MANAGE INNOVATION AND
CONTINUOUS IMPROVEMENT

CANDIDATE RESOURCE WITH SIMULATED
ONLINE BUSINESS ASSESSMENT
BSBMGT608B
Table of Contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Legend</td>
</tr>
<tr>
<td>3</td>
<td>Qualification Pathways</td>
</tr>
<tr>
<td>4</td>
<td>Qualification Rules</td>
</tr>
<tr>
<td>5</td>
<td>Introduction</td>
</tr>
<tr>
<td>7</td>
<td>BSBMGT608B/01 Review Programs, Systems and Processes</td>
</tr>
<tr>
<td></td>
<td>Key Points</td>
</tr>
<tr>
<td></td>
<td>Establish strategies to monitor and evaluate performance of key systems and processes</td>
</tr>
<tr>
<td></td>
<td>Undertake detailed analyses of supply chains, operational and product / service delivery systems</td>
</tr>
<tr>
<td></td>
<td>Identify performance measures, and assessment tools and techniques, and evaluate their effectiveness</td>
</tr>
<tr>
<td></td>
<td>Analyse performance reports and variance from plans for all key result areas of the organisation</td>
</tr>
<tr>
<td></td>
<td>Identify and analyse changing trends and opportunities relevant to the organisation</td>
</tr>
<tr>
<td></td>
<td>Seek advice from specialists, where appropriate, to identify technology and electronic commerce opportunities</td>
</tr>
<tr>
<td>25</td>
<td>'True' or 'False' Quiz</td>
</tr>
<tr>
<td>27</td>
<td>BSBMGT608B/02 Develop Options for Continuous Improvement</td>
</tr>
<tr>
<td></td>
<td>Key Points</td>
</tr>
<tr>
<td></td>
<td>Brief groups on performance improvement strategies and innovation as an essential element of competition</td>
</tr>
<tr>
<td></td>
<td>Foster creative climate and organisational learning through the promotion of interaction within and between work groups</td>
</tr>
<tr>
<td></td>
<td>Encourage, test and recognise new ideas and entrepreneurial behaviour where successful</td>
</tr>
<tr>
<td></td>
<td>Accept failure of an idea during trialling, and recognise, celebrate and embed success into systems</td>
</tr>
<tr>
<td></td>
<td>Undertake risk management and cost benefit analysis for each option/idea approved for trial</td>
</tr>
<tr>
<td></td>
<td>Approve innovations through agreed organisational processes</td>
</tr>
<tr>
<td>39</td>
<td>'True' or 'False' Quiz</td>
</tr>
<tr>
<td>41</td>
<td>BSBMGT608B/03 Implement Innovative Processes</td>
</tr>
<tr>
<td></td>
<td>Key Points</td>
</tr>
<tr>
<td></td>
<td>Promote continuous improvement as an essential part of doing business</td>
</tr>
<tr>
<td></td>
<td>Address impact of change and consequences for people, and implement transition plans</td>
</tr>
<tr>
<td></td>
<td>Ensure objectives, timeframes, measures and communication plans are in place to manage implementation</td>
</tr>
</tbody>
</table>
Implement contingency plans in the event of non-performance
Follow-up failure by prompt investigation and analysis of causes
Manage emerging challenges and opportunities effectively
Evaluate continuous improvement systems and processes regularly
Communicate costs and benefits of innovations and improvements to all relevant groups and individuals

53 'True' or 'False' Quiz
54 Summary
55 Bibliography
57 Assessment Pack

Legend

This symbol indicates the beginning of new content. The bold title matches the content of the competency and they will help you to find the section to reference for your assessment activities.

Activity: Whenever you see this symbol, there is an activity to carry out which has been designed to help reinforce the learning about the topic and take some action.

This symbol is used at the end of a section to indicate the summary key points of the previous section.

This symbol is used to indicate an answer to the Candidate’s questions or notes to assist the Facilitator.
"There are always two choices. Two paths to take. One is easy. And its only reward is that it’s easy". Source Unknown

This unit of competency is provided to meet the requirements of BSB07 Business Services Training Package although it can be used in a range of different qualifications. The BSB07 Business Services Training Package does not state how a qualification is to be achieved. Rather, Registered Training Organisations are required to use the qualification rules to ensure the needs of the learner and business customer are met. This is to be achieved through the development of effective learning programs delivered in an order that meets the stated needs of nominated Candidates and business customers.
Qualification requirements include core and elective units. The unit mix is determined by specific unit of competency requirements which are stated in the qualification description. Registered Training Organisations then work with learners and business customers to select elective units relevant to the work outcome, local industry requirements and the qualification level.

All vocational education qualifications must lead to a work outcome. BSB07 Business Services Training Package qualifications allow for Registered Training Organisations (RTOs) to vary programs to meet:

- **Specific needs of a business or group of businesses.**
- **Skill needs of a locality or a particular industry application of business skills.**
- **Maximum employability of a group of students or an individual.**

When packaging a qualification elective units are to be selected from an equivalent level qualification unless otherwise stated.
Introduction

“Whether as an individual, or as part of a group, real progress depends on entering whole-heartedly into the process and being motivated to make you a more deeply satisfied human being.”

Source Unknown

This unit of competency is about being able to sustain and develop an environment in which continuous improvement, innovation and learning are promoted and rewarded. It will help you with the skills you need to demonstrate competency for the unit BSBMGT608B Manage Innovation and Continuous Improvement. This is one of the units that make up Advanced Diplomas in Business.

This manual is broken up into three distinct sections. They are:

1. **Review Programs, Systems and Processes**: First we will examine how to review your business systems and processes. Understanding what actually occurs and when is crucial to capitalising on opportunities for improvement.

2. **Develop Options for Continuous Improvement**: Once discovered, opportunities must be developed, planned and must be able to be measured. We will look at these areas in this section.

3. **Implement Innovative Processes**: Finally, the improvements must be implemented and this is a team activity. We will look at ways to initiate the improvements and methods of ensuring they remain in place.

At the conclusion of this training you will be asked to complete an assessment pack for this unit of competency. The information contained in this resource will assist you to complete this task.

On competent completion of the assessment, you will have demonstrated your ability to develop goals, set and meet your work priorities and undertake personal development.
Key Points Section 1

- In order for you to determine what systems need improvement, it is important that you and your organisation carefully review the programs that you have in place by establishing strategies to monitor and evaluate the performance of key systems and processes.

- This should also include a detailed analysis of your organisation’s supply and distribution chain, examining in detail how your organisation deals with inventory.

- The performance measures that your organisation adopts should provide an accurate view of your organisation and provide reports that show any variances clearly and in a timely manner.

- Where possible, consult specialists to identify appropriate technologies and opportunities within your organisation.
Part 1: Review Programs, Systems and Processes

Where Are We Now?

The quality production of goods and services is integral to the success of your organisation as a whole. Quality design begins with defining the organisation’s mission, including its purpose, values, objectives, and clients, with an eye to quality. This is the first step both for creating a new production program and for redesigning an existing program. To develop realistic objectives concerning quality, managers must clearly assess the level of quality that can be achieved with available resources; the organisation’s strengths and weaknesses, including current production performance and quality; the customer population, including how customers themselves perceive quality; and the political and social climate. Objectives best foster quality when they focus on meeting customers’ needs.

When setting objectives for an organisation you must ensure that they are:

- **Measurable**: How will you know if the objective has been met if you can’t measure progress towards it? Make sure you understand how the employee will be measured against the objective when you create it.
- **Comprehensible**: Everyone concerned must fully understand the objective. Without that you won’t be able to agree on whether it’s been met or not.
- **Unambiguous**: Some people are especially skilled at crafting objectives so those employees are misled about what they are aiming to do. Other people just can’t write them. Whichever the case, it’s critical that there be no scope for multiple interpretations of an objective.
- **Relevant**: We all have a tendency to think in the terms most familiar to us. Something that might be relevant to your approach to a job might not make sense for the person actually doing it.
- **Realistic**: No point in asking people to do the impossible, so recognise that objectives are to push people to the limits of their abilities, not past them. Even if it is technically possible to achieve the objective, is it realistic to expect these people to achieve it?
- **Agreed**: Each objective must be agreed by you and the staff. This is a good chance to check that you’re seeing eye-to-eye with your team – or to fix things if you’re not. It’s worth remembering that the second best idea that works is better than the best idea that may not work.

When setting your objectives and developing work methods (such as the processes listed in the previous section), ensure that you adhere to these requirements. All the objectives you state should be aimed at maintaining, or possibly increasing, the level of quality within your organisation. Quality may be defined in a number of different ways depending on what aspect of production is being referred to. Some examples include:

- **Reducing the level of wastage of raw material.**
- **Increasing the number of orders which are fulfilled within the required amount of time.**
- **Reducing the levels of rejected products due to poor production techniques.**

Each of these and many others, provide good examples of general quality issues that can be transferred into objectives and methods for production within your organisation. The way that resources are allocated influences the quality of products and services.
Part 1: Review Programs, Systems and Processes

- **Material resources:** The amount and kinds of facilities, equipment, and supplies, determine what services and products can be offered and how accessible they are.

- **Human resources:** Provider qualifications, training opportunities, and supervision policies determine how knowledgeable service providers are and what services they can provide.

- **Organisational arrangements:** The allocation of authority and responsibility determine whether providers feel motivated or discouraged. Resource scarcities can cause hectic shifts in operations strategy to meet objectives. Additionally, many resource prices are rising. The limited quantity of resources available, and their high prices, act as a double incentive to use them to their greatest advantage in achieving operational objectives.

Today, perhaps as never before, you as a manager or supervisor must understand that operational strategies must be set and objectives must be met within significant constraints that are imposed on your organisation by a shortage of resources.

This problem leads to the fact that work must be prioritised in order to meet objectives if resources are limited. Determine which objectives are the most important to fulfil, and attempt to fulfil these objectives first. Then work towards achieving lesser objectives. You may find that the key priority for your organisation is to ensure that all orders are fulfilled within the required time frame; once this key objective is met, then you can begin attempting to meet other objectives.

**Management By Objectives (MBO)**

A useful means of developing your management objectives is to examine your systems and trying to achieve ‘Management by Objectives’. Management by Objectives (MBO for short) is a method of managing that ensures that you get the best use out of the resources that you have in front of you.

MBO aims to ensure that you and your staff have a solid understanding of what is required of your organisation to be most effective and aims to ensure that everyone understands these goals and objectives that you, as an organisation, are working towards. You will also find that by better understanding the goals and objectives you are working towards that you can, in fact, gain a greater understanding of the roles of your staff – as you will know the actual work that individuals are undertaking.

An MBO organisation is working towards achieving one goal – the achievement of overall objectives and goals for the entire organisation.

MBO is all about trying to achieve focus. This in turn means that in order for it to be effective you must work on:

- Making sure your objectives are well defined
- Making sure your objectives are precise
- Making sure there are only a limited number of objectives
- Making sure that you actually have a focus – rather than focussing on nothing
- Attempting not to focus on too much
- Ensuring that all your managers understand the objectives that you have put in place.
Part 1: Review Programs, Systems and Processes

Managers must know the objectives in order to be in a position to review them and make improvements to overall processes. There are some areas where you will find this is particularly important – this includes:

- Your marketing efforts
- Quality improvement
- Human resources
- Finance
- Purchasing.

MBO attempts to link strategy with implementation through the use of effective thinking with regards to the way that you use your resources to achieve goals and objectives. Managers have overall responsibility for the achievement of any such objectives. But this is then passed down the line to the point where your staff become responsible for some of this achievement. Allowing for this level of control among your staff is critical to organisational success. It allows you as an organisation to delegate responsibility and to allow for the achievement of goals by all staff – making them feel more committed to the organisation as a whole.

Inventory Management

The system by which inputs are introduced into your organisation for production can make or break the quest for stopping delays and waste. The inventory problem resolves itself into three basic questions, the answers to which constitute your inventory policy: what to order; when to reorder; what quantity to order. This section will examine generalised inventory management techniques and discuss two specialised forms of planning, Just-in-Time systems and Materials Requirements Planning.

The inventory process is the retention of material in order to facilitate efficient operations. The problem involved in the inventory process hovers around the cost of first maintaining an inventory and second not having sufficient inventory to satisfy commitments of the operation. Another cost that can be considered in the inventory is the cost of holding too much inventory, some of which may become spoiled, or the costs of storing the inventory in a warehouse. It is very difficult to classify all the possible inventory systems that are being used or that could be used in business and industry. Most of these systems, however, can be grouped under one of two basic systems: the Two-Bin System or the Ordering Cycle System, or some variation or combination of these two systems.

Two Bin System

In the Two-Bin System, which is perhaps the oldest system of inventory management, each item is stored in two bins. One of the bins contains sufficient stock to meet the demand between the arrival of one order and the placement of the next order. The second bin contains sufficient supply to meet the expected demands during the purchasing lead-time plus a safety reserve. In this system, a purchasing order is issued as soon as supply in the first bin falls to a predetermined level. In its simplest form, the order quantity in this system for a particular item is fixed while the time between ordering fluctuates depending on the rate of depletion. In other words, the ‘when’ fluctuates with the rate of usage but the ‘how much’ remains constant. Often referred to as the fixed order system, perhaps
its greatest advantage lays in its ease of operation. On the other side of the coin, many operational complications can arise. For example if several items are purchased from the same source, a rigid adherence to the system may result in loss of cost saving opportunities such as volume discounts and freight discounts. Also, if the item must be stored at different locations in the plant, much of the automatic nature of the fixed ordering system is lost.

**Ordering Cycle System**

In an ordering cycle system, which you may hear referred to as periodic ordering, is a system whereby you have a:

- **Fixed time when reorders are made**
- **A variable amount that can be ordered during each order period.**

The advantage of this system is that you will always have a specific amount of product on hand at all times. This allows you to ensure that you do not run out of product. Generally you will always make sure that you order enough to replenish your supplies for one period plus the lead time for the next order period in order to ensure you have enough on hand.

In practice, in designing a particular system of inventory control, the planner can take elements from both systems, depending upon the nature of the operations, demand for the different items and other related factors pertinent to an economical inventory management system. As a check on the operational efficiency of a particular control system, most firms keep records of what is called inventory turnover ratio. For all inventory items, these ratios are calculated by dividing the average monthly or yearly inventories into monthly or annual sales. For the most part, inventory turnover ratios are optimised in terms of historical comparisons available from the firm’s or industry’s records. Thus, the inventory turnover ratios may be thought of only as a supplementary tool of control, because they are essentially determined by the prior decisions of how much to store per unit of time.

Any system of inventory management needs an information feedback mechanism in order to operate successfully. This is accomplished either by taking a physical inventory at the end of a specific time interval, or by instituting perpetual inventory procedures. Most large organisations maintain perpetual inventory records. This is especially useful where the volume of business is large enough to justify computerised inventory management. As long as consistency is practised in inventory valuations, the perpetual inventory method is usually recommended for operating a system of inventory control.

**Material Requirements Planning (MRP)**

MRP begins with the principle that many materials held in inventory have dependent demands (that is the demand of the item is dependent on the demand of other items in inventory). Materials in raw materials inventory and partially completed products held in ‘in-process’ inventory are materials with dependent demand. The amount of a particular material with dependent demand that is needed in any week depends on the numbers of products to be produced that require that material. The demand for raw materials and partially completed products does not have to be forecast, therefore, because if it is known what finished products must be produced in a week, the amount of each material needed to produce these finished products can be calculated.
Part 1: Review Programs, Systems and Processes

MRP is a computer based system that takes the master production schedule, explodes it into the required amount of raw materials, parts, sub-assemblies and assemblies needed in a week; reduces these materials requirements to account for materials that are in inventory or on order; and develops a schedule of orders for purchased materials and produced parts over the planned timeframe.

MRP is adopted by many organisations because it improves customer service, reduces inventory investment and improves the operating efficiency of the firm. The master production schedule drives the entire MRP system. The inventory status file and bills of material file supply additional information about products included in the master production schedule. These inputs are fed into the MRP computer system that generates the outputs. The inventory transactions resulting from the MRP actions are put back into the inventory status file so that current inventory records are maintained. The planned order schedule and changes to planned order schedule are the primary outputs of MRP.
### Master Production Schedule

A master production schedule (MPS) is devised to either replenish finished goods inventories or to fill customer orders. The early weeks of an MPS are understood to be frozen, the middle weeks described as firm and the later weeks are said to be full or open. The early weeks are frozen so that production departments can depend on this portion of the plan to the extent that material can be ordered, personnel can be scheduled to work and machine changeovers can be scheduled to support the MPS. If in the early weeks of the MPS changes were allowed, then personnel, machinery etc. would also need to change. Such changes cause chaos in production departments. The MPS drives the MRP system and is the primary basis for the MRP system’s planning for the acquisition of the required materials and production. As the MPS is updated, the MRP results are also modified.

### Bills of Material File

A bill of material is a list of the materials and their quantities required to produce one unit of a product, or end item. Each product therefore has a bill of material. These are the basis for planning the amount of each raw material for each time period given a production schedule of end items. A bill of material file is a complete list of all finished products, the quantity of each material in each product and the structure of products. The bill of material file is an up-to-date computerised file that must be revised as products are designed. Accuracy of the bills of material files is a major hurdle that must be overcome in most MRP applications. With the confidence that the file is current, once the MPS is prepared, the information can be fed into the system.

### Inventory Status File

The inventory status file is a computerised file with a complete record of each material held in inventory. Each material, no matter at how many levels it is used in a product or in many products, has one and only one material record. A material record includes low-level code for the material; inventory on hand, materials on order, and customers’ orders for the item. These records are kept up-to-date by inventory transactions such as receipts, disbursements, scrapped materials, planned orders and order releases. Another part of the file includes planning factors that are used by the MRP system. These factors include such information as lot sizes, lead times and scrap rates. The inventory status file not only provides the MRP system with a complete status record for each material in inventory, but the planning factors are also used by the MRP system to project delivery dates of orders, quantities of each material to order and when to place the orders.
Outcomes of the MRP

The outputs of the MRP system dynamically provide the schedule of materials for the future – amount of each material required in each time period to support the MPS. The primary output is the Planned Order Schedule. This is a plan of the quantity of each material to be ordered in each time period. This schedule is used by purchasing personnel to place orders with suppliers and by production personnel to order parts, sub-assemblies or assemblies from upstream production departments. The planned orders become a guide for future production for suppliers and for in-house production schedules. Changes in planned orders and modifications of previous planned orders can occur. Quantities of orders can be changed, orders can be cancelled, or the orders can be delayed or advanced to different time periods though the updating process.

Just in Time (JIT) Systems

Many companies nowadays convert their manufacturing system from traditional manufacturing to a Just-in-Time System. Just-in-Time brings up not only inventory control issues, but also process management and scheduling issues. Just-in-Time is an integrated set of activities designed to achieve high-volume production using minimal inventories of raw materials, work in process, and finished goods. Parts arrive at the next workstation “just in time” and are completed and move through the operation quickly.

The process of implementing JIT into an organisation revolves around trying to eliminate any inefficiency that may exist due to not having inventory in the right place at the right time. JIT attempts to:

- Improve overall efficiency in the supply chain
- Involve employees in reducing inefficiencies
- Eliminate waste through the entire production process
- Place emphasis on scheduling inventory and services in the right place at the right time
- Reducing inventory within the supply chain
- Pull inventory through the system
- Increasing participation of all staff members in improving systems.

A concept that is related closely to JIT is Kanban. This is a system that uses tickets to control the flow of supplies and materials through your production system. So, one workstation is asked to produce or supply a fixed number of goods, once these are received the next order is produced to replenish the supplies. This means that the:

- Supplies are being pulled through the system rather than pushed through after completion
- There must be good communication among those working on the floor to ensure the system works effectively
- If a problem exists it is quickly discovered and can be rectified easily.
The production schedule is a vital component of your organisation; it assists in ensuring that the various components of the firm are working towards achieving maximum productivity. The next section discusses a number of scheduling techniques in detail: Gantt Charts, PERT, CPM, and the use of computers in production scheduling.

### Gantt Charts

Gantt Charts are a tool that is often used to provide an easy overview of the way a project has been scheduled. In this handout we will look at a simple Gantt Chart for a specific project. Gantt Charts are useful in that they allow you to:

- Create a schedule for the way events are to be done
- Ensure that all required tasks are actually undertaken
- Allow you to check when certain resources will be needed during the process
- Help you work out the best order for training to be conducted in
- Help you monitor your progress on certain tasks.

Let’s now look at an example of how you can create a Gantt Chart. The first stage is:

1. List what needs to be done. In this case you need to list every task that you need to undertake and then create an estimate of how long you believe each task will take to complete. You should also decide whether the task is done after others or at the same time as others – sequential or parallel. This will give you a table of each task that needs to be undertaken.

<table>
<thead>
<tr>
<th>Task</th>
<th>Possible Start</th>
<th>Length</th>
<th>Type</th>
<th>Dependent on...</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine Training Needs</td>
<td>Week 1</td>
<td>5 days</td>
<td>Sequential</td>
<td></td>
</tr>
<tr>
<td>2. Select Training Provider</td>
<td>Week 2</td>
<td>3 days</td>
<td>Parallel</td>
<td>1</td>
</tr>
<tr>
<td>3. Develop learning plan for the training</td>
<td>Week 2</td>
<td>5 days</td>
<td>Parallel</td>
<td>2</td>
</tr>
<tr>
<td>4. Develop learning aids</td>
<td>Week 3</td>
<td>1 week</td>
<td>Parallel</td>
<td>3</td>
</tr>
<tr>
<td>5. Develop learning materials</td>
<td>Week 3</td>
<td>1 week</td>
<td>Parallel</td>
<td>3</td>
</tr>
<tr>
<td>6. Deliver training</td>
<td>Week 4</td>
<td>2 days</td>
<td>Sequential</td>
<td>4/5</td>
</tr>
<tr>
<td>7. Evaluate training</td>
<td>Week 4</td>
<td>1 day</td>
<td>Sequential</td>
<td>6</td>
</tr>
</tbody>
</table>

2. Next you will need to create a draft of your Gantt Chart, by making a chart with each day or week at the top and then plot each task that you need to undertake on to the chart. This needn’t be pretty, it is just to allow you to look at your schedule and determine whether it will actually work. If you are using software such as MS Project, this can be done for you. A draft for our plan is below. It only shows how 1 or two of the tasks may be entered.
Gantt Chart Example

### 3. Schedule Activities:
Next look at each of the tasks you will be undertaking and determine the right place for them in the project and use the Gantt Chart to look for any issues that may exist in terms of the way things have been scheduled. You should aim to ensure that any sequential task is done on its own and that relevant parallel tasks are conducted in an appropriate order.

### 4. Presenting the Analysis:
Finally, you can create a final version of your chart, based on playing around with the draft information. The presentation is likely to vary depending on exactly how things have been done. The Gantt Chart presented below was created using Microsoft Visio.

<table>
<thead>
<tr>
<th>ID</th>
<th>Task</th>
<th>Start</th>
<th>Finish</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Determine Training Needs</td>
<td>11/03/2010</td>
<td>17/03/2010</td>
<td>5d</td>
</tr>
<tr>
<td>2</td>
<td>Select Training Provider</td>
<td>17/03/2010</td>
<td>19/03/2010</td>
<td>3d</td>
</tr>
<tr>
<td>3</td>
<td>Develop Learning Plan</td>
<td>17/03/2010</td>
<td>23/03/2010</td>
<td>5d</td>
</tr>
<tr>
<td>4</td>
<td>Develop Learning Aids</td>
<td>23/03/2010</td>
<td>31/03/2010</td>
<td>7d</td>
</tr>
<tr>
<td>5</td>
<td>Develop Training Material</td>
<td>23/03/2010</td>
<td>31/03/2010</td>
<td>7d</td>
</tr>
<tr>
<td>6</td>
<td>Delivery Training</td>
<td>01/04/2010</td>
<td>02/04/2010</td>
<td>2d</td>
</tr>
<tr>
<td>7</td>
<td>Evaluate Training</td>
<td>05/04/2010</td>
<td>05/04/2010</td>
<td>1d</td>
</tr>
</tbody>
</table>

The advantage of using a Gantt Chart is that it allows you, at a glance, to see how the project is scheduled and where any issues may lie. It tells you who will need to be involved at various stages of the project – for example, when will the trainer be needed by?

The Gantt Chart is a very useful means of ensuring that a project is scheduled correctly and that there are no major conflicts surrounding the way in which the project will be scheduled and the way tasks will be undertaken. You can see at a glance where you should be, so it makes monitoring processes much easier and simple to follow and understand.
Critical Path Method (CPM)

The next type of project management tool that you may select to use is Critical Path Analysis. This tool is especially useful for more complex and difficult projects to schedule. Critical Path Analysis (CPA) allows you to plan the most appropriate order in which specific tasks within a project should be undertaken. This then allows you to produce a complete schedule which you can utilise to allow you to plan resource needs and measure your progress towards specific milestones.

CPA analysis is more complex in terms of what it allows you to do as opposed to Gantt Charts. It will force you to think carefully about each specific project task and the requirements for them to be completed on time in order for the project as a whole to be considered a complete success. It also enables you to look at areas where you can make some delays in order to accomplish other tasks within the project and yet still manage on time.

However, the issue with the CPA chart is that while it allows you to view the tasks to be undertaken and the order in which they will be conducted, there is no easy way to compare this to actual time frames. So, it isn't as easy to follow the way the chart is actually structured.

How to use the tool:

Begin the process by identifying the sequence of events that must occur for the project to be successful. This means attempting to determine which projects are sequential in nature and which are parallel. The project components can then be placed in a specific order for the project to be completed.

Drawing a Critical Path Analysis Chart

List all activities in the plan: As with a Gantt Chart, list all activities that must be undertaken, start dates and length of times required. It may also be useful to provide information on whether something is parallel or sequential at this stage.

As we work through this example, we will use the same process as we used with the Gantt Chart – although this project is perhaps too simplistic for this specific example, it will allow you to compare the way that the two techniques are used.

<table>
<thead>
<tr>
<th>Task</th>
<th>Possible Start</th>
<th>Length</th>
<th>Type</th>
<th>Dependent on...</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine Training Needs</td>
<td>Week 1</td>
<td>5 days</td>
<td>Sequential</td>
<td></td>
</tr>
<tr>
<td>2. Select Training Provider</td>
<td>Week 2</td>
<td>3 days</td>
<td>Parallel</td>
<td>1</td>
</tr>
<tr>
<td>3. Develop a learning plan for the training</td>
<td>Week 2</td>
<td>5 days</td>
<td>Parallel</td>
<td>2</td>
</tr>
<tr>
<td>4. Develop learning aids</td>
<td>Week 3</td>
<td>1 week</td>
<td>Parallel</td>
<td>3</td>
</tr>
<tr>
<td>5. Develop learning material</td>
<td>Week 3</td>
<td>1 week</td>
<td>Parallel</td>
<td>3</td>
</tr>
<tr>
<td>6. Deliver training</td>
<td>Week 4</td>
<td>2 days</td>
<td>Sequential</td>
<td>4/5</td>
</tr>
<tr>
<td>7. Evaluate training</td>
<td>Week 4</td>
<td>1 day</td>
<td>Sequential</td>
<td>6</td>
</tr>
</tbody>
</table>
Next, draw each of the activities as a circle and arrow diagram: When you are creating a CPA, you use circles to describe each of the activities to be undertaken and lines to represent linkages between them. In order to allow you to follow what is happening, each circle is numbered and represents the beginning and end of the task and the line is labelled to represent the task itself. You may like to place the length of time for the specific task to be listed above the actual line. Below we represent the first task to be completed in our hypothetical project. An example of a very simple diagram is shown below:

So, this simple diagram shows the start of a specific task (circle 1) and the completion of this event (circle 2). The arrow then lists the task itself and the length of time allocated to that specific task.

Once you have a sequential task, you start a new arrow for that activity and where things are parallel you will then split this into two specific arrows, each with tasks to be completed. Let’s now develop our CPA one stage further by adding a few more tasks.

Here the activities of ‘select training provider’ and ‘develop learning plan’ can not be started until ‘determine training needs’ task has been completed.

Below we present a complete overview of the project as it stands. It shows all the tasks that must be completed in order to develop the training program as you have it. You can see that this project is relatively simple and so does not require a complex chart such as this, but you can imagine that a more complex project may.
Part 1: Review Programs, Systems and Processes

1. Determine Training Needs
2. Select Training Provider
3. Develop Learning Plan
4. Develop Training Material
5. Develop Learning Aids
6. Deliver Training
7. Evaluate Training
8. Develop Learning Plan
9. Evaluate Training

1 Week
2 Days
3 Days
5 Weeks
5 Days
2 Days
1 Week
1 Day
1 Week

© Precision Group (Australia) Pty Ltd
Program Evaluation and Review Technique (PERT)

PERT analysis is a technique that allows you to examine your key estimates and analyse exactly how accurate they are. We discussed earlier in the manual the difficulties associated with making estimates that are accurate. PERT tries to make a weighted estimate of the amount of time a task may take. In order to do this, you need three different estimates. You need to:

- Estimate the shortest time something may take
- Estimate the longest time a task may take
- Estimate the likeliest time that you will be able to get a task undertaken in.

Once you have these estimates you can plug in this information into the following formula.

\[
\text{shortest time} + 4 \times \text{likely time} + \text{longest time}
\]

By using this weighted average, you can ensure that timeframes are more realistic and not unreasonably short or long.

Measuring Productivity

Productivity means the amount of products or services produced with the resources used. Productivity in a time period is usually measured with formulas such as this:

\[
\text{Productivity} = \frac{\text{Quantity produced}}{\text{Amount of resources used}}
\]

Notice that there are two sides to the productivity equation – the amount of production and the amount of resources used. Productivity varies with the amount of production relative to the amount of resources used. The productivity of each resource can and should be measured. For example, measures such as the following could be used to determine productivity:

- Capital: number of products produced divided by the asset value.
- Materials: Number of products produced divided by dollars spent on materials.
- Direct Labour: Number of products produced divided by direct labour – hours.
- Overheads: Number of products produced divided by dollars spent on overheads.

Such measures are not perfect. For example, the measure for materials productivity includes price. This is generally not desirable, but there is no other practical way to combine the many different units of measurement for the diverse materials used in production. Although such measures of productivity have their shortcomings, they do provide a starting point for tracking productivity so that managers are aware of productivity trends.
In the past when labour cost was the predominant cost of production, productivity was only measured by the output per hour of direct labour. Today however there is a need to look beyond merely direct labour costs and develop a multi-factor perspective. Our view of productivity must be towards improving the productivity of all the factors of production - labour, capital, materials and overheads.

The trouble with measuring productivity by output direct labour hours only is that the productivity of one factor can be increased simply by replacing it with another factor. For example if a factory that previously bought castings and machined them in-house decides to purchase the castings pre-machined, then the company can lay off skilled workers and sell the machine tools. What happens to productivity? Output will remain the same, but the number of workers will fall, so labour productivity will increase. Capital productivity will also increase, because investment will be less and production levels will be unchanged. But materials productivity will decline because the value of purchased materials will increase while productivity levels will not change. So by simply looking at one aspect of the productivity equation you are getting a false view of the overall productivity of a business. You should combine a number of productivity measures in order to fully understand the productivity of the firm with regard to its resource use.

“High achievement always takes place in the framework of high expectation.”
Jack Kinder
The Purpose of Review

In order to establish whether or not your current production process is operating at its most efficient for your business, you need to establish review systems that enable you to compare your current performance against an ‘ideal’. Any variances between your ‘ideal’ results and your actual results should be carefully examined to determine the reason.

Earlier in the development process you examined the need to develop measurable objectives. It is at the review stage where these measures become increasingly important. These objectives can be utilised as a form of ‘ideal result’, that is a result which is closest to a situation which would be the best you could hope for given the current resources being used. You may also find it useful to obtain historical data on productivity within your firm; this may assist in making the objectives you are striving for more realistic. Although it is impossible to get data from your competitors to use as a means of analysis, you may be able to obtain industry-wide figures from the trade association which covers your industry. These may be useful in establishing how well you compare to similar companies.

You then use the formula mentioned in the previous section to determine the actual productivity of your firm. You may decide to sample productivity at various stages of the production process, and over a number of different days, in order to get a wider view of current productivity rather than just a snapshot of the situation at one certain point. Look at conducting regular reviews of productivity. You may decide to conduct such an analysis once a month, or even more regularly. The key to remember is that you are gathering actual data on the productivity of your firm.

Getting the Message

The final stage is to compare the actual results with your desired results and evaluate how well you are meeting the current objectives of your organisation in terms of productivity. You should determine the variance in terms of a percentage difference from where you want the organisation to be on each productivity measure. The higher the percentage figure obtained, the worse the variance is. Of course there are two types of variance figure you can obtain, negative variance and positive variances.

Positive variances occur when you are performing above the level of productivity you set in your firm’s objectives. This is generally a positive sign that your production processes are working as they should, although you should take care to ensure that the productivity measure isn’t masking other problems as discussed in the previous section. If you find positive variances, make sure you are not overspending in some areas. It may be that your objectives can be altered to reflect this greater level of productivity within your organisation.

Negative variances are by their very nature indicative of a problem within the production process. You should seek to immediately rule out causes such as the initial objective being set too high as the cause and then further analyse the data to establish the cause of the variance. Review the findings with members of the production team where the fault was found, and seek input from those team members as to why the variance may have occurred.
After reviewing negative variances, you may find there is room for improvement within the current processes. In these cases, seek to make recommendations that will assist in bridging the gap between what is expected and the actual results found in the process. This may include recommendations for new technology being introduced, or the implementation of better methodologies for handling certain processes.

Constantly reviewing the production processes is vital as it means that you can ensure the productivity levels that you desire are firstly achieved, and once you have achieved the desired levels, these are maintained. Review the production processes on a regular basis, to ensure that the productivity level is being maintained.
Activity One

Your organisation has asked you to determine a way of measuring the productivity of your department. What measures would you use, and how would you measure them?
## Section 1 - ‘True’ or ‘False’ Quiz

<table>
<thead>
<tr>
<th>Please tick</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality process design begins by creating scheduling charts for production processes.</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>The way that resources are allocated influences the quality of products and services.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management By Objectives creates a link between top management’s strategic thinking and the strategy’s implementation lower down.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERT networks assume a beta probability distribution for the time estimates.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The vertical axis of a Gantt chart is a time scale.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The cost of maintaining an inventory of raw materials is not a consideration in inventory management processes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Material Requirements Planning, materials and components arrive at a work area at just the right time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity = Quantity produced / Amount of resources used.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity measures are never perfect.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are many pre-packaged computer software applications that will suit an organisation’s scheduling needs.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>