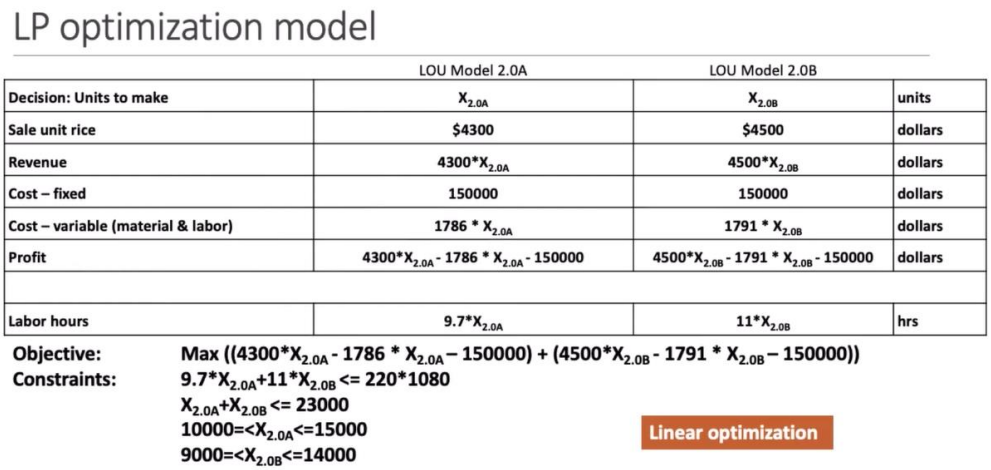
M7L2c. Linear Optimization

Slide #1

Slide #2



This slide describes the mathematical equations of the business model for the purpose of illustrating the optimization process.

The decision variables are XA and XB. The revenue of each model is the production volume multiplied by the unit sale price.

The cost includes both fixed management cost and variable cost, which includes materials and labor cost. Profit is revenue less cost.

The amount of labor hours for each product is calculated with these equations.

The business objective is to optimize the profit, which is described in this equation.

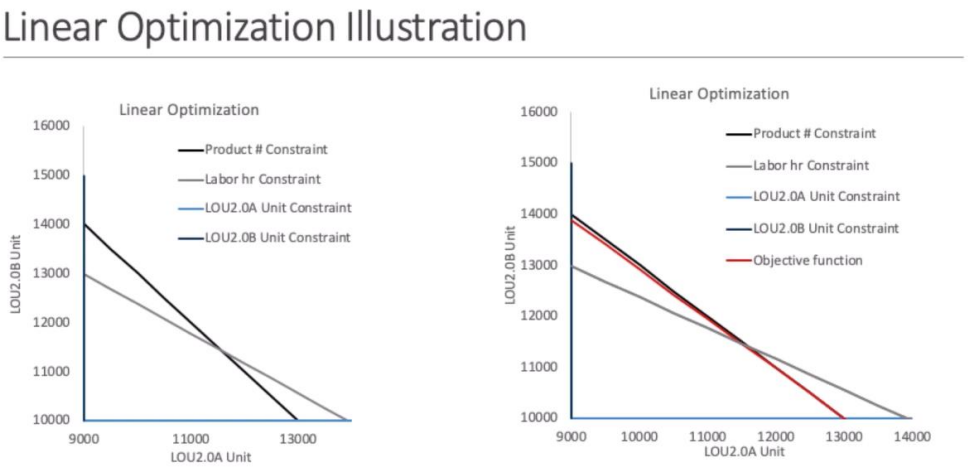
The human resource constraint is 9.7 multiplied by XA plus 11 multiplied by XB, less than and equal to 220, multiplied by 1080, which is the total hour of a person in a year.

The production capacity constraint is XA plus XB less than or equal to 23,000.

The demand constraints are as follows.

All equations are linear, so this is called linear optimization.

Slide #3



These two charts illustrate constraints and solution of the linear optimization problem.

The left chart represents the constraints in the two-dimensional chart.

The horizontal axis is the production volume of model A unit and the vertical axis is the production volume of model B unit.

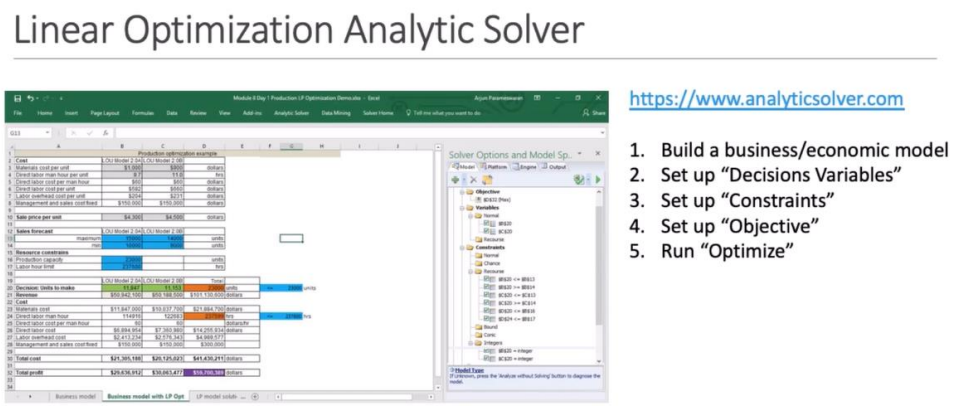
The production capacity constraint and labor hour constraint are the two lines between the axis.

The demand constraints are marked on the axis.

The right chart includes the objective function, which is the red line.

This position returns the maximum profit within the boundary conditions.

Slide #4



Fortunately, the Microsoft Excel Analytic Solver tool provides powerful functions to build and solve linear optimization models, so that you do not have to worry about how to solve the linear equations.

For the rest of this optimization model, we will explain the linear optimization business models on the Analytics Solver platform, rather than discussing mathematical calculations.

Analytics Solver is installed on your computer.

With help of the Analytics Solver tool, we can focus on the construction of a robust business model for different optimization business applications.

The configuration of the optimization model decision, variable constraints, and objective function is quite intuitive in the analytic solver.

The demo video clip of each model will explain how you can set up those optimization elements.

This is the Microsoft Excel interface of the Optimization Model with Analytics Solver add in tool.

A typical process of business optimization analysis is as follows.

The first step is to build a business economic model to describe the relationship of decisions, constraints, and business objectives.

The second step is to set up decision variables with the Analytics Solver toolbar.

The third step is to set up constraints, and the fourth step is to set up the objective.

Then you can run the optimization model by just clicking the optimization button.

The tool will replace your initial decision inputs with optimization outcomes.

The resulting Excel model represents the best business solutions.

For the rest of this module, please use the analytic solver to help you find the optimum business solution to your problems.