ROAD CIVEL WORK

LEVEL II

NTFQ

Learning Guide #19

Unit of Competence: Supporting Operational Plan

Module Title: Supporting Operational Plan

LG Code: CON RCW2 M06 LO19-01

TTLM Code: CON RCW2 M06 0919v1

LO 1: Contribute to implementation of operational plan.

Instruction Sheet	Learning Guide #19

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Contribute to implementation of operational plan
- Assist in recruiting employees and acquiring resources
- Support operations

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Identifying Details of resource requirements are collected, recorded and reported to relevant personnel
- Contributing operational plan is ensured to the achievement of the organisation's performance and business plan
- Identifying Key performance indicators is to measure own and work team's performance
- Undertaking Contingency planning is as required
- Proposing the development and presentation of for resource requirements are supported as required

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information "Sheet 1, Sheet 2, Sheet 3 and Sheet 4,---" **in page ---, ---, --- and ---** respectively.
4. Accomplish the "Self-check 1, Self-check t 2, Self-check 3 and Self-check 4" ,---" **in page ---, ---, --- and ---** respectively
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 "**in page ---.**
6. Do the "LAP test" **in page – ---**

Information Sheet-1	Concept on project planning

1. INTRODUCTION

Planning function is an initial stage of managerial process. It reflects tasks, objectives and actions choosing, in order to achieve chosen goals. It requires decision making by choosing between concurrent alternative paths of action of the future. By planning, organization can determine means and ways of how and what they will achieve specific goals. Plans must be set to fulfill objectives and purposes of (any) organization, and the same stands for manufacturing organizations. This comes naturally, because organizations exist to serve interests of their owners, management and employees. It means that planning comes before any other managerial function, because manager must plan intra-organizational relations, qualifications, how employees will be directed, and what kinds of control should be put in practice. Efficiency of the plan reflects the level of accomplishment of purpose and objectives of business. Simultaneously, efficiency of the plan implies cost-effectiveness regarding purpose and objective achievements, versus expenditures and other factors necessary for its accomplishment. Limitations of resources and environmental uncertainty also affect planning efficiency. Managers need to plan use of resources, in order to avoid their exhaustion and subsequent consequences. As a result of planning, production relations, economic relations, and transportation relations, are coordinated and directed. One of the most essential features of planning is clear sense of direction, which helps anticipate use of resources in the future. This paper introduces operational planning through capacity planning, material planning, management of manufacturing process, and scheduling. Listed operations are among most challenging for manufacturing organizations. The paper will focus on aggregate production and aggregate capacity, which will be broken to the level of scheduling and rough-cut capacity planning. All of the system will be taken into account.

2. OERATIONAL PLANNING AND SCHEDULING SYSTEM

Operational planning and scheduling systems depend on the utilization of operations capacity, the volume and timing of outputs, and on balancing of outputs with capacity at desired levels for competitive effectiveness. Setting compatibility between these systems must take place on various levels of management, so that various activities support each other.As process progresses from top to bottom, intervals of time shrink, and specs of planning go from broad at the top, to very detailed at the bottom.

A.

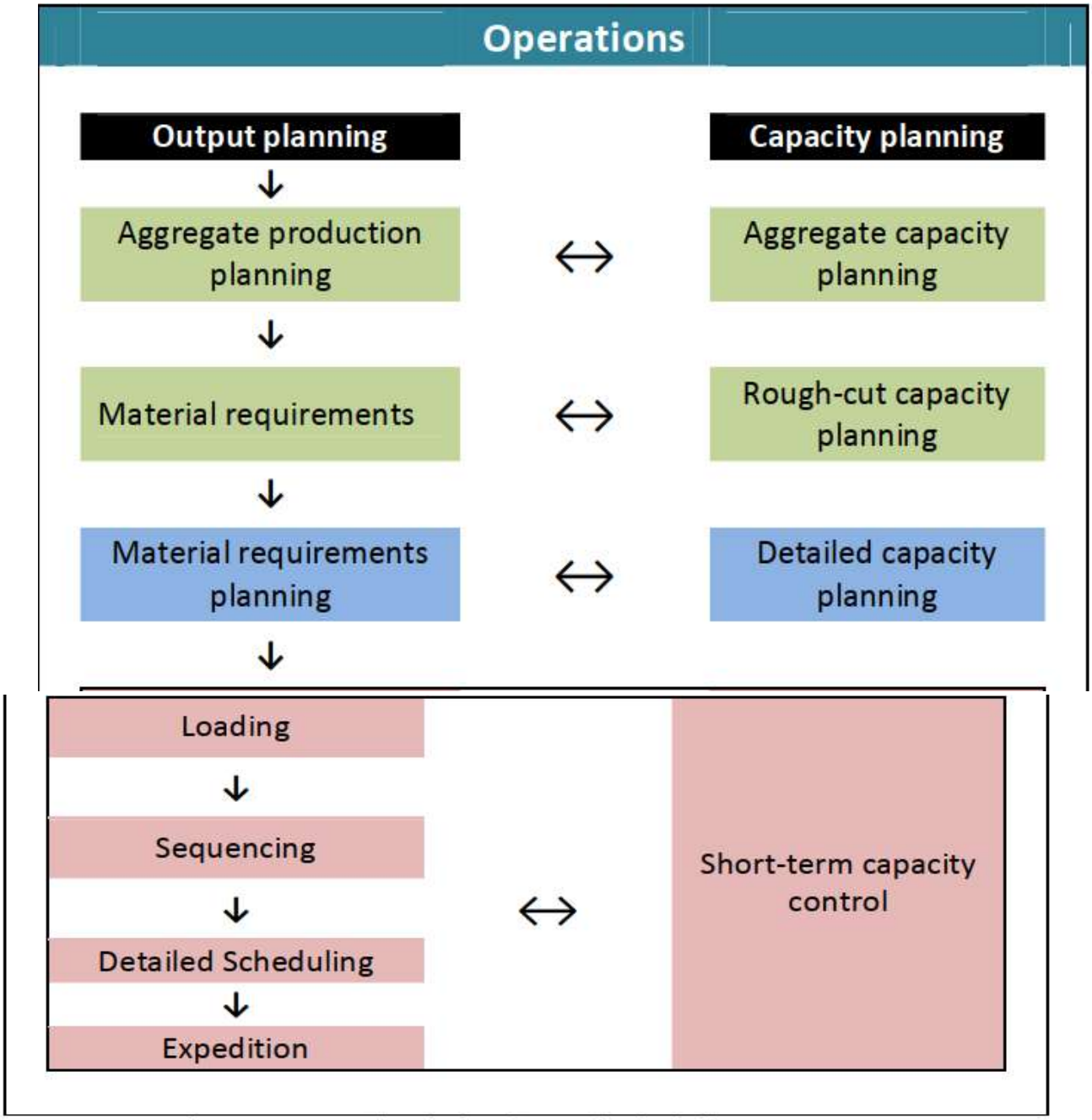

Figure 1. Operational planning and scheduling system [2]

Business plan represents a stated intention of activities in organization, for the specified period of time. It is being developed at the highest executive level of organization, based on overall economic forecast, state of industry forecast, and on the analysis of competitiveness. Business plan reflects competitiveness strategy for the forthcoming years. Figures are usually expressed in terms of the quarterly, or even monthly, output levels. It also can state the overall levels of inventory, which will be maintained during the specified period of time. Business plan is a kind of internal contract between various sectors in organization, such as finance, production, engineering, development,

2.1 AGGREGATE PRODUCTION OUTPUT PLANNING

Production process is the transformation of organizational resources into products. The resources are interpreted as assets with which the manager has the ability to create the product itself. Inputs of the manufacturing organization are raw materials, purchased parts, production workers, and work plan. They can be classified in the production process as:Transformed resources: resources transformed into semi-products or finished productsTransforming resources: resources, on which transformed resources are created. The purpose of the transformation process in production is to use transformed resources in order to obtain the finished product. Therefore, there is:

Material processing - includes operations for transforming the physical properties of the material. Information processing - operations of processing production process pieces of information. Procurement of consumer needs - includes operations that convert consumers' needs into finished production the production process, inputs are converted into outputs. Inputs of each production process include work items and means of work. The objects of work include: fabrication material, auxiliary material, directional material

- Aggregate Production Planning refers to the production and to the activities of the organization concerning demand, showing the quantity of production expressed in pieces and units of production, by groups or types of products. Since product groups can be manufactured in different factories, institutions or sectors, each of them requires a separate plan. The sectoral production plan covers a predetermined period of time, on a weekly or monthly basis. Planning at this level does not consider minor details such as, for example, how much product will be produced in a particularcolor, style, model, etc. This plan recognizes only the existing production capacity and existing rules for inventory and inventory maintenance, job stability and the stability of subcontractors

- Master Production Scheduling (MPS): The main objective of the MPS is to harmonize the demand of individual products from a product group. This higher level of planning performs the fragmentation of the product group to individual products, and indicates when it will be produced. MPS is an important link between marketing and production. It shows when the orders will be fulfilled, and when the shipment will be ready for delivery. Arrears are also not neglected, so the timing of planned production and delivery is realistic.

3. Concept on project planning

Planning consists of setting specific targets and goals and specifying in detail the necessary resource and actions to reach those targets. Similarly every work site needs to be organized in a structured manner in order to ensure that the outputs of all staff and workers are properly coordinated. In order to be able to prepare a plan one needs to have available essential data and background information, like:

Site inspection report

- List of available equipment
- Contract document with specifications and work drawings
- List of available personnel, especially skilled labor
- List of available tools
- List of material required

Site inspection report is a report prepared by an authorized party or auditor which highlights critical EHS (and potentially more) information about a specific site or project.

3.1 Project Plans

In order to be able to measure progress and to what degree the project is successful in moving towards its ultimate goals, the project implementation plans will include a time schedule during which specific targets or milestones are to be reached. As part of this exercise, the project manager or supervisor may establish the project special development programmers to increase the speed at which the goals can be reached. Project implementation and maintenance plans commonly relate to specific development projects, normally involving the construction or improvement of one particular road project or road project section. Detailed plans are the working documents which the technical staff refers to in relation to the scheduling of individual work activities, supply of equipment and materials and hiring of staff and labor. Detailed plans are prepared for various time horizons, ranging from the entire duration of the project, to monthly, weekly and daily work plans. The main purpose of the detailed plans is to secure proper management of all resources used as inputs to produce the planned outputs.
These plans are normally combined with a comprehensive reporting and monitoring system, allowing management to compare actual achievements with the planned target.

Self-Check 1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

PART ONE: - chose the beast answer

1. _____ is consists of setting specific targets and goals and specifying in detail the necessary resource and actions to reach those targets.
   A. Planning B. Project Plans C. available tools
   D. production workers
2. . Which one of the following correct about Operational planning and scheduling systems?
   A. order to ensure that the outputs of all staff and workers are properly coordinated
   B. production plan covers a predetermined period of time, on a weekly or monthly basis
   C. the utilization of operations capacity, the volume and timing of outputs, and on balancing of outputs
   D. all are correct

Note: Satisfactory rating - 20 points **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Part one: - multiple question

1. _____
2. _____

Information Sheet 2	Resource requirement

2.1 Resource requirement

As was mentioned previously one of the major objectives of planning is the effective use of available resources, and we shall in this section of the course be looking at resource analysis and scheduling.

Remember that through effective planning, that the successful control of project resources is achieved.

Although there are other minor resources, the four main resources used on a construction project are:

- Labour
- Plant and equipment
- Materials
- Finances

2.1.1Labour

Labour law and regulation are set at international and national level

The international Labour organization in united nation body that deal with Labour issues. Over the year, the IOL has issued for adoption by member states, of which Ethiopia is one, a widely respected code of international Labour convention and recommendation of freedom of association, employment, social, and policy, condition of work, social security, industrial relations and Labour administration, among other.

On a nation level these recommendation lead to comprehensive Labour laws. In Ethiopia these laws are regulated by acts of parliament, commonly known as" Labourlaw". These laws are enforced by the ministry of Labour and social security. This module explains common and particular regulation that are important for contractors in the construction sector

2.1.2 Plant and equipment

The fixedassets used to produce goods for a company. A factory and the machinery there in are common examplesof plant and equipment. On a balance sheet, plant and equipment are recorded according to their historical cost.

Itis important to note that the historical cost of net plant and equipment usually bears little or no relationship to themarket value after they have been held for several years. They ar e also called net plant and equipment.

Plant and equipment is a catch all phrase to cover a multitude of mechanical equipment used in construction and also useful for cost coding (allocation of costs).

Very generally and many people will argue with me on this but plant tends to be a machine that has a running engine that requires regular refuelling such as mobile crane, excavator, truck, scissor lift, boom truck (Hi-ab), generator etc. and equipment is mostly (but not exhaustively) supporting the machines such as excavator buckets, man basket, bowser, lifting chains, concrete bucket,
The fixed assets used to produce goods for a company. A factory and the machinery therein are common examples of plant and equipment. On a balance sheet, plant and equipment are recorded according to their historical cost. It is important to note that the historical cost of net plant and equipment usually bears little or no relationship to the market value after they have been held for several years. They are also called net plant and equipment.

- **The context of construction)**

✓A *plant* produces consumables by combining a number of different raw materials as per the requirement of the civil works involved in a project, e.g. - ready mix concrete (RMC) hot mix asphalt (HMA), wet mix macadam (WMM) etc.

Fig. 2.1 plant production

✓ equipment on the other hand are any and all machinery which are used to place, or transport, or compact, or hoist, or lift various loads of materials, other machinery, etc. E.g. - pavers, backhoe excavators, cranes, jackhammer, smooth wheeled roller, etc.

Fig. 2.2 construction

2.3 Materials and Resource Requirement Planning

2.3.1 Introduction

Success of an operation department of any organization is dependent upon an efficient production plan. One of the key essential of a production plan is material and manufacturing planning system. Material requirement planning plays a pivotal role in assembly-line production. Material requirement planning is a system based approach, which organizes all required production material.

Material requirement planning is an information system for production planning based on inventory management.

2.3.2 The basic components of material planning are:

- Material planning provides information that all the required raw material and products are available for production.
- Material planning ensures that inventory level is maintained at its minimum levels. But also ensures that material and product are available whenever production is scheduled, therefore, helping in matching demand and supply.

- Material planning provides information of production planning and scheduling but also provides information around dispatch and stocking.

2.3.3 Objective of Material Requirement Planning

Material requirement planning is processed which production planning and inventory control system, and its three objectives are as follows:

- Primary objective is to ensure that material and components are available for production, and final products are ready for dispatch.
- Another primary objective is not only to maintain minimum inventory but also ensure right quantity of material is available at the right time to produce right quantity of final products.
- Another primary objective is to ensure planning of all manufacturing processes, this scheduling of different job works as to minimize or remove any kind of idle time for machine and workers.

2.3.4 Advantages and Disadvantages of Material Resource Planning

As with every system based process, material resource planning also has its advantages and disadvantages, and they are as follows:

2.3.5 Advantages of Material Resource Planning

- It helps in maintain minimum inventory levels.
- With minimum inventory levels, material planning also reduces associated costs.

- Material tracking becomes easy and ensures that economic order quantity is achieved for all lot orders.
- Material planning smoothens capacity utilization and allocates correct time to products as per demand forecast.

2.3.6 Disadvantages of Material Resource Planning

- Material planning is highly dependent on inputs it receives from other systems or department. If input information is not correct than output for material planning will also be incorrect.
- Material planning requires maintenance of robust database with all information pertaining inventory records, production schedule, etc. without which output again would be incorrect.
- Material planning system requires proper training for end users, as to get maximum out of the system.
- Material resource planning system requires substantial investment of time and capital.

2.3.7 Material Resource Planning - Inter dependency of Business Function

Material planning not only benefits operation department but is also beneficial to the other department of organization.

They are as follows:

- Material planning is useful in determining cash flow requirement based on material requirements and final dispatch schedules.
- It helps procurement team in scheduling purchase of necessary material.
- It helps the sales team in determining delivery dates for final products.

2.3.8 Implementation of Material Resource Planning

Implementation and success of material resource planning dependent on following factors:

- Acceptability of by top management about advantages and benefits
- Proper training and participation of all workers and personnel
- Precision and accuracy of input data for accurate and reliable results

2.4 Finance

Finance is a field that is concerned with the allocation (investment) of assets and liabilities over space and time, often under conditions of risk or uncertainty. Finance can also be defined as the art of money management. Participants in the market aim to price assets based on their risk level, fundamental value, and their expected rate of return. Finance can be split into three sub-categories: public finance, corporate finance and personal finance.

2.4.1 What is Finance?

Finance is defined as the management of money and includes activities like investing, borrowing, lending, budgeting, saving, and forecasting. There are three main types of finance:

(1) Personal,

(2) Corporate, and

(3) public/government.

2.4.2 Finance Examples

The easiest way to define finance is by providing examples of the activities it includes. There are many different career paths and jobs that perform a wide range of finance activities. Below is a list of the most common examples:

- Investing personal money in stocks, bonds, or guaranteed investment certificates (GICs)
- Borrowing money from institutional investors by issuing bonds on behalf of a public company
- Lending money to people by providing them a mortgage to buy a house with
- Using Excel spreadsheets to build a budget and financial model for a corporation
- Saving personal money in a high-interest savings account
- Developing a forecast for government spending and revenue collection

- **Finance Topics**

  There is a wide range of topics that people in the financial industry are concerned with. Below is a list of some of the most common topics you should expect to encounter in the industry.

  - ✓ Interest rates and spreads
  - ✓ Yield (coupon payments, dividends)
  - ✓ Financial statements (balance sheet, income statement, cash flow statement)
  - ✓ Cash flow (free cash flow, other types of cash flow)
  - ✓ Profit (net income)
  - ✓ Cost of capital (WACC)
  - ✓ Rates of return (IRR, ROI, ROA)
  - ✓ Dividends and return of capital
  - ✓ Shareholders
  - ✓ Creating value
  - ✓ Risk and return
  - ✓ Behavioral finance

2.4 purchasing or ordering of goods

- What is a Purchase Order?

A purchase order is a commercial source document that is issued by a business' purchasing department when placing an order with its vendors or suppliers. The document indicates the details on the items that are to be purchased such as the types of good, quantity, and its price. In simple terms, it is the contract drafted by the buyer when purchasing goods from the seller.

Fig. 1.3 purchase order

- **Steps in Ordering**

1. Buyer creates a purchase requisition

Before sending out the purchase order to the supplier, the first step is to create a purchase requisition. It is a document issued within the company to the purchasing department to keep track of the goods ordered.

The purchase requisition also helps the company keep an account of their expenses. The PO is created only after the purchase requisition is approved by the authorized manager.

2. Buyer creates a purchase order

When the goods that need to be purchased are agreed upon, the purchase order is created. The PO lists the date of the order, FOB shipping information, discount terms, names of the buyer and seller, description of the goods being purchased, item number, price, quantity, and the PO number.

The PO number is a unique number associated with a certain order. It serves two purposes; one is to ensure that the goods ordered match the ones that were received and the second, the PO number is matched to the invoice to make sure the buyer is charged the right amount for the goods.

3. Seller accepts (or rejects) purchase order

At the bottom of the purchase order is a dotted line for the authorized manager to sign off on the order. The PO includes all the details about the transaction and what the buyer expects to receive. Once the seller receives the PO, they have the right to either accept or reject the document. However, once the PO is accepted, it becomes a legally binding contract for both parties involved.

4. Buyer records purchase order

Once the order has been placed, the purchase order remains “open.” An open purchase order is a PO where the order is placed but the goods have not yet been received, or it can mean that only part of the order has been received. Either way, it signifies that the delivery of the goods is not complete.

2.5 Benefits of Purchase Orders

1. Avoids duplicate orders

Purchase orders bring several benefits to the company. The most important being that it helps avoid duplicate orders. When a company decides to scale the business, POs can help keep track of what has been ordered and from whom.

Also, when a buyer orders similar products, matching the invoices can be hard. The PO serves as a check for the invoices that need to be paid.

2. Keeps track of incoming orders

In addition, POs help keep track of incoming orders, and a well-organized purchase order system can help simplify the inventory and shipping process.

3. Serves as legal documents

Purchase orders serve as legal documents and help avoid any future disputes regarding the transaction.

2.1.1 How Does the Supplier Use the Purchase Order?

Purchase orders play a major role in the inventory management process. When the supplier receives the PO, they will take the items listed in the PO from their inventory. The PO helps keep a record of the inventory on hand and identify any discrepancies between the values shown in the records and the actual stock.

Additionally, the supplier needs the PO to fulfill the order correctly. The buyer will also be charged by the supplier based on the payment terms agreed upon in the PO.

2.1.2 Purchase Order vs. Invoice

The purchase order is a document generated by the buyer and serves the purpose of ordering goods from the supplier. The **invoice**, on the other hand, is generated by the supplier and shows how much the buyer needs to pay for the goods bought from the supplier. The PO is a contract of the sale while the invoice is the confirmation of the sale.

2.1.3 Purchase Order vs. Sales Order

While the purchase order shows what goods were ordered from the supplier, the **sales order** is generated by the supplier and sent to the buyer. It signifies the confirmation or approval of the sale. Nowadays, the PO process is no longer paper-based, and the buyer usually sends its suppliers an electronic PO. It is done using the purchasing order module in the ERP software. It helps speed up the purchasing process while decreasing the chance of error.

2.6. Stock requirements and requisitions

What is a Material Requisition?

A material requisition, also known as a materials requisition form, or a material request, is a document used by the production department to request materials they need to complete a manufacturing process. It is used to authorize and keep a record of the components used so that an appropriate inventory can be stocked to keep production moving.

Information on the requisition is used to update the stores record card, also known as the bin card, and the stores ledger. It's also used to determine the direct materials used on various jobs or products, along with the indirect materials used by various cost centers.

The bin card is a paper or computer record used to keep track of inventory for each stock item held in storage. The card details the amount of stock received and issued, the amount of stock reserved to meet current production orders, and any residual balance free for future use.

The production manager generally fills out the materials requisition form and delivers it to either the materials or storage department where all the raw materials are located. Then, the materials manager approves the request and has the raw materials moved from the storage area to the production floor.

The person who is requesting the materials will keep a copy of the form, as will the warehouse staff. An additional copy goes along with the picked goods to their eventual destination. If any items listed on the form are not in stock, another copy may go to the purchasing department so they can create a purchase requisition and purchase order to obtain the necessary materials.

What Information Does the Materials Requisition Form Contain?

Typically, this form has the job number, the date of the request, the date the items are needed by, material description, item number, quantity, and proper management signatures for approval.

2.7 stock requisition

Departmental Stock Requisition: Departmental stock requisitions are user-initiated point-of-use orders generated on a regular basis on an ordering template.

Duties - Supervises eight employees engaged in the materials-handling activity of a section of binned stores in a central ordnance depot - by issuing daily work orders for the performance of tasks, which specify procedures to be followed in receiving and distributing bulk stock to bins, - by issuing stock requisitions and material lists used to select and assemble stock items at the outgoing clearing areas, - by issuing and explaining reference material used for stores identification and stores maintenance purposes, - by requisitioning materials-handling equipment and assigning operators to work with section personnel, - by inspecting work in progress to ensure its safe and proper conduct, and - by relating work performed to established performance standards in order to judge the warehouse efficiency.

When the RN supply ship was away replenishing her stores at Hong Kong, which she had to do about once every three months, or when the items required were not in stock, requisitions could be signaled to the RN base at Hong Kong which would then forward requirements by the next Japan-bound ship.

For example, Members will have the opportunity to take part in a pilot project involving the use of electronic forms to simplify and speed up stock requisition processes.

2.8The Importance of Collaborating With Supervisors & Colleagues

Collaboration and open lines of communication are essential for the success of any small or large business. As a business owner, listening to other entrepreneurs in your industry can provide invaluable insight into market trends and consumer needs. Keeping an open ear to your management/supervisor team can also provide you with a keen understanding of policy performance in your company and how to best improve your business strategy for long-term success.

2.8.1 Developing New Ideas

As a small-business owner, collaboration with other entrepreneurs in your area can help stimulate ideas and develop new business strategies you might not have developed on

your own. Experienced small-business owners in your area may have singular insights into the tendencies and needs of consumers in your target market. Collaborating with these professionals can provide critical support for your small business, especially in the company's early days. This collaboration can help you craft your product development methods and promotional campaigns to garner greater attention from your target customer base.

2.8.2 Lowering Company Costs

Collaborating with successful colleagues in your industry can help your small business lower its infrastructure and labor costs by borrowing from strategies that worked for those other companies. This shortens the trial and error period for your company where you're trying multiple business strategies to achieve optimal productivity and probably losing money in the process. Collaboration early in the life of your small business also tightens your revenue stream and allows you to save more money to sustain growth as your company achieves success.

Self-Check 2	

Instructions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page.

Part one: - **True or False**

1. As a small-business owner, collaboration with other entrepreneurs in your area can help stimulate ideas and develop new business strategies
2. Departmental stock requisitions are user-initiated point-of-use orders generated on a regular basis on an ordering template.
3. The requisitions order is a document generated by the buyer and serves the purpose of ordering goods from the supplier
4. Purchase orders bring several benefits to the company.
5. Finance is defined as the management of money and includes activities like investing, borrowing, lending, budgeting, saving, and forecasting. There are three main types of finance:

Note: Satisfactory rating - 20 points **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Answer Questions

Part one: - True or false answer question

1. _____
2. _____
3. _____
4. _____
5. _____

Information Sheet 3	Performance indicator

3. Performance indicator

3.1 Performance Specifications

This is also called Results Specifications. It specifies the critical characteristics which the product or material is expected to exhibit after delivery and installation or completion of an activity. As a general rule, specifications specify the results required and leave the method to the Contractor. There forfeit is the Contractor's responsibility to ensure the specified performance achieved, by whatever means the Contractor considers appropriate and which suits his/her way of working. The Contractor remains fully responsible for the finished work regardless of the method. However, in Performance Specifications it is paramount to state any restriction on method of working, and some contracts require that the contractor submits his proposed methods of work to the Engineer for approval, before the project commences

3.2 Performance Measurement

Carefully constructed performance measures are an essential asset management tool. Performance measures should be:

- Current
- Available
- Reliable

Current: provide information about current performance

Available: At the fingertips of those who need to know, when they need to know

Reliable: Provide information that will not be subsequently proven to be inaccurate.

Performance measures can be used as follows:

Strategic	Report on annual performance to external stakeholders, e.g. Best Value Performance Indicators. They provide a snap shot of overall performance but do not generally assist with the day-today management of the asset. Primary Purpose: To report on performance to others
Tactical	Provide ongoing management information to the Highway/rural roads authority, e.g. random auditing to determine the general condition of the asset (designed as an ongoing management tool). Primary Purpose: To assist in resource allocation decision making
	Provide operational information to service deliverers. They are principally focused on assisting in the management of service delivery and may typically be focused on time to carry out a specific task, e.g. time to respond to reports of dangerous defects. Primary Purpose: To provide information to improve the efficiency of service delivery

3.4 Types of Performance Monitoring

In general asset performance management measures are focused on the tactical issues. It is however important that there is alignment between the efforts at all levels. There are a number of different ways of carrying out performance measurement.

The following are some of the most commonly carrying out performance measurement:

A) Random auditing

B) System auditing

c) Monthly auditing

D) Annual audit

A) Random Auditing

Audits can include customer satisfaction surveys, sample condition surveys and ad hoc inspections. Random audits are frequently used to independently audit the performance of Highway Authorities who are working under quality management systems their purpose therefore is to provide an independent crosscheck on performance.

B) System Audits

Where asset management software systems have been implemented the system, if properly used, will provide a source of performance management data. For example customer query systems will be able to provide response times to queries and also be able to identify areas of exception. I.e. particular types of complaint or query or particular geographical areas generating a high number of queries

C) Monthly audits

Where established management systems are in place it is possible to obtain monthly performance statistics. In general these may focus on activities and the time taken to complete them. Progress against an established program may also provide a useful management tool.

D) Annual audits

Some indicators will be based upon information supplied by others annually. This limits the use of such indicators to annual reviews.

3.2 Compliance Monitoring

Depending on the service delivery arrangements in place there will be varied opportunities to gather and report on compliance with contracted as well as the road level of service requirements.This is particularly important where performance specifications have been utilized and it is recommended that in such instances performance measures are not only included in the contract but that the results are made available to the wider asset management team.It is recommended that each authority establish a performance-monitoring regime that comprises an appropriate combination of the above.

3.2.1 Developing Performance Measures

The key steps in defining highway and rural roads network performance indicators are:

- ✓ Identify the objective
- ✓ Select the input data
- ✓ Check the validity of the results

3.2.2 Identify the objective

Many authorities have published vision, mission and goal statements, as well as objectives. In these instances the objectives form a logical starting point for the development of performance measures and specifically to identify what aspect of performance is being measured. Objectives are often grouped, for example, into areas such as safety, availability, sustainability, customer service, and asset preservation and environmental. This is the approach recommended, by grouping proposed performance measures to support levels of service. The important consideration in starting, by identifying the objective first, is to establish that the

elements of the service being measured genuinely contribute to the delivery of a strategic goal. This helps to develop an understanding of how the system of service delivery is (or isn't) supporting progress toward achieving established strategic goals.

3.2.3 Select the input data

It is advisable to start with data that is readily available or can be easily obtained.

Do not assume that new data sources are required. It is likely that much of the data needed to support desired performance measures is already being collected. It may simply not be being collated and provided to others. Maintenance history records for example can provide the input for maintenance cost analysis, which can provide intervention triggers for treatments.

- **Ideally a performance measure should be:**
  - ✓ Objective: desirable but some subjective measures are inevitable.
  - ✓ Repeatable: able to be repeatedly measured with appropriate accuracy.
  - ✓ Reproducible: able to be reproduced by a different operator and instrument.
  - ✓ Aligned with Objectives: linked as closely as possible to Highway Authority strategic goals
  - ✓ Cost Effective: Data collection cost must be reasonable compared to the perceived benefit.
  - ✓ Manageable: able to be influenced or controlled by the service deliverers
  - ✓ Model able: Ideally it should be possible to predict the change of a measure with time using some form of model e.g. a pavement deterioration model
  - ✓ Safe to Measure: Ideally via high-speed data collection.

3.2.4 Check the validity of the results

Check the validity of the result to ensure that they genuinely reflect current performance. The precision of the performance measures and the ability to measure to an appropriate level of accuracy is a critical issue when performance measures are established and target values set. Problems are likely to occur when the difference between the target level and the measured condition is small and the accuracy of the measuring method could be the reason for non-achievement rather than the actual performance provided.

3.3 Regular Monitoring and Reporting

There are a number of ways in which performance measures can be summarized and reported. In deciding upon a reporting format considerations should be given to:

- Showing the alignment between the measures to outcomes/strategic goals
- Reflecting a balance between competing demands
- Presenting only information that the audience requires
- Keeping the number of measures manageable
- Balanced Scorecard

Increasingly there is a demand for organizations to report on not only the financial performance of their assets but also on the social and environmental effects of their actions. Under such a regime the outcomes of their actions are reported against the social, economic and environmental outcomes. This means a move away from a purely financial reporting to being able to demonstrate to stakeholders that they are also managing their social and environmental responsibilities. Clearly there is an inherent tension between these competing demands

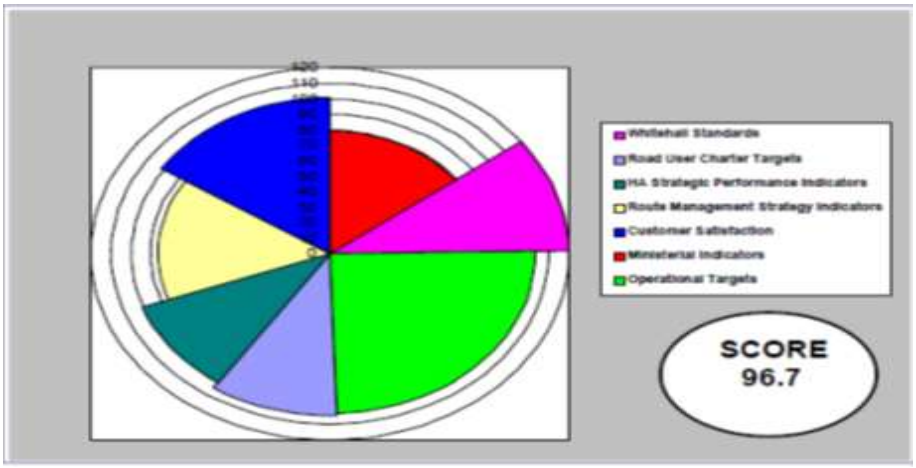

Fig.2.3 score balance

A balance scorecard approach is therefore appropriate as a tool for demonstrating the level of attention given to each outcome area. Developing a scorecard requires input from a variety of stakeholders. The example below illustrates how a series of outcomes can be collectively presented. In this example the size of the slice represents comparative importance and the radial measure shows current performance.

The exact detail of this example is not important. It is included to illustrate one means of visually representing a range of performance results in a format that can be quickly understood. Numerous alternative methods of presenting such results exist and it is for each authority to decide whether such reporting is important for them and to determine an appropriate presentational format.

Self-Check 3	Written test

Part one: -Choose the baste answer

1. The following are some of the most commonly carrying out performance measurement?
   A. System auditing
   B. Identify the objective
   C. Safe to Measure: Ideally via high-speed data collection.
   D. All are correct

Part two: - Matching question

A	B
1. Random Auditing 2. Annual audits 3. Monthly audits 4. System Audits	A. Some indicators will be based upon information supplied by others annually B. Where asset management software systems have been implemented the system, if properly used, will provide a source of performance management data. C. Audits can include customer satisfaction surveys, sample condition surveys and ad hoc inspections. D. Where established management systems are in place it is possible to obtain monthly performance statistics.

Note: **Satisfactory rating - 20 points** **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Part one; - Multiple choose

1. _____

Part two: - Matching question

1. _____
2. _____
3. _____
4. _____

Information Sheet 4	Contingency Planning

4.1 Contingency plan

A **contingency plan** is a course of action designed to help an organization respond effectively to a significant future event or situation that may or may not happen.
A **contingency plan** is sometimes referred to as "**Plan** B," because it can be also used as an alternative for action if expected results fail to materialize.

4.2 You've heard the phrase, "Always have a Plan B."

Well, "Plan B" is just common vernacular for what's known as a contingency plan. In other words, a contingency plan is put in place in case the primary plan that you're executing doesn't unfold as expected. Contingency plans are used by smart managers who are aware that there are always risks that can sideline any project or business. Without having a contingency plan in place, the chances of completing a project successfully will drop considerably, even if that project plan was made with planning software. The use of contingency plans is widespread and applies to any business venture. Governments, for example, use them to prepare for disaster recovery or economic disruption. If you're not working on a contingency plan when you're planning any enterprise, then you're opening yourself up to unnecessary risk.

4.3 What Is a Contingency Plan for a Business?

In most cases, a contingency plan is devised to respond to a negative event that can tarnish a company's reputation or even financial livelihood. However, contingency plans in business aren't, by definition, always negative. There are positive contingency plans, such as what to do if the organization receives an unexpected sum of money or other resource. The contingency plan is a proactive strategy, different from a crisis management plan, which is more of a reaction to something that happened. A contingency plan is set up to account for those disruptive events, so you're prepared if and when they arrive. While any organization is going to plan for its product or service to work successfully in the marketplace, that marketplace is anything but stable. Unpredictability might be the enemy of business, but that doesn't mean that it doesn't exist. To execute a plan believing you can avoid unpredictability may be fatal to your organization's future.

Fig. 4.1 contingency plan in5 steps

4.4 How to Create a Business Contingency Plan

A contingency plan is a plan, and like any plan, it requires a great deal of research and brainstorming. And like any good plan, there are steps to take to make sure you're doing it right.

1. **Identify and Prioritize Resources:** Research your company and list its crucial resources, such as teams, tools, facilities, etc., then prioritize that list from most important to least important.

2. **What Are the Key Risks?** Figure out where you're vulnerable by meeting with teams, executives and every other department in the organization to get a full picture of what events could compromise your resources; hire an outside consultant, if necessary.

3. **Draft a Contingency Plan:** If you can, write a contingency plan for each risk that you identified in the above steps, but start with what's most critical to the life of your organization. As time permits you can create a plan for everything on your list. Whatever the plan, the thought behind each should be the steps necessary to resume normal operation of the company, thinking about communications, people's responsibilities, timelines, etc.

4. **Share the Plan:** When you've written the contingency plan and it's been approved, the next step is to make sure everyone in the organization has a copy. A contingency plan, no matter how thorough, is not effective if it hasn't been properly communicated.

5. **Revisit the Plan:** A contingency plan isn't chiseled in stone. It must be revisited, revised and maintained to reflect changes to the organization. As new employees, technologies and resources enter the picture, the contingency plan must be updated to handle them.

4.5 Contingency Plans and Risk Management in Project Management

In project management, contingency planning is often part of risk management. Any project manager knows that a plan is only an outline. Sometimes the project will extend beyond those lines. The more a manager can prepare for chance in their plan, the more effective it will be.But risk management isn't the same as contingency planning. Risk management is about identifying, assessing, avoiding, mitigating, transferring, sharing and accepting risk; while a contingency plan is about developing steps to take when an actual issue occurs. However, they do share the aspect of what to do when the risk happens. So, a contingency plan is what to do if an unplanned event occurs. It can be as simple as asking, "What if…?," and then outlining the steps to your plan as you answer that question.

4.6 Project Risk for Contingency Planning

When managing a project there are many entry points for risk that need to be accounted for with a contingency plan. For example, there's the physical, as in loss due to damage to information, equipment or facilities as a result of an accident or natural disaster.Technical issues are another risk factor, in that systems can stop working or not work as needed to deliver the project on time and within budget. Of course, human resources are another risk, as teams get sick, leave projects or are terminated.On a larger scale, there are factors even further beyond the control of a project manager, such as political and social change. For example, if you're working on a government contract that can change with whoever is currently in control of the government. Policy can change, and communities can protest projects and effectively stop them. Liability issues are also at play when managing a project. There is the threat of legal action or compensation plans.

4.7 Key Steps in Contingency Planning

Project managers are adept at creating contingency plans, as the structure and actions are like many of the processes already familiar to their profession. For instance, a contingency plan breaks down tasks to get more detail and, in so doing, more control.

The following are the key steps in contingency planning:

- Note where there are resources that can be used in an emergency. Also, note where in your contingency plan these resources might be applied.
- Identify dates that if missed will negatively impact your plan, for example getting approval from a group or committee that only meets every now and then.
- Know your contingency plan. Check for any weak links and strengthen them. Identify any slack that you can find in it.
- See if you can find points in your plan where alternative routes can be taken, and think through each one's scenario to add flexibility to your plan.
- Use your experience to help you see patterns in your project's ebb and flow of activity to sharpen your plan.

4.8Challenges of Contingency Planning

Like any plan, there are always challenges that managers need to think about before and during the process of creating their contingency plans.

4.9 The Desire to Focus on "Plan A"

Human nature likes to focus on one solution. A contingency plan might not get the attention it needs because people are solely invested in the main action. They want "Plan A" to be successful and feel spending too much time on a "Plan B" could potentially sabotage that success.It's critical that managers stress the importance of a contingency plan. That will serve as a safeguard that helps facilitate success rather than hinder it. Therefore, it cannot be put on the backburner or given little thought, but rather, must be thoroughly followed through.

4.10 The Small Probability of Occurrence

Another issue is that because of its nature, a contingency plan has a small probability of occurring, and so many might not see the urgency in such an activity. That means that it can land on the bottom of their to-do list or never get done.Again, the need for a contingency plan might seem like a luxury when planning for a project, but without one you're putting your project and your business at risk. The time you put into creating a thorough contingency plan will pay off if you need it, while if you don't, you're lucky. But never place a bet on chance.

- ## Use Task Lists to Outline the Elements

  Use our task list feature to outline all the elements of a contingency plan. Since a contingency plan likely wouldn't have any hard deadlines at first, this is a good way to get grasp all of the necessary tasks and resources. You can add comments and files to each task, so everyone will know what to do when the time comes.

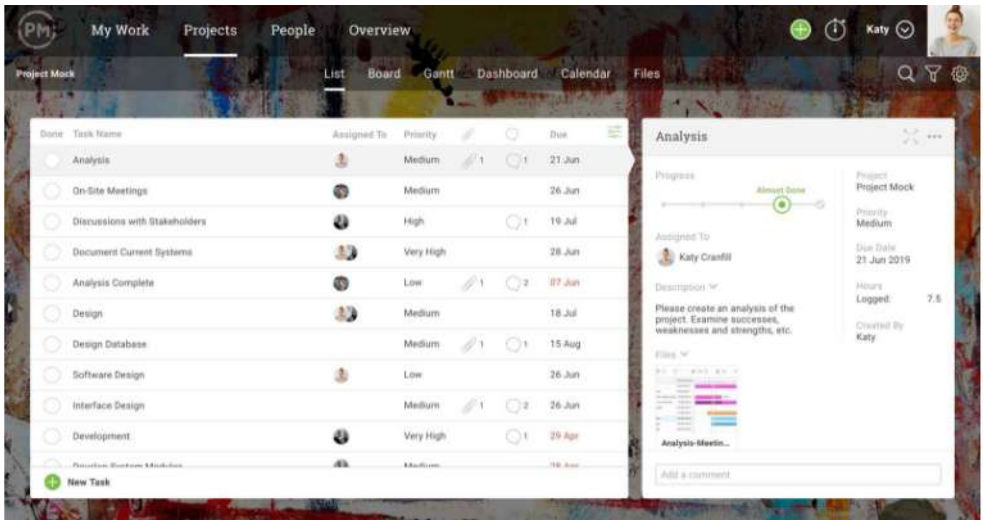

Fig. 4.2 outline the elements

- ## Gantt Charts for Rolling Out Deadlines

  If your contingency plan has to be executed, switch to the Gantt chart view. From here you can visualize your due dates, set dependencies and track progress in real time. You can also assign tasks to team members and balance their workload in the very same view.

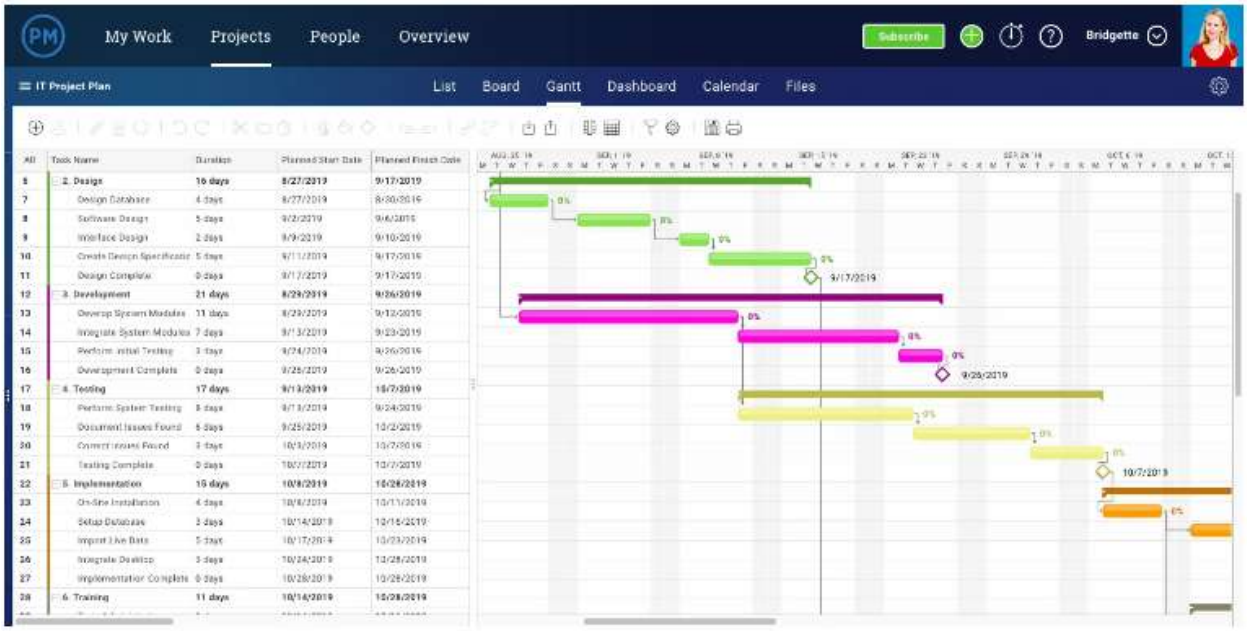

Fig. 4.3 Gantt Charts for Rolling Out Deadlines

- **Dashboard to Monitor the Contingency Plan**

Our dashboard gives you a bird's eye view of all of the critical project metrics. It displays live data, so you're getting a real-time look at how your project is progressing. This live information can help you spot issues and resolve them to make sure that your contingency plan is a success. This, given that it's your plan B, is tantamount.

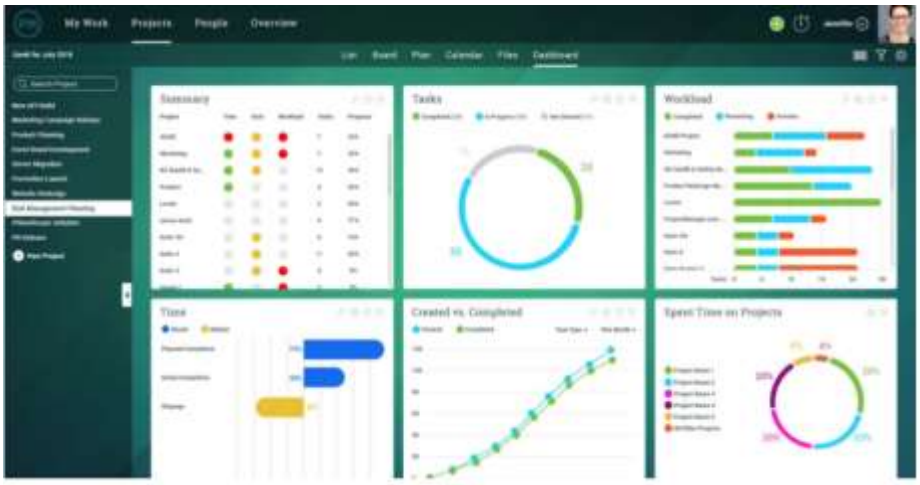

Fig. 4.4 Dashboard to Monitor the Contingency Plan

✓ *If you're planning a project, include a contingency plan, and if you're working on a contingency plan then have the right tools to get it done right. ProjectManager.com is a cloud-based project management software that helps you create a shareable contingency*

plan, and then, if you need to, execute it, track its progress and make certain to resolve whatever problems it's addressing. You can do this all in real-time!

4.11 Conducting a Risk Assessment

Every organization faces a unique set of risks that it needs to plan for. They key to identifying yours is to conduct a thorough risk assessment.The first step is to identify your business-critical operations**.** These are the key processes and functions without which your organization could not operate – for example, your supply chain, your internet connection, or your ability to comply with legal standards. Next, identify the threats that could harm each critical operation. These could include the loss of key staff, technical failure, or a change in government policy, for example. (Our article, Risk Analysis and Risk Management , covers this process in more detail.) Chances are, you'll end up with a long list of potential threats. It may be unrealistic to attempt contingency planning for all of them, so you need to prioritize.

- **Risk Impact/Probability Charts** are a good way to do this. These charts help you to analyze the impact of each risk, and to estimate how likely it is to happen. This reveals which risks require the expense and effort of risk mitigation. Business processes that are essential to your organization's survival, such as maintaining cash flow and market share, are typically at the top of the list.

Self-Check 4	

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part one;- choose the baste answer

1. Which one of the following correct about the keysteps in contingency planning?
   A. See if you can find points in your plan where alternative routes can be taken, and think through each one's scenario to add flexibility to your plan.
   B. These are the key processes and functions without which your organization could not operate
   C. You can add comments and files to each task, so everyone will know what to do when the time comes.
   D. All are correct answer
2. _____ is a course of action designed to help an organization respond effectively to a significant future event or situation that may or may not happen.
   A. Risk Impact/Probability Charts
   B. Revisit the Plan
   C. Contingency plan
   D. A and B are answer

Note: **Satisfactory rating - 20 points** **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Part one; - Multiple choose

1. _____
2. _____

Information Sheet 5	Short-term operational planning and scheduling

5.1 A short term production planning and scheduling model

An optimal decision making model is developed to assist the manufacturer to select among the potential customer orders, which orders to reject and which orders to accept and in what quantities such that the net operational profit during the planning time horizon will be maximized. This model is developed based on the group technology concept and assumes that (i) job splitting is allowed, (ii) all the necessary stages of operation of each job (e.g., a batch of identical parts with a specified due date, availability time, required setup time, and required processing time) at each workstation (e.g., assembly cell) is represented by a single aggregated stage of operation, (iii) the time horizon is set to be sufficiently short, and (iv) the processing priorities of the potential customer orders during the planning time horizon is specified. Based on the above model, an operational plan for optimal loading of an integrated manufacturing system consisting of a set of finite capacity workstations linked by a material handling system is obtained.

5.2. Operations Planning & Scheduling

Operations planning are an important part of any business. Effective and efficient management of operations is the hallmark of a successful company. Operations management is an old concept, but as many of the techniques of operations management have gained attention in the business media, the definition has become somewhat unclear, making effective management of operations seem more complicated than it really is.

5.2.1 What is Operations Planning and Scheduling?

Operations management, also called “operations planning” or “operations scheduling,” is a term assigned to the planning of production in all aspects, from workforce activities to product delivery. While this type of planning is almost exclusively seen in manufacturing environments, many of the techniques are used by service-oriented businesses. Simple to implement, operations management can be applied using nothing more than a spreadsheet program.

Operations management is primarily concerned with the efficient use of resources. While it is sometimes referred to as production planning and employs many of the same techniques, the primary distinguishing characteristic is that production planning is narrowly focused on the actual production whereas operations management looks at the operation as a whole.

5.3 How Does Operations Management Work?

Operations management has a broad focus: inventory levels must be managed, materials ordered/stored, capacity maximized, relationships with suppliers maintained, and the interactions within the system monitored.Many methods satisfy these items of focus; however, there are some generalities involved in their processes. Each involve the observation of the current state, analysis of the costs associated, the establishment of performance goals, and the monitoring of efforts toward those goals. Primary concerns are capacity planning and production management.

5.4 Static vs. Dynamic Scheduling

There are two main types of operation scheduling: static and dynamic. Static scheduling carries an assumption that all steps in a process can be defined and will not change. Dynamic scheduling assumes that steps in the process will change so nothing is scheduled until the demand is received. Dynamic scheduling works well in environments where there is a high degree of customization.An example of a static plan would be a retail clothing company. In this case, production levels are determined up to one year in advance. An example of a dynamic plan would be a floral shop. In these cases, while there may be a few arrangements for display and possible purchase, the primary focus is on creation of arrangements after an order is received.

5.5 What is Capacity Planning?

Capacity planning is focused on maximizing the capacity of a company to make it more efficient and more profitable. Capacity planning at its most basic attempts to match the volume the company is able to produce to the demand to avoid downtime by preventing bottlenecks.

- What is Production Planning?

Aggregate planning is a static form of production planning. It focuses on satisfying expected demand. This may be in relation to production, the workforce itself or inventory management. Aggregate planning basically ties facility planning in with scheduling decisions and it does so quantitatively, meaning it produces numbers to back up an operations plan.Aggregate plans help match supply and demand while minimizing costs by applying upper-level forecasts to lower-level, production-floor scheduling. Plans generally either “chase” demand, adjusting the workforce accordingly, or are “level," meaning that labor is relatively constant with fluctuations in demand being met by inventories and back orders.

5.6 Strategic Planning Characteristics

Many businesses develop strategic planning within a short-term, medium-term and long-term framework. Short-term usually involves processes that show results within a year. Companies aim medium-term plans at results that take several years to achieve. Long-term plans include the overall goals of the company set four or five years in the future and usually are based on reaching the medium-term targets. Planning in this way helps you complete short-term tasks while keeping longer-term goals in mind.

- **Short-Term Planning**

  Short-term planning looks at the characteristics of the company in the present and develops strategies for improving them. Examples are the skills of the employees and their attitudes. The conditions of production equipment or product quality problems are also short-term concerns.

  To address these issues, you put in place short-term solutions to address problems. Employee training courses, equipment servicing and quality fixes are short-term solutions. These solutions set the stage for addressing problems more comprehensively in the longer term.

- **Medium-Term Planning**

  Medium-term planning applies more permanent solutions to short-term problems. If training courses for employees solved problems in the short term, companies schedule training programs for the medium term. If there are quality issues, the medium-term response is to revise and strengthen the company's quality control program.

  Where a short-term response to equipment failure is to repair the machine, a medium-term solution is to arrange for a service contract. Medium-term planning implements policies and procedures to ensure that short-term problems don't recur.

- **Long-Term Planning**

  In the long term, companies want to solve problems permanently and to reach their overall targets. Long-term planning reacts to the competitive situation of the company in its social, economic and political environment and develops strategies for adapting and influencing its position to achieve long-term goals. It examines major capital expenditures such as purchasing equipment and facilities, and implements policies and procedures that shape the company's profile to match top management's ideas.

  When short-term and medium-term planning is successful, long-term planning builds on those achievements to preserve accomplishments and ensure continued progress.

Self-Check 5	Written test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part one; - True or False

1. In the long term, companies want to solve problems permanently and to reach their overall targets
2. Capacity planning is focused in the capacity of a company to make it more efficient and more profitable.
3. Operations planning are an important part of any business

Note: **Satisfactory rating - 20 points** **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Part one; - Multiple choose

1. _____
2. _____
3. _____

Information Sheet 6	Reporting

6 Reporting

6.1 Technical report writing

Technical reporting is an essential part of the management system in civil works projects. A proper reporting system enables the project to objectively monitor the progress and quality of work, even at an early stage, and assess whether defined targets are being reached. It is then possible to revise plans and take remedial action at an early stage to improve performance and secure the original set target.A proper reporting system enables the project to objectively monitor the progress and quality of work, even at an early stage, and assess whether defined targets are being reached. It is then possible to revise plans and take remedial action at an early stage to improve performance and secure the original set targets. The purpose of a reporting system is to: A proper reporting system enables the project to objectively monitor the progress and quality of work, even at an early stage, and assess whether defined targets are being reached. It is then possible to revise plans and take remedial action at an early stage to improve performance and secure the original set targets.

6.2 The purpose of a reporting system is to:

- Measure performance of ongoing works,
- Provide a uniform method of collecting production data,
- Ensure the correct and efficient use of funds, machines, materials and labor,
- Identify weak components of the production chain,
- Enable the management to effectively re-plan and reschedule remaining works,
- Calculate payment of completed works,
- Provide reliable information to others about the project activities, and
- Collect experience data to improve planning of future new projects.

Fig.6.1 writing report on site

The flow of reports from the work sites to headquarters follows the formal line of command.
Supervisor → Technician → Site Engineer → Client and head quarter

The responsibility for reconciling daily reports into weekly and monthly summaries is usually assigned to the technicians. This exercise allows the site management to compare results with current plans and assess whether any specific action is required in order to improve progress. The reporting of quantities of completed works provides the contractor with important information relating to when it is appropriate to submit the next invoice and forms the basis on which claims are calculated. In order to achieve uniformity in reporting and securing the essential data for monitoring and planning purposes, reporting is usually carried out using a set of standardized report forms. To ensure that the forms are used in the same way by all staff, the report forms are issued with a set of procedures and directions relating to how and when they are used and how the information is passed on to superiors.In order to achieve uniformity in reporting and securing the essential data for monitoring and planning purposes, reporting is usually carried out using a set of standardized report forms. To ensure that the forms are used in the same way by all staff, the report forms are issued with a set of procedures and directions relating to how and when they are used and how the information is passed on to superiors.Depending on the size of the site, the responsibility for maintaining these report forms can be divided among the supervisors, storekeeper and site office staff. The supervisors remain responsible for the end result and need to verify the accuracy of the reports. Record keeping is a routine job which takes time and despite the fact that it may be perceived as tedious, it is extremely important, since the whole chain of planning, progress monitoring and control and payment processing is based on the site reports.

6.2 The most commonly used reports are described here:

a) Muster roll
b) Flow of report
c) Monthly progress report
d) Daily site record
e) Comparison to Planned Progress
f) Payment Certificates
g) Store Records
h) Tools Inventory
i) Vehicle Logbooks
j) Other Site Reports

A. Muster Rolls

The muster roll is an attendance record, which forms the basis for the wage calculations and the payroll. It is a ledger in which the presence or absence of individual workers are noted on a daily basis. The muster roll is used as the main supporting document for accounting labor expenditure. The muster roll is updated in the morning with occasional checks in the afternoon. The entries are done at a central place, such as outside the store or site office before work starts, or as the supervisor visits the different gangs, depending

on the distance from store to site, the use of task work and the system applied for distribution of tools. The workers must be properly informed about the conditions of employment, including the rules applied when coming late to work or being absent for more than a stipulated period of time. Being absent may result in removing the person concerned from the muster roll and employing a new worker in his/her place.At the end of the day, the supervisor should make crosschecks of the daily attendance recorded in the Muster Roll with the labour inputs entered into the daily site records. The muster roll should be maintained every day and be readily available for inspection. Every week or at the end of each month, depending on how frequent the project carries out wage payments, the muster roll is reconciled to calculate the wages for the workers. This exercise determines the exact amount of payments required at each site and for each worker.

B. Flow of Reports

The flow of reports from the work sites to headquarters follows the formal line of command. The supervisors report to the technicians, the technicians to the site engineer, the site engineer to the client and to headquarters. The responsibility for reconciling daily reports into weekly and monthly summaries is usually assigned to the technicians. This exercise allows the site management to compare results with current plans and assess whether any specific action is required in order to improve progress. It is important that the aggregate figures are provided to the supervisors, thus informing them about how their work is progressing according to plans and giving them an indication whether the actual outputs are satisfactory. The reporting of quantities of completed works provides the contractor with important information relating to when it is appropriate to submit the next invoice and forms the basis on which claims are calculated.

C. Daily site record

The daily site record forms the basis for the reporting and control of physical work progress on site. It records the "input" (number of workers and use of equipment) used for each work activity. The site record is filled in at the end of each workday when the supervisor inspects the work of the individual workers or gangs.

The daily record is a sort of diary in which the main events on a work site are entered on a daily basis. This includes:

- The location at which the various activities are carried out. For road works the location is described by indicating the change where works are ongoing;
- The outputs achieved at the end of the workday. Outputs are recorded using the same unit of measurement as applied in the Bill of Quantities;

- The input assigned to each work activity such as labour and equipment;
- The overall productivity rate is calculated from the inputs and completed outputs at the end of the day.
- It is also common practice to report general site conditions including issues such as weather conditions, any problems encountered, accidents or unusual events on site.

The exact design and contents of the report form will vary from one program to another. In some projects, the daily site record is combined with a daily work plan, outlining the planned activities, planned inputs and expected results by the end of the day. To simplify the monthly report writing, the daily records are summarized at the end of each week into a weekly report. The project management needs to compare the daily, weekly and monthly work outputs with project work plans. This comparison also needs a close review of the inputs used to ensure that these do not exceed the estimated inputs used when calculating the unit rates in the Bill of Quantity.

Daily Site Planning and Output Record										
District:		Road Name:				Length:			Date:	
		Planned				Actual				Remarks
Activity	Unit	km start	km end	Quantity	Labour	km start	km end	Quantity	Labour	
Survey And Setting Out	m									
Bush Clearing	m^3									
Topsoil Removal	m^3									
Soil Excavation	m^3									
Side Drain (Left Side)	m^3									
Side Drain (Right Side)	m^3									
Benching	m^3									
Embankment	m^3									
Camber Formation	m^3									
Turfing	m^2									
Compaction	m^3									
Gravelling	m^3									
Compaction Of Gravel	m^3									
Culvert Construction	m^3									
Protection Works	no									
Other	m^3									
Total Work Days										

Table.6.1 Daily site records

d. Monthly Progress Report

Monthly summaries of performance, based on the weekly totals of the daily reports, are prepared by the site office. The main purpose of this exercise is to enable the management to monitor progress against planned targets. Together with the daily and weekly progress reports, this information also provides the basis for the invoicing of completed works. Thesummary reports contain output and productivity data for the current month and for the total period so far since the project commenced. This enables management to review performance for the last month and the average performance during the year so far, against planned outputs and productivity. Summary reports are designed to meet the monitoring needs of each level of management. Report forms are designed so that the information needed for performance monitoring is displayed in a clear way that is easily understood and recognized. The higher up in the management organization, the more general picture will be required of the performance statement.

Activity	Chainage		Inputs		Outputs		
	Start	End	Labour	Equipment	Unit	Quantity	Norm
Setting out	1+800	2+100	5	Setting out tools	m.	300	60
Bush clearing	1+550	1+800	15	Bush knife and axes	m^2	1500	100
Leveling	1+350	1+550	50	Hoes, shovels, wheelbarrow, water bowser and rollers	m^3	100	2
Side drains	1+115	1+200	30	Hoes, shovels, pickaxe and spades	m^3	54	1.8
Embankment	1+200	1+350	75	Hoes, shovels, mattocks, stretcher, wheelbarrow, water bowser and rollers	m^3	187.5	2.5
Camber	1+000	1+115	39	Hoes, shovels, stretcher, wheelbarrow, water bowser and rollers	m^3	70.2	1.8

Table 6.2 performance statement

E. Comparison to Planned Progress

The monthly progress data is essential for planning overall progress and assessing the performance of a work site as compared to the planned performance. This exercise includes both calculating the aggregate figures for each month as well as summing up performance since the start of the project. The comparison between planned and actual results is carried out for inputs of labor, usage and costs of equipment, consumption of materials and finally for the work outputs. Monthly planned and actual outputs can be presented in table form, as bar charts or using time-location charts. The use of time-

location charts is a very common method for presenting progress of road works, since this graphical presentation depicts the entire history of work progress at any stage through the project period and at any location along the road alignment. With these charts, it is also easy to predict completion dates on the basis of current production rates.

Activity	Unit	Total Quantities		Output	Month				
		Actual	Plan		JAN	FEB	MAR	APR	MAY
Earthworks	km	10.8	11.0	Actual	0.4	0.9	2.1	3.3	4.0
				Planned	0.5	1.0	2.5	3.0	4.0
Gravel Works	km	4.0	4.5	Actual				1.5	2.5
				Planned				1.5	3.0
Culverts	km	3	4	Actual			1	1	1
				Planned		1	1	1	1

Table 6.3 current production rates.

F. Payment Certificates

It is common practice that the contractor is paid on a monthly basis. The payment is based on a claim submitted by the contractor. The claim needs to be justified with details on where the work has been carried out and the exact quantities completed under each activity listed in the bill of quantities.At the end of each month, the supervising engineer and the site manager carries out a final inspection to verify that the reported works have been carried out according to prescribed quality standards.During the field visit, the supervising engineer checks that actual progress compares to the monthly site report records. A monthly payment certificate is then issued and submitted to the client for payment.

G. Store Records

Accurate records need to be kept on all materials supplied to the project and also where and when they are used. These records give details about date, movements (issued or received), quantity, origin and destination. Each entry is signed by the responsible supervisor or storekeeper. At the end of each month, it is common practice to count the contents in the stores and check the current holdings against the records of consumption. On a regular basis, the project management reviews the contents and quantities of materials stored on site and assesses whether it is sufficient for the projected work activities. Before embarking on new activities, the staff in charge of procurement needs to stock up on necessary materials well in advance of the start of the work. Any items that are no longer in demand should be transferred to other sites or returned to the main store.

H. Tools Inventory

Tools on site are monitored at two levels, on a daily basis when they are issued to the workers, and as a whole, relating to the total amount of tools on site. The daily recording of tools issued to the workforce is carried out in order to make sure that all the tools are returned when the workers have completed their work. Secondly, the project needs to establish an overview of all

the tools available on site in order to assess whether they have the right type and amount for the works taking place.The tools inventory also records the condition of the tools and keeps track of repairs and when tools are worn out and need replacement. Similar to the materials records, the tools inventory also provides the details of when tools were supplied to the project. The regular control of tools is the responsibility of the storekeeper.

I. Vehicle Logbooks

Each vehicle and piece of equipment should have a logbook in which the use of the vehicle is recorded. Information on the consumption of fuel, service and repairs is also noted in this book. For vehicles it is common practice to enter the authorization for their use in the logbook. Keeping logbooks on the equipment is essential for the purpose of obtaining objective information about the performance of the equipment. By recording fuel and oil consumption and all repairs carried out, it is possible for the lead mechanic to make qualified decisions regarding the future of the equipment. When the equipment reach a certain age, the owner needs to decide whether it is worth continuing to operate it, whether to carry out a major overhaul, or instead scrap it or use it for less demanding work. Equally, the project management prefers to allocate more reliable equipment with less downtime to activities that are essential to the work progress. The logbooks provide necessary information on the pieces of equipment with the best performance.

J. Other Site Reports

When culvert manufacturing takes place on site, records are kept on the materials used and the number of workers engaged in this activity. These reports also keep track of the curing schedules of the batches of culverts being moulded, thus providing the project management with projections on when culvert pipes are available for the work sites.Similarly, detailed records should be kept for works related to structures such as bridges, drifts and culverts. When bridges are constructed with a piled foundation, the client may insist on keeping records of the piling works. The results of laboratory test are recorded in specific forms designed for each test. These forms are normally standardized and will clearly show the prescribed quality requirements and compare these with the actual test results. Each of the reports described above provides a wealth of information. Often, the management is requested to provide summary presentations of progress and costs relating to recent project activities. This information normally contains aggregate figures covering all works since the start as well as data for the most recent reporting period, such as the last month. In order for theregularrecipients ofsuch reporting to fully understand the contents of these summaries, it is useful to install a standard for such purposes. This also allows the readers to compare current reports with those prepared at an earlier stage.

Self-Check 6	

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part one; - Matching

A	B
1. Muster Rolls 2. Flow of Reports 3. Daily site record 4. Comparison to Planned Progress 5. Payment Certificates 6. Store Records	A. The results of laboratory test are recorded in specific forms designed for each test. B. Recording fuel and oil consumption and all repairs carried out, it is possible for the lead mechanic to make C. Accurate records need to be kept on all materials supplied to the project and also where and when they are used. D. Is based on a claim submitted by the contractor E. The monthly progress data is essential for planning overall progress and assessing the performance of a work F. It records the "input" (number of workers and use of equipment) used for each work activity. G. A report from the work sites to headquarters follows the formal line of command. H. Is used as the main supporting document for accounting labor expenditure.

Note: **Satisfactory rating - 20 points** **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Part one; - Matching

1. _____
2. _____
3. _____
4. _____
5. _____

ROAD CIVEL WORK

LEVEL II

NTQF

Learning Guide #20

Unit of Competence: Supporting Operational Plan

Module Title: Supporting Operational Plan

LG Code: CON RCW2 M06-01LO 2LG 20

TTLM Code: CON RCW2 0919v1

LO.2 Assist in recruiting employees and acquiring resource

Instruction Sheet	Learning Guide #20

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Contribute to implementation of operational plan
- Assist in recruiting employees and acquiring resources
- Support operations

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- To Collecting the resource requirement and reporting and recording detail resource
- To achieving the organisation performance to contribute operational and business plan
- Identifying the work performance to measuring
- Contingency planning is undertaken as required
- The development and presentation of proposals for resource requirements are supported as required

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4,---” in page ---, ---, --- and --- respectively.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4” ,---” in page ---, ---, --- and --- respectively
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ”in page ---.
6. Do the “LAP test” in page – ---

Information Sheet-1	Recruiting Policies

1.1 Recruiting policies

- **Recruitment for jobs should be conducted in manner that ensures**
  - ✓ Impartial and transparent methods e.g. lottery system/ secret ballot method.
  - ✓ Not based on distinction such as gender, political opinion, ethnic or social origins or any other criteria not related to the ability to do the job.
  - ✓ No force or threat of any nature.
  - ✓ Enough open publicity about impending recruitment
- **Before actual recruitment exercise is conducted, publicity about recruitment for jobs should be made. This publicity should**
  - ✓ Be made well in advance of recruitment through public notices (see example at end of module
  - ✓ Be aimed at all segments of communities
  - ✓ Give full information about the jobs and terms of employment
  - ✓ State that all male and female workers above the minimum age are welcome to apply/participate

For "Notice of Recruitment of Casual Labour for Road Works" see Annex to this Module.

1.2 Principles of fair working conditions

- The recruitment and employment procedures that will be adopted have to be first discussed and agreed on with the local leaders (chief, politicians, women's group leaders, others)
- Conditions of employment have to be worked out beforehand and agreed on with all parties concerned. this requires awareness of international labour laws and regulation to be applied
- In principle, the people to benefit from project employment should be the people living with the project area. Specialized personnel like craftsman and technicians may be hired form elsewhere if they cannot be found in the project

- **For "Casual Employment Form for Road Works" see Annex to this Module.**
- **It is very important that the conditions of employment are carefully explained to all labourers in a language they can understand.**

1.2.1 The lottery system

- The opening of recruitment is widely advertised by signs, word of mouth, etc. A date and place is set for the recruitment (see also example of public notice at end of the module)
- All persons who would like to have a Job during the project place their name on piece of paper. All names are collected in a container. A neutral person selects the names out of the container one at a time and the names are written down the order in were selected
- Adaptation can be made
- Limitation of those who can participate can be based on:- where they live(close to the project), -previous unemployment,-households with single adult heads, etc. household names are used instead of individuals

1.3 Payment

- Time based worker is paid on the basis of how much time he or she is present at the place of work
- Productivity based; worker is paid on the basis of how much he or she produces

1.3.1 Daily paid

- The worker is paid a fixed sum each day in return for working a fixed number of hours per day. The number of hours, number of breaks, start and finish time are established.
- Production is assured by supervision and by disciplinary measures for workers who do not produce
- One day's worth; no assurance of quantity
- Easy book-keeping, simple to organize
- High amount of supervision is required to maintain a reasonable output. The rate of progress can be extremely

1.3.2 Place work

- The worker is paid on the basis of small quantities of output. There is no reference made to the amount of time it takes to accomplish one place.
- Production is assured as payment is made only upon production
- Many places, usually unlimited
- Pay relates to output and output can be maximized each day.
- Tendency to self-exploitation as no limit is placed on the amount of work a worker can do.
  Difficult to control by government administration

1.4 Task work

- The worker is paid a fixed wage in return for a fixed quantity of work, or task. The size of the task is usually set to be accomplished in eight hours. The size of a task may be

smaller and more tasks may be given in a single day; the smaller the task the more like place work. The size of the task may large, set to be accomplished over several workdays and perhaps with several other workers

- Production is assured as payment is made only upon production
- Usually of one task. Where the task is small, usually 2 or 3 per day; where the task is larger, a fraction of one task. A day rule may limit the number of tasks, which may be done in one workday.
- Where task is set properly, allows typical worker to finish task and go home
- Requires close supervision and monitoring in the daily laying out of work and overall setting of task size. When deviations are made from the usual model, particularly as regard the amount of work (number of tasks of tasks and portion of tasks), which can be done every day, possibility for exploitation.

1.5 Payment in kind

- Most workers like to be paid in cash money. However, for a number of reasons.
- They may be offered things of value other than cash money or
- Actually prefer to receive things other than cash money for their work; food, for example, particularly where it is scarce
- Inconsistent quality of food
- High real deliver costs
- Distortion of food production markets, and
- Difficult logistic

  Correct and timely wage payment keep labour- based infrastructure programs working without them
- Project progress can be seriously slowed or stopped because of labour problems and strikes
- Project costs go up because of delayed production
- The quality of the final infrastructure can go down because workers and supervisors, loose motivation to produce high quality work
- The social objective of providing gainful employment is weakened or lost, and
- The continued use of labour-based methods is threatened.

1.6 SAFETY AND HEALTH ON SITE

Essential safety measures:

- First aid kit to be on site!
- Protective goggles for stone cutting, chiseling, grinding, and welding.
- Gloves for handling chemicals, waste and other hazardous material.
- Face masks when working in dust and shouldering waste.
- Helmets when working on site where there is a danger of falling objects, e.g. in deep drains, digging pit latrines, work in quarries, etc.
- The site supervisor should also know where the nearest hospital/clinic is and where on ambulance or quick transportation can be found
- It is also advisable that the site supervisor has first aid knowledge.

Self-Check 7	

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part one: - chose the baste answer

1. Which one of the following correct about payment?
   A. Productivity based; worker is paid on the basis of how much he or she produces
   B. The social objective of providing gainful employment is weakened or lost, and
   C. All are correct

2. _____ is assured as payment is made only upon production?
   A. Production B. payment C. Task work D.Daily paid

Note: **Satisfactory rating - 20 points** **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Part one:- multiple chose

1. _____
2. _____

Information Sheet 2	Procurement Policies and Procedures

2.1 Procurement basics and principles

Procurement is the purchasing, hiring or obtaining by any other contractual means of services (e.g., technical assistance studies, provisions of know-how and training), supplies (i.e., equipment and materials) and works (i.e., infrastructure and other engineering works).

In principle procurement should aim at:

- Getting the best value for money. Obtaining best value for money requires careful selection of supplier/ contractor based on economy, capability and reliability. The process of selection often takes time, hence proper planning with sufficient lead time is required.
- On the delivery of best value outcomes.
- A recognition that the service provider/ supplier needs to be able to obtain an adequate return to be able viable. Fees should not be forced down to the point to the point where consultants and contractors cannot afford to assign properly qualified staff for sufficient period of time.
- Encouraging partnering approaches where appropriate to the project.

It is essential that procurement is well planned and managed as it is an expensive procedure that can potentially end in waste of scarce resources, or even complete failure.

Procurement should be:

- Fairness
- Transparency
- Economy
- Efficiency
- Accountability

2.2 Method of procurement

There are six methods of procurement

a) Open bidding
b) Two-stage bidding
c) Request for proposals
d) Restricted bidding
e) Request for quotations
f) Direct procurement

a) Open bidding

In this type of procurement, the job is open to any contractor/ supplier who are interested to bid for the project. The client either himself or through his/her consultants will advertise the project in newspapers, or other media of sufficient circulations or wide distribution.

- **In the advertisement, relevant brief project detail should be specified such as:**
  - ✓ Name and address of the procuring entity
  - ✓ A brief description of the works/services and location
  - ✓ Source of funds
  - ✓ If applicable duration of the project
  - ✓ Place of obtaining the document
  - ✓ Cost of purchasing the document
  - ✓ Deadline and place of submission of bids
  - ✓ Place and time of opening of bids
  - ✓ Specify bidders'/ consultants' category

b) Restricted bidding

- If procured item can only be available from limited suppliers
- Time and cost to evaluate bid is disproportional to value of bid
- The procurement made by restricted bidding shall not exceed Birr 1,000,000.00 for works and 250,000.00 for goods and services.

c) Direct procurement (negotiated)

- Item can only be supplied by one supplier
- Additional delivery to original items on the reason of compatibility
- Uncovering of additional works not included in initial contract and separation of the additional work is difficult
- For new works where job basically comforts with original work awarded on the basis of open/restrictive bid
- For continuation of consultancy where original service was satisfactory and continuing is of economic advantage
- On the case of 'sales', not by regular suppliers
- Case of pressing emergency and hence delay would create serious damage
- In most of the above cases, a limit is put to the extent of the contract

d) Request for proposal

- For consultancy services where cost of consultancy exceeds 50% of total contract
- The request shall be to not less than 3,nor more than 7 prospective suppliers.
- Request shall contain
  - ✓ Name & address of procuring entity
  - ✓ Description of service required

- ✓ Reminder not to bid if it creates conflict of interest
- ✓ Criteria in proposal evaluation
- ✓ Place and deadline for submission
- ✓ Can negotiate
- ✓ with 1st ranked bidder and ask for clarification

e) Request for quotation

- For readily available goods and for works &services of established market but less than a certain value (the threshold)
- Shall solicit quotation from as many but at least 3 suppliers(candidates)
- Clear statement of what is required
- Only from equal opportunity suppliers
- Only one price quotation

f) Two-stage bidding

1) Proposals of various natures are needed to be explored
2) Technical works needed to be negotiated upon
   - When not possible to formulate detailed specifications/ characteristics of item to be procured
   - Research and development (R &D) works, when goods are not to be produced for commercial viability or recover cost
   - When all bids were rejected or bid offer couldn't attract potential bidder and entity believes that such would be the case again.

g) Open International bidding

- To be used when effective competition is not available at home, procurement is above a certain threshold (to be ratified by the MFED on its directive)
- Follow all local procedures plus
- Document to be in language in common use in international trade
- Invitation to be advertised using same language and in newspapers of international circulation
- Enough time should be allowed
- Specifications in international standards if they don't conflict with national
- Bid price should be in Birr or widely used international currency
- Other types of bidding, if used, should comply with the above and their corresponding local requirements

Self-Check 8	

***Instructions**:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page.

Part one; - chose the baste answer

1. Which one of the correct about Direct procurement (negotiated)
   A. For consultancy services where cost of consultancy exceeds 50% of total contract
   B. Additional delivery to original items on the reason of compatibility
   C. Only from equal opportunity suppliers
   D. Shall solicit quotation from as many but at least 3 suppliers(candidates)
2. Which one of the following estimatecorrect about restricted bidding?
   A. If procured item can only be available from limited suppliers
   B. Document to be in language in common use in international trade
   C. Case of pressing emergency and hence delay would create serious damage
   D. Place of obtaining the document

Note: **Satisfactory rating - 20 points** **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Part one: - Multiple question

1._____

2._____

ROAD CIVEL WORK

LEVEL II

NTQF

Learning Guide #21

Unit of Competence: Supporting Operational Plan

Module Title: Supporting Operational Plan

LG Code: CON RCW2 M06 LO1-21

TTLM Code: CON RCW2 M06 0919v1

LO 1: Support operations

Instruction Sheet	Learning Guide #22

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Contribute to implementation of operational plan
- Assist in recruiting employees and acquiring resources
- Support operations

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Details of resource requirements are collected, recorded and reported to relevant personnel
- The operational plan is ensured to contribute to the achievement of the organisation's performance and business plan
- Key performance indicators is identified to measure own and work team's performance
- Contingency planning is undertaken as required
- The development and presentation of proposals for resource requirements are supported as required

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information "Sheet 1, Sheet 2, Sheet 3 and Sheet 4,---" in page ---, ---, --- and --- respectively.
4. Accomplish the "Self-check 1, Self-check t 2, Self-check 3 and Self-check 4" ,---" in page ---, ---, --- and --- respectively
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 " in page ---.
6. Do the "LAP test" in page – ---

Information Sheet-1	Resource planning and management

1.1 Resource planning and management

As was mentioned previously one of the major objectives of planning is the effective use of available resources, and we shall in this section of the course be looking at resource analysis and scheduling. Remember it is through effective planning that the successful control of project resources is achieved.

Although there are other minor resources, the four main resources used on a construction project, which should be the main focus of management, are:

- Labour
- Plant and equipment
- Materials
- Finances

Network analysis lends itself most readily to comprehensive resource analysis and will be technique on which we shall focus on in this presentation.

The effective and efficient use of resources is dominant if a project is to be completed on time and within budget, and any careless use of resources cannot be tolerated. Despite the figures shown in Table 1 below being based on past experience in the UK and May therefore not be strictly applicable to Ethiopia at the present time, the figures do highlight the need for careful use and Management of resources. Bearing in mind how easily it is to inefficiently use resources their careful Management is a prime requirement of the planning.

Resources	Percentage Of Project Value	Common Inefficiencies	Consequent Effect on Project
Materials	40%	5% overuse due to losses, contamination over-excavation and short deliveries	40% x 5% = 2% loss
Subcontractors	20%	10% extra cost due to Day works claims, waiting for materials and instructions	20% x 10% = 2% loss
Labour Plant	18% 10%	7% overuse due to bad planning, failure to put plant off hire.	28% x 75 = 2% loss
Overheads	10%	20% under-recovery due to project over-run, inflation, and estimating errors.	20% x 10% = 2% loss
Net Profit	2%		

Table: 1 How to lose your profit margin

1.2 Estimation of Resource Requirements

The estimate of the resources required for the construction of the bridge abutment foundations are given in Table 2 This is a very simplified estimate for this simple example. In practice, this estimate may be made in more detail, and the plan may be refined to overlap some activities to achieve more efficient use of some of the resources. Resources can be planned in one of two ways. On the basis that a finite number of each resource must be available for each and every period – this is the method shown in Table2 In the form of total amounts for an activity, e.g. man-days, money etc.; in Table 15the allocation of the three men to activity 1 (piling) is equivalent to the allocation of six man-days for this activity of two days duration.It is the first method of allocating a finite number of resources to an activity, that you will be interested in as it is the one that is used for construction purposes. It allows estimates to be made of maximum manning and equipment levels which is essential for planning site accommodation, plant servicing etc. The second method, using a total resource for an activity, is used for financial planning.

1.3 Resource Analysis

Resource analysis is concerned with making the best use of resources in the time-scale of the project, so that the analysis must be done on a time basis. For this reason, if CPM has been used, the network should be generated in the form of a bar chart.

- **There are three mode of resource analysis**:
  - ✓ Resource aggregation;
  - ✓ Resource smoothing; and
  - ✓ Resource leveling.

Activity		Project Time (days)													
No	Description	1	2	3	4	5	6	7	8	9	10	11	12	13	
1	Upstream clearing	3	3												
2	Downstream clearing	3	3												
3	Excavation Abut 1	5	5	5											
4	Excavation Abut 2				5	5	5								
5	Blinding Abut 1				2										
6	Blinding Abut 2							2							
7	Foundation Abut 1					2 2c 2sf	2 2c 2sf	5 2c	1						
8	Foundation Abut 2								1 2c 2sf	2 2c 2sf 2	5 2c 2	1 2c			
9	Backfill Abut 1												2	2	
10	Backfill Abut 2														
Labourers		11	11	5	7	7	7	7	2	4	7	1	2	2	73
Carpenters						2	2	2	2	2	2	2			14
Steelfixers						2	2		2	2					8
Formwork						1	1	1	1	1	1	1			7
Backactor		1	1	1	1	1	1			1	1		1	1	10
Pump		1	1	1	2	2	2	2	2	2	2	1	1	1	20

Table: 2 Resource Requirements (early start)

a) Resource Aggregation

This is a simple summation of the total of each resource required by the activity being planned, for each period (hour, day, week, etc). The totals for each resource could be shown in figures or plotted graphically, either way the fluctuating demand for specific resources can be readily seen, and thereby indicates possible areas of the program that requires attention if the resources are to be smoothed or leveled.

b) Resource Smoothing

Resource smoothing may be used to make the pattern of resources demand given by the summation more Manageable, but without lengthening the planned project duration. The objective is to delay some of the activities through using their individual float and thereby remove peak demands for the resources. The aim is to produce a schedule that requires a steady and more or less constant demand for any particular resource and in so doing to facilitate the management through the avoidance of a fluctuating demand.

Activity		Project Time (days)													
No	Description	1	2	3	4	5	6	7	8	9	10	11	12	13	
1	Upstream clearing							3	3						
2	Downstream clearing								3	3					
3	Excavation Abut 1	5	5	5											
4	Excavation Abut 2				5	5	5								
5	Blinding Abut 1				2										
6	Blinding Abut 2							2							
7	Foundation Abut 1					2 2c 2sf	2 2c 2sf	5 2c	1						
8	Foundation Abut 2								1 2c 2sf	2 2c 2sf	5 2c	2 2c			
9	Backfill Abut 1												2	2	
10	Backfill Abut 2												2	2	
Labourers		5	5	5	7	7	7	10	8	5	5	4	4	4	76
Carpenters						2	2	2	2	2	2	2			14
Steelfixers						2	2		2	2					8
Formwork						1	1	1	1	1	1	1			7
Backactor		1	1	1	1	1	1						1	1	8
Pump		1	1	1	2	2	2	2	2	1	1	1	2	2	20

Table 3 Resource Smoothing

a) Resource Leveling

Resource leveling reschedules the project activities to give a maximum demand for each resource within an imposed limit. This reprogramming may result in the project being delayed if the resources made available are not enough to reschedule the activities within the available float. It is plainly demonstrated that with resource leveling any original concept of managing a project through the monitoring of a critical path disappears.

Activity		Project Time (days)																
No	Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Upstream clearing											3	3					
2	Downstream clearing				5					3								
3	Excavation Abut 1	5	5	5														
4	Excavation Abut 2					5	5	5										
5	Blinding Abut 1				2													
6	Blinding Abut 2								2									
7	Foundation Abut 1								2 2c 2sf	2 2c 2sf	5 2c	1						
8	Foundatio Abut 2											1 2c 2sf	2 2c 2sf	5 2c	1 2c			
9	Backfill Abut 1														2	2		
10	Backfill Abut 2																2	2
Labourers		5	5	5	5	5	5	5	4	5	5	5	5	5	3	2	2	2	73
Carpenters									2	2	2	2	2	2	2				14
Steelfixers									2	2		2	2						8
Formwork									1	1	1	1	1	1	1	1			8
Backactor		1	1	1		1	1	1							1	1	1	1	10
Pump		1	1	1	1	1	1	1	2	1	1	2	1	1	2	1	1	1	20

Table 4 Resource Leveling

Self-Check 9	

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

PART ONE: -matching question

A	B
1. Resource Leveling 2. Resource Smoothing 3. Resource Aggregation 4. Resource Analysis	A. concerned with making the best use of resources in the time-scale of the project, B. The project activities to give a maximum demand for each resource within an imposed limit. C. used to make the pattern of resources demand given by the summation more Manageable, D. This is a simple summation of the total of each resource required by the activity being planned,

Note: **Satisfactory rating - 20 points** **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

PART ONE: - **matching**

1. _____
2. _____
3. _____
4. _____

Information Sheet 2	Monitoring and Evaluation

1.1 Monitor Plan Performance

Monitoring the performance of the work zone and that of the TMP during the construction phase is important. It will enable you to see if the predicted impacts closely resemble the actual conditions in the field, and if the strategies in the TMP are effective in managing the impacts.

You need to review the application of the work zone traffic management plan and recommend any changes that may be required for continuous improvements.

Fig.2.1 monitor on site

1.2 Measurement of Works

In most civil works contracts, payments are directly linked to the actual amount of works completed by the contractor. Since the contractor would like to recover incurred expenditure as soon as possible, the contract normally indicates when and how often payment claims can be submitted to the client. When payments are due, the contractor prepares an invoice detailing the quantities of work completed since the previous claim. These quantities are based on information compiled from the site production reports. Before the client issues the payment, a final control of the works is necessary to verify that the quantities of work have actually been carried out, and that the works conform to prescribed quality standards. Any errors in the claimed quantities are then rectified. Equally, the client may deduct poor quality work from the claim. Based on the revised volumes of work, the client can then finalize the payment. Measuring completed works is a common cause of disputes between the contractor and the client. For this reason, the method of measurement is often described in detail in the works specifications. The volumes of work do for payment are recorded using the unit of measurement stated in

the bill of quantities or activity schedule. If the contract documents have been properly prepared, the units of measurement in the bill of quantities correspond to the ones referred to in the works specifications.

1.3 Cost Monitoring

Monitoring costs is necessary to avoid cost over-runs and to prevent unauthorized expenditure. Every civil works project needs to operate within the budgetary limits set in contract agreements and annual work programs.

The most common reasons for cost overruns are:

- Poor work organization
- Inefficient utilization of available resources
- Inaccurate estimates of the quantities of work
- Unforeseen circumstances at the project site,

Whatever the reason are for incurring cost increases, it is important that it is detected at an early stage. The reasons for the change in costs need to be examined and on this basis new projections should be made. With the new projections, there may be a need for adjusting contract agreements and budgets. This involves major decision-making by senior managers, and can only be done on the basis of reliable cost monitoring and projections. A project may also have cost savings. When this occurs, the senior management should be informed at the earliest possible so that the unused funds can be redirected to other activities. In some cases, savings on certain work activities can be used for covering cost increases on other work operations. If it appears that the entire works project will cost less than originally estimated, unused funds can be transferred to other projects. The majority of costs incurred on a civil works project are related to the individual work activities.

The bill of quantities provides the budget, which the project needs to work within. Each line item in the BOQ provides the detailed budget available for each work activity. Although there may be deviations from the quantities of work estimated in the BOQ, the final outputs of work should not change too much from the original estimates. In any case, the unit rate provided for each work activity acts as a budgetary limit for that specific type of works. This implies that the cost monitoring needs to look into the detailed costs of each activity.

All inputs such as labour, equipment and materials used for a particular activity need to be closely monitored and casted, and compared to the original estimates.

Special attention must be paid to overhead costs (supervision, administration, transportation, etc.). The percentage of funds spent on overheads can easily become excessive if it is not controlled. When production is running at a low level, savings in overhead costs should be looked for (such as reducing the site administration, rationalizing the use of vehicles and sharing of office facilities). Vehicle operation is expensive and should therefore be carefully monitored and controlled. High fuel consumption, frequent repair costs and vehicle misuse are common causes of over-

expenditure on vehicles. As with performance monitoring, all relevant information must be carefully scrutinized when costs are monitored. For example, the proper utilization of hauling equipment cannot be found from the vehicle cost reports alone. It is necessary to cross check with the quarry operations, haulage distances and equipment availability for the same period in order to obtain a clear picture. Equally, it is important to focus attention on the large work operations, which carry the largest quantities of works. This work incurs the highest costs, so any savings and productivity increases here have a higher impact on the overall project cost.

All civil works projects are described through a set of drawings, which graphically describe the works to be carried out. The level of detail in the drawings may vary, depending on the complexity of the works and to what extent the works adheres to common building practices and design standards. Drawings for road works normally refer to a standard design used for the specific type and class of road the authorities have decided to build. Road works drawings therefore concentrate on how these designs are applied in the terrain through which the alignment passes, describing the levels of the road and its curvature. A further description of the works in terms of quality requirements for materials and the completed works are contained in the work specifications, in which detailed instructions are provided on how the various work activities should be carried out. In addition, the specifications describe how to measure and pay for completed works. Specifications are either prepared by prescribing the quality of all inputs and specifying the work methods or by describing the features of the end product.

The most common method of describing the works is by issuing design and method specifications. This implies that the works are described in terms of quality of materials to be used and by specifying the work methods. Method specifications of ten also include minimum requirements and the type of equipment to be used. The opposite of such specifications are performance-based specifications, where the results or intentions of the finished product are described. In this type of specification, the details of materials and how to carry out the work are left to the contractor to decide, only ensuring that the end product meets certain performance requirements. If the selection of materials and work methods prove to be inadequate, the fault is then entirely with the contractor who will need to redo the works using higher quality materials and improved work methods. The advantage of using performance based specifications is that it is then possible to fully utilize the experience and knowledge of the contractor in terms of executing the works. In most cases, the specifications consist of a combination of the two principles, i.e. prescribing specific work methods and materials as well as the end result.

1.4 Reporting and controlling

Reporting and control is an essential part of the management system in civil works projects. A proper reporting system enables the project to objectively monitor the progress and quality of work, even at an early stage, and assess whether defined targets

are being reached. It is then possible to revise plans and take remedial action at an early stage to improve performance and secure the original set targets.

Reporting and monitoring also form the basis for developing and improving planning figures, used for preparing future civil works projects. Slow progress is caused by a number of factors and is not necessarily the fault of anyone particular in the project. It may be due to wrong assumptions made at the planning stage, bad weather, delays in securing equipment and materials, delays caused by the slow performance of other contractors involved in the project or many other reasons.

The main intention of works monitoring is to keep track of progress from an early stage and be in a position to take remedial action at an early stage when delays occur. With good follow-up of site activities, it is possible to deal with problems before they become un-manageable or result in serious cost implications. Monitoring of works is therefore an essential part of project management and constitutes an important input to the continuous planning activities required on a construction site. Work activities and all the resources used are monitored in detail; however, reports are produced to varying levels of detail depending on its purpose and audience.

A site supervisor needs to know the detailed performance of each of the work gangs while senior management staff is more concerned with overall progress on a work site.

Different types of control procedures exist, including:

- Quality control
- Production control
- cost control

At the work site, the production and quality controls are the most important. Reporting and control also forms a central part of contracts management. Contractors engaged on civil works projects are paid at regular intervals.

In most civil works contracts the services of the contractor are paid on the basis of quantities of completed works. Before the contractor is paid, the completed work is controlled to verify that it has actually been carried out and that it has been delivered to the prescribed quality standards.

Monitoring work progress involves keeping track of:

- The inputs, i.e. the number of workers allocated to each activity, amount of tools and materials and usage of equipment. Inputs also include overheads such as running a site camp, supervisory staff insurances, etc.
- The output which are essentially the quantities of completed work. The main unit of measurement is obviously the length of completed road sections; however, it is also useful to measure progress on each of the detailed works activities, such as square meters of clearing, cubic meters of excavation and completed culvert and bridge works. Inspections, materials testing and reviewing records and reporting are part of

the methods of control are. As with planning, reports are based on time (daily, weekly, monthly), activity clearing, earthworks, gravelling) or items used (vehicles, materials). The project management has to deal with all of these types of reports.

- The progress reports also provide essential information to those who planned the works. When the production figures are analyzed it is possible to establish the extent to which the original production targets are being achieved. If there are substantial differences between the planned targets and actual results, the management needs to find out why the targets have not been reached. Either the targets have not been set correctly or the work has not proceeded as planned. With the information coming from the work site, it is possible to revise and improve the current plans as well as improve planning and costing of future projects. The progress reports also give an opportunity to analyze good performance, i.e. when the targets have been exceeded. Accurate and timely reporting is also an indication of the skills and abilities of the supervisors.

Self-Check 10	

***Instructions**:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page.

Part one: - **chose the beast answer**

1. _____ is an essential part of the management system in civil works projects?
   A. Reporting and control
   B. The progress reports
   C. Quality control
   D. Production control
2. _____ is necessary to avoid cost over-runs and to prevent unauthorized expenditure?
   A. Monitoring costs
   B. Poor work organization
   C. Inefficient utilization of available resources
   D. Unforeseen circumstances at the project site

Note: **Satisfactory rating - 20 points** **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Part one: - Multiple Questions

1._____

2._____

Information Sheet 3	Mentoring and Coaching

3.1 Mentoring and Coaching

Mentoring is a long-term process based on mutual trust and respect. Coaching, on the other hand, is for a short period of time. Mentoring is more focused on creating an informal association between the mentor and mentee, whereas coaching follows a more structured and formal approach

- **The Difference between Coaching and Mentoring**

The aim of this short article is to provide clarity for those in a workplace developmental relationship such as mentoring. That is, to understand the difference between coaching and mentoring. However, this is not straightforward since there is often much confusion of definitions between practitioners.

- **Let's begin with a definition:**

A mentor is a more experienced individual willing to share knowledge with someone less experienced in a relationship of mutual trust. – David Clutter buck

Mentoring is a partnership between two people and emphasizes a mutuality of learning. However, mentoring is sometimes confused with coaching, teaching, or counseling.

The aim of this article is to describe mentoring from a European (Clutter buck) point of view and compare this with other forms of development: coaching, teaching, and counseling.

- **What's the Difference between Coaching and Mentoring?**

The difference between coaching and mentoring isn't clear-cut. A mentor may draw on a number of approaches: teaching, coaching, and counseling.

Indeed it can be argued that these areas often occupy the same developmental space. Nonetheless, one significant difference between mentoring and coaching and other forms of development is the relationship forged between two people.

3.2 Coaching

The focus of coaching is usually task and performance. The role of a skills or performance coach is to give feedback on observed performance. Consequently, coaching usually happens at the workplace. The coach is likely to set or suggest goals for the learner; measuring performance periodically as the learner develops new skills. This needs a good working relationship between learner and coach.

- **Teaching**

The focus of teaching is to impart knowledge and information through instruction and explanation. And the goal for the student is usually to pass a test. Once again, learning has a one-way flow. However, unlike coaching the closeness of the relationship between teacher and student is often low.

- **Counselling**

The counsellor uses listening and questioning to build self-awareness and self-confidence in the client. The goal is to help the person deal with something difficult. Once again learning is one-way and the closeness of the relationship low.

- **Mentoring**

The role of the mentor is to build capability. The developmental mentor helps the learner discover their own wisdom by encouraging them to work towards career goals or develop self-reliance.

✓ The Mentor Helps the Learner Discover their Wisdom.

The mentoring relationship is off-line — that is, the mentor does not have authority over the mentee — and centers on the learner's personal goals.

Because the relationship is mutually beneficial strong bonds are often forged. And these may outlast the lifetime of the mentoring relationship.

- **What Makes a Good Mentor?**

Now that we have an understanding of the difference between coaching and mentoring let's look at the attributes of a good mentor.

Mentoring involves primarily listening with empathy, sharing experience (usually mutually), professional friendship, developing insight through reflection, being a sounding board, encouraging. – David Clutterbuck

Good mentors provide the learner with the right kind of help and support. What's more, experienced mentors adapt to the needs of the learner. As a result both mentor and mentee learn from one other and help each other's development.

3.3 A successful mentor:

1. is committed to learning and helping others learn,
2. is a good listener,
3. displays empathy,
4. builds rapport,
5. encourages the learner to speak,
6. observes and reflects,
7. provides constructive challenge,
8. is self-aware and understands others,
9. has intuitive wisdom from life experience,
10. helps the learner reshape their thinking,
11. is politically or professionally savvy,
12. shares experiences,
13. steps back from the detail,
14. manages the relationship and not the goals, and
15. Offers friendship.

Finally, the mentor will keep the relationship off-line. What is said between mentor and learner is confidential and never shared with others except in very special circumstances.

To recap, the difference between coaching and mentoring is largely about focus — performance vis-à-vis building capability — and goal setting.

- ✓ In mentoring the learner sets their own goals. Whereas the coach usually sets goals for the learner.

Self-Check 11	

***Instructions**:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page.

Part one: - matching question

A	B
1. The role of the mentor is to build capability 2. The counsellor uses listening and questioning to build self-awareness and self-confidence in the client. 3. The focus of teaching is to impart knowledge and information through instruction and explanation. 4. The role of a skills or performance coach is to give feedback on observed performance. 5. Mentoring is a long-term process based on mutual trust and respect.	A. Mentoring and Coaching B. Mentoring C. Counselling D. Teaching E. Coaching

Note: **Satisfactory rating - 20 points** **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Part one: - Matching

1._____

2._____

3._____

4._____

5._____

List of Reference Materials

References (3)

- Small Business: Business planning: Short, medium and long-term objectives
- Info Entrepreneurs: Strategic Planning
- Board Effect: The Difference Between Short-Term and Long-Term Goal Planning

The trainers (who developed the LEARNING GIDE)

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No	Name	Qualification level	TVET Bureau
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ANSWER KEY

SELF-CHECK1

1. A
2. C

SELF-CHECK 2

1. TRUE
2. TRUE
3. TRUE

SELF-CHECK 3

1. C
2. A
3. B
4. D

SELF-CHECK 4

1. A
2. C

SELF-CHECK 5

1. TRUE
2. TRUE
3. TRUE

SELF-CHECK 6

1. H
2. G
3. F
4. E
5. D
6. C

SELF-CHECK 7

1. A
2. A

SELF-CHECK 8

1. B
2. A

SELF –CHECK 9

1. B
2. C
3. D
4. A

SELF-CHECK 10

1. A
2. A

SELF- CHECK 11

1. B
2. C
3. D
4. E
5. A