



## Assignment No:7

### **Two Goals Optimization- Optimal number of Engineers**

---

#### **1. Assignment Description**

Engineers are the most important human resource needed for the R&D process. The greater the number of the engineers the faster the development process. However, engineers are also relatively expensive. The purpose of this assignment is to determine the optimal number of engineers needed for the R&D process using the framework of the two goals optimization function.

#### **2. Background Theory**

The optimal number of engineers should be estimated through estimation of the multi input – multi output production function.

The inputs for this production function are the number of engineers, the quality of these engineers and the amount of money invested. Quality is defined by the knowledge index of the firm. When engineers work at the firm for an increasing amount of time and firm invests in knowledge preservation and the knowledge index increases.

The output of this function is the time for accomplishing the R&D task and the cost of the R&D process. These two targets compete with each other. The more money invested in the R&D process, the less time is needed yet the costs will be higher. Thus, in order to estimate the results of the R&D process, definition of a Multi Goal output function is required. This function should take into consideration the two goals (time and cost).



## Assignment No:7

### **Two Goals Optimization- Optimal number of Engineers**

---

#### **3. Data Source**

- Establish a firm with an average production function
- Select one of the R&D projects and define your investment policy
- Set the number of engineers you would like to allocate to the R&D process
- Define your Knowledge preservation policy
- Run simulations for several quarters, until R&D results are achieved and implemented
- Record the time and cost needed for the process

#### **4. Analysis Required**

- a. What is the functional form of the function that should be optimized?
- b. What method would you recommend for allocating various weight to the two goals?
- c. For the selected project, what is the optimal policy for the following variables:  
Number of engineers, investment in knowledge preservation and investment in R&D process
- d. How does interest rate affect these results?