Producer Equilibrium

Is a model that predicts how a producer will allocate the investment between different resources/ inputs.

What should a producer consider to decide which resource to use?

1. Marginal product of labor (productivity of any given resource)
2. Lower cost of resources

Producer Objective: is to maximize the output with available <u>amount of investment</u>

To construct, producer equilibrium diagram you need 2 graphs namely Isocost and Isoquant.

1. *Isocost* - is a graph that shows the quantities of 2 resources (capital and labor) that a producer can afford with available amount of investment

2. **Isoquant** - is a graph that shows a certain level of output that a producer can produce using different combinations of labor and capital.

Where the isocost and isoquant are tangent to each other that is the equilibrium point in the producer equilibrium diagram.

Since Isocost and Isoquant are tangent to each other at the point of equilibrium therefore the gradient of these lines to be equal to each other. This is something that is always mathematically true.

Gradient of Isocost =   - PL / PK

Gradient of Isoquant =   - MPL / MPK (Marginal product of Labor divided by Marginal Product of Capital)

Marginal Product of Labor: refers to additional output produced by each additional unit of labor hired

Units of Labor --------------------------- Total Output   ------------------------------ Marginal Product

Units of Labor	Total Output	Marginal Product
1	30	30
2	45	15
3	55	10
4	60	5
5	63	3

Each additional labor contributes less output compared to the previous unit of labor and **this is known as Law of Diminishing Marginal Product of Labor.**

Will the diminishing marginal product of labor always exist? Yes, in every type of business in the short run this concept will hold true.

Variable Inputs: these inputs like labor are relatively easier to increase or decrease in quantity at a certain point in time.
Fixed Inputs: these inputs like capital and land are relatively difficult to increase or decrease in quantity at certain point in time.

Marginal Product of Capital: refers to additional quantity of output produced by one more unit of capital.

The final form of the producer equilibrium point will be as follows:

$$MPK / PK = MPL / PL$$

The left hand side of the equation shows the output that capital produces for each dollar spent on capital and the right side of the equation shows the output that labor produces against each dollar spent on labor.

MPK = 20 units
MPL = 50 units

PL = $15
PK = $10

MPK / PK = 20 / 10 = 2 units per $
MPL / PL = 50 / 15 = 3.33 units per $

Which of the 2 resources is more productive? Labor, as it makes more units of output against each dollar spent on labor.