# Using A Model of Dynamic Programming in The Iraqi Economy

**Assist. Prof.**
**Dr. Ali S. Alobaidy**
**Accounting Department**
**Cihan University**

Iraqi economy is facing number of serious problems which form obstacles threatened its current and future food security. The most advanced problems are the climatic changes and aggravation of global warming phenomenon which their environmental impacts can be seen as desertification, drought, decline of undergrowth and lack of rainfall, together with severe reduction of water supply. These problems call for the economists to provide all available facilities in order to alleviate the environmental and economical impacts of problems.

From among the scientific methods used is the mathematical programming and models which can include the various economic problems; at the front of them is the dynamic programming, as a method of operations researches. The model takes into accounts all the problems restrictions, among them the risk and uncertainty as their negative impacts increased because of the bad environmental circumstances mentioned.

However, application of the suggested model requires detailed information which can not be provided unless the use of advanced technologies for the satellites, through the Remote Sensing. If such technology is used with the dynamic programming model, the major negative environmental impacts will be disposal through the optimal investment of time and resources.

## Elements of the Dynamic Model

Mathematical model includes the basic elements of the operations research method which aims at the minimization of the total delay times that expected during the planting season resulted from draught season or climate changes which are as follows:

1.Objective Function

Minimization of total costs of losses in the time allocated to plant crops during a particular season

$$\sum_{q\in\Theta} p(q)\chi\{\left[\sum_{c\in\phi}\sum_{t=c}^{T+1}(t-c)\chi(X_{c,t}^{q}-X_{c,t-1}^{q})\right]+\lambda\times\sum_{t=1}^{T}W_t^q\}\ \text{Min.}$$

Where:

t : is the time period of cultivating crops (in a particular season)

T : is the end of cultivation period (T+1 is the end of cultivating the first crop)
c : is one crop which is belong to group Φ and (Φ = 1,2,…c)

$\sum_{c\in\phi}\sum_{t=c}^{T+1}$ : is the beginning and ending of cultivating c crop matrix which belong to Φ group that planted in a particular season (supposed to be drought season q)

$P_{(q)}$ : is the unconditional probability of dry season (one of the potential season with a total number Θ (where $q \in \Theta$ )

$X^{q}_{c,t} - X^{q}_{c,t-1}$ : is the difference between the two periods of cropping c within season q (comparison of current period of cultivation with last year's period)

λ : cost per unit of lost periods in a drought season (must be accurately estimated by using the Alternative Opportunity Costs

$\sum_{t=1}^{T} W^{q}_{t}$ : is the number of crops cultivated in t period and ended in T during the season q

2. Constraints :

$X^{q}_{c,t} - X^{q}_{c,t-1} \geq 0$ (to all cases where $t \in (c,...,T+1), c \in \Phi$ and $q \in \Theta$), which means that there is clear measurement for the lost periods occurred during the cultivation of crop c which belong to group Φ and through the possible diversification in season q which belong to group of seasons Θ

$W^{q}_{t-1} W^{q}_{t} + \sum_{c\in\phi}(X^{q}_{c,t} - X^{q}_{c,t-1}) \leq M^{q}_{t}$ in all cases where $t \in (1,...,T+1)$ and $q \in \Theta$ where ($M^{q}_{t}$) is the changeable capacity through the time of each type of seasons (groups of crops cultivated from the beginning of season up to the end ($M^{q}_{T+1}$)

$W^{q}_{0} = W^{q}_{T+1} = 0$ any crops do not grow in season q have no economic value at the end of the season T+1

$X^{q}_{c,T+1} = 1$ crop c implemented planting in season q is the only one that shows his economic value at the end of season T+1