be divided into a sales mix and sales quantity (sometimes called a sales yield variance) variance.
- The **mix variance** measures the impact arising from the actual sales mix being different from the budgeted sales mix.
- The **quantity variance** measures the effect of changes in physical volume on total profits.
- The variances can be measured either in terms of contribution margins or profit margins.

How to calculate sales advance variance

Sales Mix Variance					
Product	AQAM	AQSM	Qty. Variance	Std margin	Mix variance
Tooth paste A	XXXX	XXXX	XXXX	XX	XXX A
Tooth paste B	XXXX	XXXX	XXXX	XX	XXX F
	XXXX	XXXX	XXXX		XXX F

Sales Qty Variance					
Product	BQSM	AQSM	Qty. Vaiance	Std margin	Qty variance
Tooth paste A	XXXX	XXXX	XXXX	XX	XXX F
Tooth paste B	XXXX	XXXX	XXXX	XX	XXX A
	XXXX	XXXX	XXXX		XXX A

Standard / Budgeted Margin Vs Actual Margin

Standard Margin	=	Standard Selling Price	- Standard Cost
Actual Margin	=	Actual Selling Price	- Standard Cost

Operating Statement

Operating Statement

- The purpose of calculating variances is to identify the different effects of each item of cost/income on profit compared to the expected profit. These variances are summarized in a reconciliation statement or operating statement.

Operating Statement under absorption costing

	$
Budgeted profit	X
Sales volume profit variance	X/ (X)
Standard profit on actual sales (= flexed budget profit)	X
Selling price variance	X/ (X)
	X

Cost variances:	**F** $	**A** $	
Material price	X	(X)	
Material usage	X	(X)	
Labour rate	X	(X)	
Labour efficiency	X	(X)	
Variable overhead expenditure	X	(X)	
Variable overhead efficiency	X	(X)	
Fixed production overhead expenditure variance	X	(X)	
Fixed production overhead capacity variance	X	(X)	
Fixed production overhead efficiency variance	X	(X)	
Total			X/ (X)
Actual profit			X

Operating Statement under marginal costing

	$
Budgeted contribution (budgeted production × budgeted contn/unit)	X
Sales volume contribution variance	X/ (X)
Standard contribution on actual sales (= flexed budget contribution)	X
Selling price variance	X/ (X)
	X

	F $	**A** $	$
Material price	X	(X)	
Material usage	X	(X)	
Labour rate	X	(X)	
Labour efficiency	X	(X)	
Variable overhead expenditure	X	(X)	
Variable overhead efficiency	X	(X)	
Total	X	(X)	X/ (X)
Actual contribution			X
Budgeted fixed production overhead			X
Fixed overhead expenditure variance			X/ (X)
Actual profit			X

The suitability of standard costing in different organizations

- Standard costing is most suited to organizations with:
  - mass production of homogenous products
  - repetitive assembly work
- The large scale repetition of production allows the average usage of resources to be determined.
- Standard costing is less suited to organizations that produce non-homogenous products or where the level of human intervention is high.

Example: McDonalds

- Restaurants traditionally found it difficult to apply standard costing because each dish is slightly different to the last and there is a high level of human intervention. McDonalds attempted to overcome these problems by:
- Making each type of product produced identical. For example, each Big Mac contains a pre-measured amount of sauce and two gherkins. This is the standard in all restaurants.
- Reducing the amount of human intervention. For example, staff do not pour the drinks themselves but use machines which dispense the same volume of drink each time.

Standard costing and variance analysis in the modern manufacturing environment

- Variance analysis may not be appropriate because:

Non-standard products

- Standard product costs apply to manufacturing environments in which quantities of an identical product are output from the production process. They are not suitable for manufacturing environments where products are non-standard or are customized to customer specifications.

Standard costs become outdated quickly

- Shorter product life cycles in the modern business environment mean that standard costs will need to be reviewed and updated frequently. This will increase the cost of operating a standard cost system but, if the standards are not updated regularly, they will be of limited use for planning and control purposes. The extra work involved in maintaining up-to-date standards might limit the usefulness and relevance of a standard costing system.

Standard costing and variance analysis in the modern manufacturing environment cont.

Production is highly automated

- It is doubtful whether standard costing is of much value for performance setting and control in automated manufacturing environments. There is an underlying assumption in standard costing that control can be exercised by concentrating on the efficiency of the workforce. Direct labor efficiency standards are seen as a key to management control. However, in practice, where manufacturing systems are highly automated, the rates of production output and materials consumption, are controlled by the machinery rather than the workforce.

Ideal standard used

- Variances are the difference between actual performance and standard, measured in cost terms. The significance of variances for management control purposes depends on the type of standard cost used. JIT and TQM businesses often implement an ideal standard due to the emphasis on continuous improvement and high quality. Therefore, adverse variances with an ideal standard have a different meaning from adverse variances calculated with a current standard.

Emphasis on continuous improvement

- Standard costing and adherence to a preset standard is inconsistent with the concept of continuous improvement, which is applied within TQM and JIT environments.

Standard costing and variance analysis in the modern manufacturing environment cont.

Detailed information is required

- Variance analysis is often carried out on an aggregate basis (total material usage variance, total labour efficiency variance and so on) but in a complex and constantly changing business environment more detailed information is required for effective management control.

Monitoring performance is important

- Variance analysis control reports tend to be made available to managers at the end of a reporting period. In the modern business environment managers need more 'real time' information about events as they occur.

When should a variance be investigated - factors to consider

Size

- A standard is an average expected cost and therefore small variations between the actual and the standard are bound to occur. These are uncontrollable variances and should not be investigated.
  - In addition, a business may decide to only investigate variances above a certain amount. The following techniques could be used:
  - Fixed size of variance, e.g. investigate all variances over $5,000
  - Fixed percentage rule, e.g. investigate all variances over 10% of the budget
  - Statistical decision rule, e.g. investigate all variances of which there is a likelihood of less than 5% that it could have arisen randomly.

Favorable or adverse

- Firms often treat adverse variances as more important than favorable and therefore any investigation may concentrate on these adverse variances.

When should a variance be investigated - factors to consider

Cost

- For investigation to be worthwhile, the cost of investigation must be less than the benefits of correcting the cause of the variance.

Past pattern

- Variances should be monitored for a number of periods in order to identify any trends in the variances. A firm would focus its investigation on any steadily worsening trends.

The budget

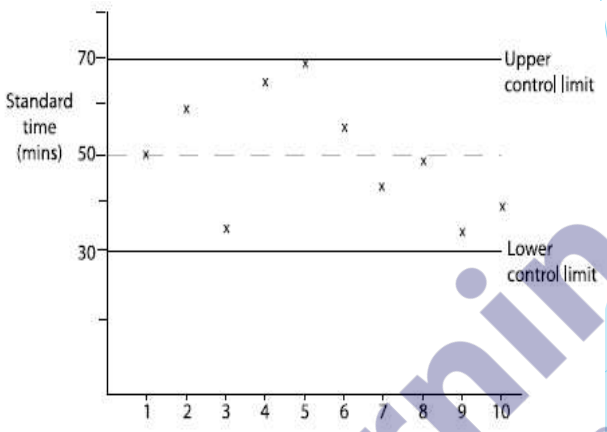
- The budget may be unreliable or unrealistic. Therefore, the variances would be uncontrollable and call for a change in the budget or an improvement in the budgeting process, not an investigation of the variance.

Reliability of figures

- The system for measuring and recording the figures may be unreliable. If this is the case, the variances will be meaningless and should not be investigated.

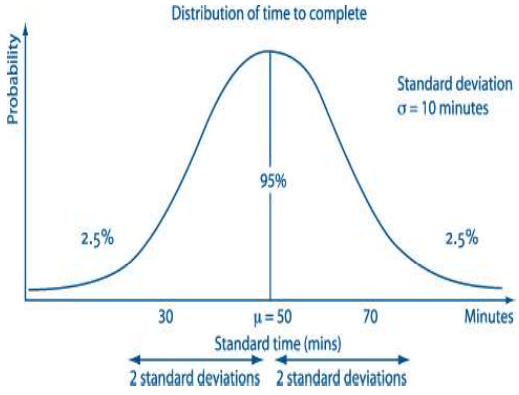
Methods used when investigating variances

- A process has a standard time of 50 minutes. Control limits may beset as a fixed amount, a fixed percentage or using a statistical model. Assume they are set at a fixed amount 30 and 70 minutes, and actual times recorded as follows:



Methods used when investigating variances cont.

- In this example the control limits are set two standard deviations from the mean. This means that 95% of the recorded process times should lie within the control limits.
- The actual time is recorded on the chart after the completion of each process. It will soon be apparent if the mean time is shifting from 50 minutes, as the recorded times move outside the control limits.
- If more than 5% of the observed results do lie outside the control limits, then the system may be referred to as being statistically out of control. At this stage management must decide what further action to take.



Thank you.