Appendix (1)

Accepted economic theory, which addresses the topic of business efficiency or productivity, can incorporate the following functional forms.

COST MINIMIZATION

The first equation involves the minimization of a standard cost function where:

Given the simple production function:

$$Q^t = f(x^t, t) + error$$

where:

Q^t **output is produced during time (t) and the input set used during period (t),** $x^t = (x^t_1, x^t_2, x^t_N)$

Then:

$$C(Q_t, p_t, t) = min_x \{p_t \ x: f(x,t) \bullet Q_t, x \bullet O_N)$$

In the above function, a producer faces a positive vector of input prices ($pt = (p^t_1, p^t_2, \ldots p^t_N) > O_N$ where O_N is a null vector 1*N dimension during period (t) and seeks to minimize costs in a competitive market.

MORE COMPLEX PRODUCTION FUNCTIONS

To estimate the returns to factors of production or inputs to a given production process, standard economic theory involves the incorporation of more complex production functions. One such form, the Cobb Douglas, enables the estimation of factor input elasticity coefficients and is depicted below.

$$Q = (IL^B, l^B, IK^B, K^B)$$

Where: Q is output for a firm and

IL is the input of Information Technology Labor
L   is the input of Non-IT Labor
IK is IT capital
K   is Non IT capital

(B) values are variables that denote the elasticity of each of the input factors.

To estimate the function one only needs to linearize the form, which yields:

$$\ln(Q) = B1\ln(IL) + B2\ln(L) + B3\ln(IK) + B4\ln(K)$$

B1 through B4 reflect the percent change in output given a 1% change in the given input.