MODULE 4B
TECHNICAL ASPECT
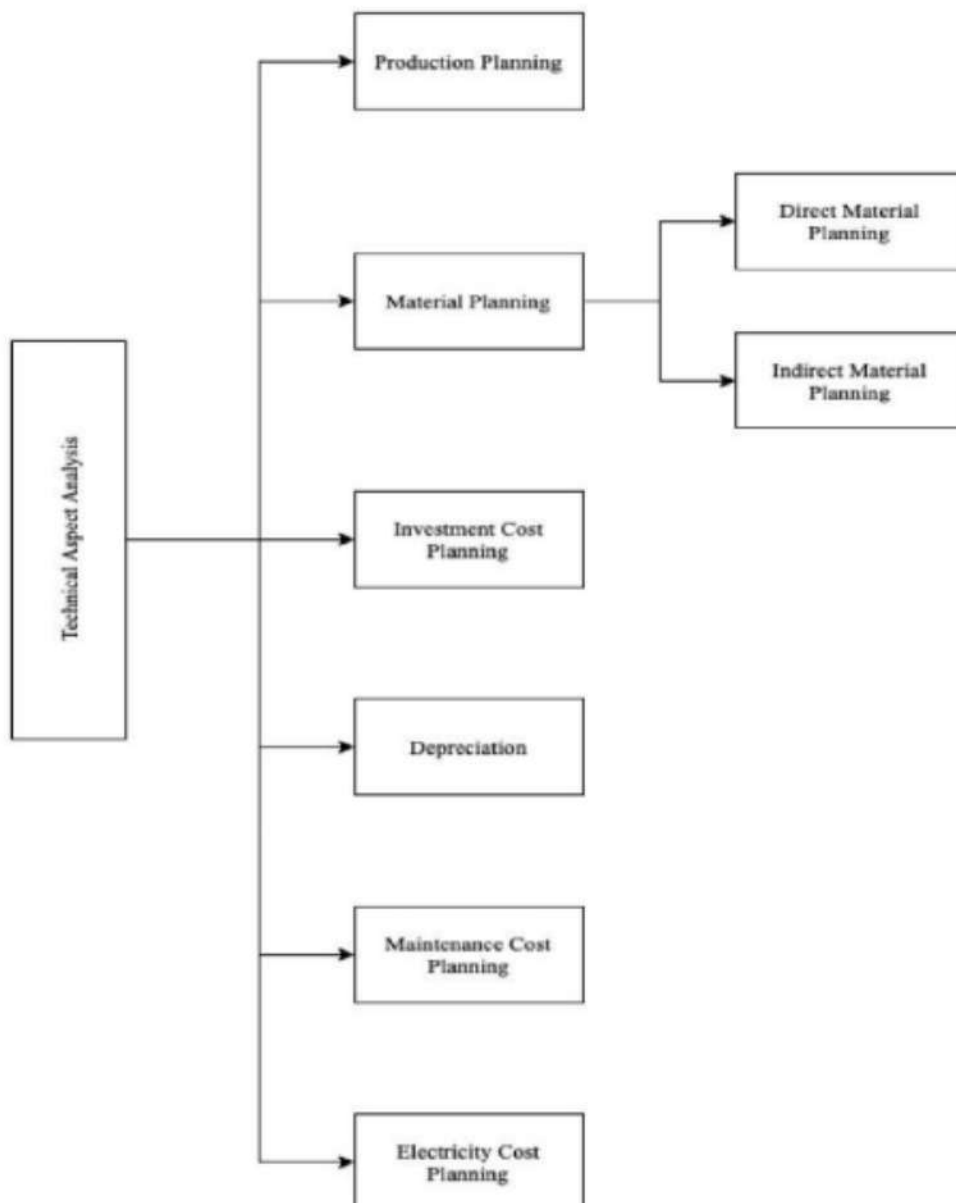
MODULE 4B
TECHNICAL ASPECT ANALYSIS

LABWORK OBJECTIVES

1. Students are able to make production plan
2. Students are able to make material plan
3. Student are able to make investment cost plan
4. Student are able to calculate maintenance cost and electricity machine cost

PRACTICUM OUTLINE

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                                    ┌──────────────────────┐
                              ┌────▶│ Production Planning  │
                              │     └──────────────────────┘
                              │
                              │                                    ┌──────────────────────┐
                              │                              ┌────▶│ Direct Material      │
                              │                              │     │ Planning             │
                              │     ┌──────────────────────┐ │     └──────────────────────┘
                              ├────▶│ Material Planning    │─┤
                              │     └──────────────────────┘ │     ┌──────────────────────┐
                              │                              └────▶│ Indirect Material    │
                              │                                    │ Planning             │
┌──────────────────────┐     │     ┌──────────────────────┐        └──────────────────────┘
│                      │     ├────▶│ Investment Cost      │
│ Technical Aspect     │─────┤     │ Planning             │
│ Analysis             │     │     └──────────────────────┘
│                      │     │
└──────────────────────┘     │     ┌──────────────────────┐
                              ├────▶│ Depreciation         │
                              │     └──────────────────────┘
                              │
                              │     ┌──────────────────────┐
                              ├────▶│ Maintenance Cost     │
                              │     │ Planning             │
                              │     └──────────────────────┘
                              │
                              │     ┌──────────────────────┐
                              └────▶│ Electricity Cost     │
                                    │ Planning             │
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THEORETICAL EXPLANATION

4.1 Production Planning

Production planning is a planning process using information from products to plan production rates and inventory levels over a period of time from a group of products (Foarty, Blackstone and Hoffman, 1991). Meanwhile, according to Nasution (2008), production planning is the process of determining the initial direction of the actions that must be taken, how much, and when to do it. This plan is related to the future, so the plan is prepared on the basis of estimates made based on past data using assumptions. Production system according to Stanford L. Opener (1986) "a system is defined as the same process of demands, each of which are functionally and operationally united in the achievement of objectives". In a production system there are inputs, processes and outputs. Production inputs can be in the form of raw materials, machinery, labor, capital, and information. While the output is products that are produced together with by-products such as waste, information, and others. The following is a production system scheme:
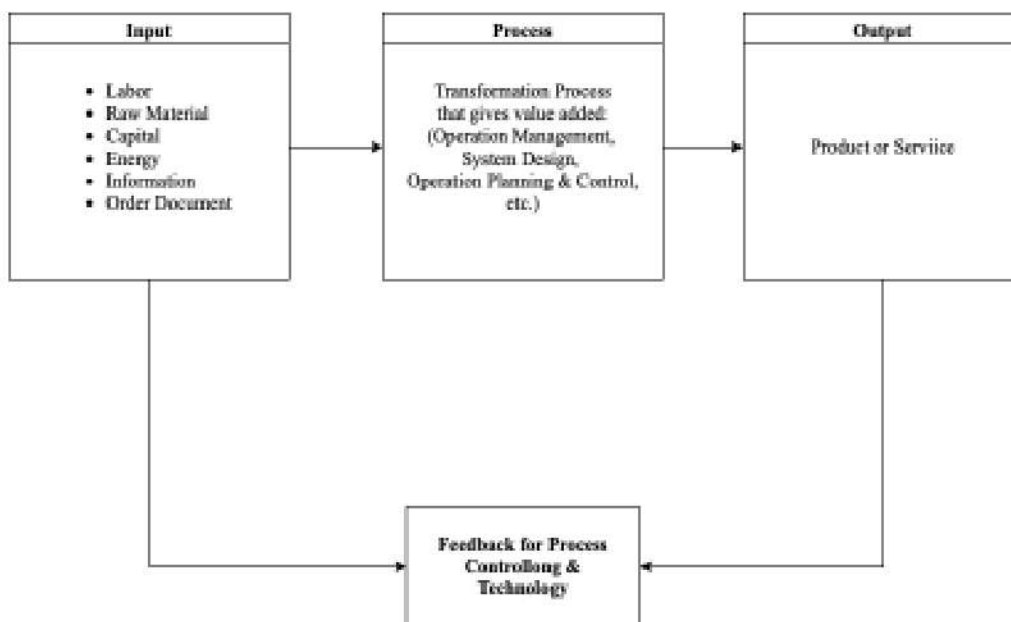
Figure 4.1 Production System Scheme

4.2 Material Planning

Material planning on a product is carried out to be able to know the various costs that will be incurred from the material. Costs consist of direct costs and indirect costs. Usually direct costs are estimated with some detail, so indirect costs are added using standard rates and factors. Determination of material classification of a product in the form of direct or indirect materials can be done using the Bill of Materials (BOM). Meanwhile, to find out the number / number of items of the final product

and provide details about the components needed to produce a product can be determined using the product structure.

4.2.1 Direct Material

Direct material costs must be paid for the costs of all materials used in the manufacture of products or services for services. However, some material costs cannot be traced practically from an accounting point of view. (Barfield, Raiborn, & Kinney, 2000). The following is the formulation carried out in the calculation of estimated direct material costs:

Table 4.1 Estimated Direct Material Cost Formulation

Direct Material Costs	Formulation
Total Needs	Needs Per Product x Production Volume
Total Product Material Cost	Unit Price x Total Needs
Total Material Holding Cost	Percentage of holding cost x Total Material Cost
Total Cost of Product Packaging	Packaging cost per unit x production volume
Total Cost of Holding Cost	Total Material Holding Cost + Total Packaging Cost

4.2.2 Indirect Material

Indirect materials are materials that usually do not become part of the finished product. This has been defined as material that cannot be allocated but which can be shared or absorbed by the cost center or unit cost, namely as follows (Cost Material used in the maintenance of machinery, buildings, etc., such as lubricants, cotton waste, bricks and cement

- Material used by service departments, that is, non-productive departments such as Power House, Boiler House and Canteen, etc.
- Materials which, because of their small cost, are not considered suitable to be treated as direct ingredients.

The following is the formula for calculating estimated indirect material cost:

Table 4.2 Estimated Indirect Material Cost Formulation

Indirect Material Costs	Formulation
Indirect Material Cost	Price per item x Total per year

4.3 Investment Cost Planning

According to Kasmir and Jakfar (2015), Investment is placing money or fund in shares in an activity that has a relatively long period of time in various business fields. According to Edwin (2014) by the book of Modern Portfolio Theory and Investment Analysis, investments are classified in two types, there are:

1. Real Investment
   Real investment is investment that generally in the form of tangible assets, such as a building, machine, or equipment.
2. Financial Investment
   Financial investment is investment that does not have a tangible form, but involves a written contract, such as shares, stocks, and debenture bonds.

The difference between real investment and financial investment lies in the level of investment liquidity. Real investments are relatively more difficult to disburse due to long-term contracts between investors and companies. Meanwhile, financial investment is easier to liquidate because it can be traded without being bound by a contract period.

The following is the formula for calculating investment cost:

Table 4.3 Investment Cost Formulation

Direct Material Costs	Formulation
Total Investment Cost	Total Machine & Facility Cost + Total Tools Cost + Total Transportation Cost + Total Stationary
Depreciation Cost	Cost of Machine or Equipment etc / Economic Life

4.4 Depreciation

Depreciation is defined as a measure of the loss of value of a depreciable asset arising from wear or tear, effluxion of time, and obsolescence of fixed assets such as buildings and equipment (Holm, 2019). Depreciation is allocated so as to charge a reasonable proportion of the depreciable amount in each accounting period during the estimated useful life of the asset. According to the Financial Accounting Standards for Entities without Public Accountability or SAK- ETAP (2009), it states that this depreciation can be started when an available asset is used, for example, assets that are in the location and conditions required so that they can operate as intended by management objectives. The depreciable amount of an asset is the cost incurred to acquire the asset less the estimated salvage value of the asset at the end of its useful life.

Table 4.4 Depreciation, Depletion, and Amortization

Depreciation	Depletion	Amortization
Depreciation is the diminution in intrinsic value of the asset due to use and/or lapse of time. Depreciation is the reduction in asset value due to use, passage of time, wear, outdated technology, etc. Examples of depreciable assets are machines, furnitures, buildings, computers, trucks, equipment, etc	The term depletion is used in the context of extraction of natural resources like mines, quarries, etc. that reduces the availability of the quantity of the material or asset. For example, if a business enterprise is into mining business and purchases a coal mine for Rp10.000,000. Then the value of coal mine declines with the extraction of coal out of the mine. This decline in the value of mine is termed as depletion.	Amortization refers to writing off the cost of intangible assets. The procedure for amortization or periodic write-off of a portion of the cost of intangible assets is the same as that for the depreciation of fixed assets. Examples of amortizable assets are patents, copyright, trademarks, franchises, goodwill which have utility for a specified period of time.

4.4.1 Influencing Factors in Determining Depreciation Cost of Fixed Assets

According to Firdaus (2001), to determine the amount of depreciation of fixed assets, there are three factors that must be known, namely cost, estimated useful life, residual value. Baridwan (2004), also states that there are three factors that must be considered in determining depreciation expense in each period, namely:

1. Cost

   The definition of cost is the money spent or appears and other costs that occur in obtaining an asset and placing it so that it can be used.

2. Residual Value (residual)

   The definition of the depreciated residual value is what is received when the asset is sold, exchanged or other means when the asset is no longer used, less costs incurred when selling or exchanging.

3. Estimated Useful Age or Benefit Period

   This estimated useful life is an asset that is influenced by the way of maintenance and the policies adopted for reparation. This can be expressed in a period of time, units of production or units of working hours.

4.4.2 Depreciation Method

According to Anthony Tarquin (2012), there are classical, internationally accepted depreciation methods used to determine depreciation: Straight of Line Depreciation (SLD), Sum of Years Digits Depreciation (SOYD), and Declining Balance Depreciation (DBD).

1. **Straight of Line Depreciation (SLD)**

   Straight of line depreciation is a method of depreciation whereby equal portions of the amount paid for an asset are shown as an expense during each accounting period of the life of the asset. It is also called a fixed installment method because the amount of depreciation remains constant from year to year over the useful life of the asset. According to this method, a fixed and an equal amount is charged as depreciation in every accounting period during the lifetime of an asset.

$$\text{Depreciation} = \frac{\text{Cost} - \text{Residual Value}}{\text{Economic Life (year,month,etc)}}$$

2. **Sum of Years Digits Depreciation (SOYD)**

   SOYD is an accelerated depreciation method, more depreciation occurs early in the asset's life than in its later life. This method is one of the accelerated depreciation techniques which are based on the assumption that assets are generally more productive when they are new and their productivity decreases as they become old. This method computed by using the following formula:

Table 4.5 Sum of Years Digits Depreciation Formulation

Sum of Years Digits Depreciation (SOYD)	Formulation
Sum of Year Digit ($\sum$digit)	(Economic Life (economic life + 1)) / 2
Sum of Year Digit ($\sum$digit)	(Remaining useful life at the beginning of year) / ($\sum$digit) x (cost-Residual Value)

3. **Declining Balance Depreciation (DBD)**

   Declining balance method of depreciation is an accelerated depreciation method in which the depreciation expense declines with age of the fixed asset. Depreciation expense under the declining balance is calculated by applying the depreciation rate to the book value of the asset at the start of the period. This method computed by using the following formula:

   Depreciation = % of depreciation x (the price of the acquisition – residual value)

4.5 Cost of Electricity Machine

Electricity costs are costs that must be paid for each kWh used

Table 4.6 Sum of Years Digits Depreciation Formulation

Cost of Electricity Machine	Formulation
kWh	(Capacity of machine) / 1000 x working time of machine / day
Total kWh Cost per Machine	kWh x cost per kWh
Total Cost of Electricity Machine	Total kWh cost per machine x amount of machine x 5 days x 48 weeks

4.6 Maintenance

Maintenance is the activities involved in keeping a system or equipment in working order (Bend-Daya, et al., 2009). The goals of maintenance according to (Alhilman et al., 2015) are:

1. Extend the useful life of the asset
2. Ensuring the operational readiness of equipment in emergency activities
3. Ensuring the safety of facility users
4. Ensuring the availability of equipment for production or services.

MODULE 4B

REFERENCES

Alhilman, J., & Safitri, O. F. (2015). Preventive Maintenance Program Using Reliability Centered Maintenance Method and Procurement Of Spare Part Based On Reliability (Study Case : PT . XYZ). *International Journal of Engineering Science and Innovative Technology (IJESIT)*.

Baridwan, Z. (2004). *Intermediate Accounting : Edisi 8.* Yogyakarta: BPFE-Yogyakarta.

Basanta, A. F., Alhilman, J., & Musnansyah, A. (2012). *Perancangan Aplikasi Analisis Rcm (reliability Centered Maintenance) Dan Rcs (reliability Centered Spares) Dalam Menentukan Kebijakan Maintenance Dan Persediaan Spare Part.* Yogyakarta: Pustaka Pelajar.

Hoffman, T., & Fogarty, D. W. (1991). *Production & Inventory Management.* South Western: Cincinnati.

Ikatan Akuntan Indonesia (IAI). (2009). *Standar Akuntansi Keuangan Entitas Tanpa Akuntabilitas publik (SAK ETAP).* Jakarta: Dewan Standar Akuntansi Keuangan Ikatan Akuntan Indonesia.

Irham, F., & Hadi, Y. L. (2009). *Portfolio Theory and Analysis.* Bandung: Alfabeta.

Jakfar, K. &. (2015). *Business Feasibility Study. Revision Edition.* Jakarta: Kencana Prenada Media.

Kinney, M. R., Raiborn, C. A., & Barfield, J. T. (2000). *Cost Accounting: Traditions and Innovations.* Northwestern University: South-Western Pub.

Rachmat, F. (2001). *Manajemen Dana Bank.* Bandung: STIE INABA.

Rosnani, G. (2007). *Sistem Produksi.* Yogyakarta: Graha Ilmu.

T. Horngren, C., M.Datar, S., & V. Rajan, M. (2015). *Cost Accounting.* Boston: Pearson.

Tarquin, A. B. (2012). *ngineering Economy: Seventh Edition.* New York: McGraw-Hill.

Daya, M. B., Duffuaa, S. O., Raouf, A., Knezevic, J., & Kadi, D. A. (2009). *Handbook of Maintenance Management and Engineering.* New York: Springer.

Elton, E. J., Brown, S. J., Gruber, J. M., & Goetzmann, N. W. (2014). *Modern Portofolio Theory and Investment Analysis.* Wiley.

Holm, L. (2019). *Cost Accounting and Financial Management for Construction Project Managers.* New York: Routledge.