Investments and their effects on quality of product and services

Investiţiile şi efectele acestora asupra calităţii produselor şi serviciilor

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Abstract

This paper aims to address issues of importance of investments on the quality of products and services in the contemporary economy. The investments have an innovative character due the fact that creates material conditions in order to promote the technology, ensuring the development and improvement of production factors. All these glide, then, for excellence, to the goal to achieve maximum quality in some efficient conditions and settled deadlines. Also, it is presented the production function Cobb-Douglas, as a model of economic growth. Thus Cobb-Douglas function is a mathematical model/pattern expressing the relationship between the results obtained and the main economic factors of production. We exemplified this mathematical model, achieving a case study of Star Glass SA.

Keywords: *investments, quality, competitive, efficiency*

Rezumat

Această lucrare îşi propune să abordeze aspecte legate de importanţa investiţiilor asupra calităţii produselor şi serviciilor în economia contemporană. Investiţiile au caracter novator deoarece creează condiţiile materiale pentru promovarea tehnologiilor de vârf, asigurând dezvoltarea şi perfecţionarea factorilor de producţie. Ori toate aceste glisează, apoi, spre excelenţă, spre atingerea calităţii maxime în condiţii de eficienţă şi la termenele stabilite. Am prezentat de asemenea pe parcursul lucrării funcţia de producţie Cobb- Douglas, ca model de creştere economică. Astfel, funcţia Cobb- Douglas reprezintă un model matematic care exprimă legătura dintre rezultatele economice obţinute şi principalii factori de producţie. Am exemplificat acest model matematic, realizând un studiu de caz la SC Star Glass SA.

Cuvinte-cheie: *investiţii, calitate, competitivitate, eficienţă*

JEL Classification: A10, M10, M11, M20, M21

Conceptual guidelines on investment process

To be competitive in quality means that all factors in the path of experience from market research and continuing with the performance of machinery, with quality materials, with highly qualified personnel to be based on investment effort.

The investment represents a stimulus, a generating (Românu et.al 1997) element which makes any activity to born, to grow and to develop.

Investments represent the material support of economic development; they underlie supplement, diversification or increased quality of all factors of production. Can not ensure increased circulating or fixed capital, to increase the number of jobs, diversify production, increase product performance, increase labor productivity, higher quality products and services without a consumer of financial resources, without investment.

The investment represents an expenditure made today to ensure a timely development for a future that contains many elements of uncertainty: reducing demand for finished products, price increases in raw materials, the emergence of new products, new competitors.

On the basis of any investment activities, should be the principle of economic efficiency, the taking of the higher effect per unit of effort made. But every investor knows that you can not get quality products and services, with a maximum economic efficiency, only by spending, purchasing only high quality machines, raw materials and materials in the structure and quality required, and using highly qualified employees.

The market priorities, the demand on production needs "*continuous changes*"(Vasilescu, 2004) investments, due to the mobility of market, increasing complexity of economic and social environment, interdisciplinary nature of problems - business, finance projects, joint research activities and production.

Investment as a stimulus in any economic activity can be focus and expressed by the following features: duration, risk and efficiency.

Thus the characteristic time - period, shows that any investment project has a life of its own stage and characterized by well defined and moments during which the project's economic parameters have described own evolution in the pattern of cash flow.

The notion of efficiency expressed the ideea that the developer agrees to change a current availability of resources for a range of effects, future revenue, which in total amount to be higher to initial costs.

The characteristic of risk results from actual future periods staggering of expected effects. These effects are future expectations and not certainties.

Also, to the concept of investment we can assign a three-dimensional image: economic, financial and book-keeping (Vasilescu, 2004).

The economic size coverage broadens the investment, because according to this sense, the investment represents the consumption of all resources that are now hoping to achieve in the future of economic effects, staggered in time and which, in total, are higher to initial costs of resources.

The investment size considers investments all financial expenditure of resources that generate income and / or savings for a long time in the future and accordingly, amortization (repayment) shall be made over many years.

The book-keeping size is restrict and reduce investment in the concept of mobilization in the accounting sense of the word and expresses all movable and

immovable, tangible or intangible, acquired or created in the enterprise, designed to remain constant in the same form.

Regardless of the size and interpretation of the concept, the investment represents the path to development.

Interestingly is the nature of investments that gives us clues about the directions of development at the firm or company. Such investments may be *"real"* - tangible or intangible and" *financial*".

The real investments themselves are new physical things such as lands, buildings, equipment or knowledge for the firm and are used to produce goods or services. These investments are ultimately responsible for the economy's productive capacity.

The "real" investments may also be investments on assets and intangible investments. Asset investments consist of the firm's physical assets and circulating assets. Intangible assets include investments in the form of intangible assets such as goodwill, patents, etc. expenditure on training of operating personnel, advertising, educational.

The financial investments are those in which investors allocate their resources for some form of financial instruments such as shares or bonds that represent claims on the merits on all real property.

When the real investment of companies generating incomes, this income is allocated to investors in accordance with both its own business, the number of shares they have.

Particularly suggestive are the areas that are absolutely necessary for sustained investment. Of these, the investments in new technology seem to be a determining factor in ensuring success in relation to competitors. Thus investments in new technologies, performance, could ensure the creation of a market dominance by undertaking support of quality products and services reflected in the characteristics of technical, economic, utility quality, etc.

Hence, the investments are the material support of economic development and the way to enhance the fixed capital, increased technical and economic efficiency of the existing and creating new jobs.

Investments have an innovative character due the fact that creating materials to promote the high technology, ensuring the development and improvement of factors of production. All these issues glide, then, for excellence, in order to achieve maximum quality in an efficient conditions and settled deadlines.

Investments in economic incresing/growing patterns – production function – Cobb – Douglas

The pattern of growth is a mean of investigation and knowledge of the influence the have investments have, as the main factor of economic growth, on the economic phenomena and processes.

The process of increasing the quality of products and services and the growth is influenced by several factors, most important of which are: the capital in service, labor, raw materials consumed, technical progress.

The production function is a mathematical way of describing the relationship between *inputs* - the factors of production such as labor, equipment, investments, etc. and *outputs* represented by the results in the production process.

The general formula for such a function is given by:

$$y = f(x_1, x_2, \ldots, x_n)$$

The broad functions of production reveals that production is the result of a combination in various proportions of the factors of production.

Among the factors in the production process, a crucial role it has working capital and operational capital.

Starting to these elements, Cobb şi Douglas (Românu et.al. 1993) presented a mathematical model to express the link between economic benefits and outcome of the main factors of production.

This production function could be expressed thus:

$$Q = g \cdot L^{\lambda} \cdot K^{\mu}$$

consisting of: Q = production, expressed in value form; L = used work (number of employees); K = operational capital (volume of fixed capital); λ = coefficient of elasticity of production, related to used labor; μ = coefficient of elasticity of production, versus the operating function capital; g = factor of proportionality.

From the relationship shown that production is influenced by two factors (labor and capital) view on the quantitative point of view, expressed by L and K, but also qualitatively, by other factors, unmeasured according to μ and λ elasticity coefficients the production, play through the coefficient g, which expresses precisely the influence of other factors than those taken into account to ensure the agreement of the statistical production, with those calculated by the production set.

Between the elasticity coefficients λ and μ could be settled the folowing relations:

$\lambda + \mu < 1 \rightarrow$ case the function has an underunit yeld / return, which expresses the development of extensive character, ie increasing the production is largely due to quantitative factors.

$\lambda + \mu = 1 \rightarrow$ case the function has an unit yeld / return and express a development of neutral type. It is an omotetic function.

$\lambda + \mu > 1 \rightarrow$ case the function has an supraunit yeld / return and express a development of intensive type.

Subsequently the model was improved, considering the dynamic nature of the function, such been made the following forms of the function:

$$Q(t) = g[L(t)]^{\lambda}[K(t)]^{\mu}$$

$$Q(t) = g \cdot L^{\lambda} \cdot K^{\mu} \cdot e^{\Psi t}$$

$$Q(t) = g(1+\varepsilon)^{t} \cdot L^{\lambda} \cdot K^{\mu}$$

consisting of: t = time; ε = yearly growth of economic efficiency; ψ = elasticity coefficient of tehnical progress.

The first model assumes knowledge of the evolution over time of capital in service and number of employees.

Based on the trend functions established and the coefficient of adjustment *g* can be calculated for each year *t* the production value *Q*.

Using production function Cobb-Douglas implies to run through several stages

1**.** Collection of data from book-keeping company record, on the development for a period (n) of about 8 years of production, capital operation and the number of employees

2.Calculate of the coefficients g, λ and μ on the basis of equation system:

$$\begin{cases} n\lg g + \lambda\sum \lg L + \mu\sum \lg K = \sum \lg Q \\ \lg g\sum \lg \mathrm{L} + \lambda\sum \lg^2 \mathrm{L} + \mu\sum \lg \mathrm{L}\cdot\lg \mathrm{K} = \sum \lg \mathrm{L}\cdot\lg \mathrm{Q} \\ \lg g\sum \lg \mathrm{K} + \lambda\sum \lg \mathrm{L}\cdot\lg \mathrm{K} + \mu\sum \lg^2 \mathrm{K} = \sum \lg \mathrm{Q}\cdot\lg \mathrm{K}; \end{cases}$$

Development of production function that approximates the correlation between production value, as dependent variable and the two factors of production considered as independent variables;

Are determined the average annual rate of growth in the future of indicators such as productivity, production, etc. and on the basis of production to be achieved and the needs of employees for this production;

Replacing the known values into the production function and establish the necessary of operating capital for the respective production achievement

Calculation of investment funds to be made to ensure equity in service on the basis of the formula:

$$I_t = CF_n - CF_o + C,$$

consisting of: I_t = investment to achieve; CF_n = fixed capital need for the h_1 year of reference; CF_o = capital fixed capital of basis year; C = fixed capital cassation made in the period between basis year and h year.

Interpretation of results obtained. With the production function may be done the evaluating of effectiveness of production factors considered, also the determination of substitution possibilities between factors of production.

Function Cobb-Douglas, however, does not reflect the degree of qualification of personnel and technological quality of fixed capital. In addition, in terms of mathematical, functions personal L (t) and K (t) appear to be independent. In reality we can not hire a large number of staff that we have not sufficient coverage of fixed capital. Therefore, as a complement, appear the condition of Solow, which says that the size of the number of personnel reported to the staff as such, must be equal to the size of fixed capital in relation to existing capital

We assume that the production function has two components overlap: $Q = Q_L+Q_K$, where Q_L is the component that is done by people work and Q_K is made through fixed capital contribution. In addition, Q_L is proportional to the number of employees and labor quality, and Q_K is proportional to the size of fixed capital and technological quality of it.

Starting from these elements we have the following formula for generalizing classical Cobb-Douglas:

$$\mathrm{Q} = \mathrm{h}\left(\mathrm{L}^{\alpha}\tau^{\beta} + \mathrm{K}^{\gamma}\omega^{\delta}\right)$$

consisting of :Q = production function of the firm;L = employees number;K = fixed capital;τ = net productivity of the work (personnel qualification);ω =flat/net investments productivity (new technology);$\alpha,\beta,\gamma,\delta$= elasticity coefficients ;h = proportionality factor.

Next we introduce the function of Cobb-Douglas production pattern to company Star Glass SA representing a case study accordingly to the data in the following table:

The function of Cobb-Douglas production pattern

Tabel 1

	Q	lg Q	L	lg L	lg^2 L	K	lg K	lg^2 K	lg L lg Q	lg K lg Q	lg L lg K
1.	149587	5,17489	949	2,97726	8,86407	23870	4,37785	19,16557	15,40699	22,65489	13,03399
2.	199600	5,30016	938	2,97220	8,83397	31200	4,49415	20,19738	15,75313	23,819714	13,35751
3.	259000	5,41329	925	2,96614	8,79798	31700	4,50105	20,25945	16,05657	24,36548	13,35074
4.	329000	5,51719	911	2,95951	8,75869	33200	4,52113	20,44061	16,32817	24,943933	13,38032
5.	359000	5,55509	904	2,95616	8,73888	35000	5,54406	20,64848	16,42173	25,242662	13,43296
6.	396000	5,59769	890	2,94939	8,69890	35700	4,55266	20,72671	16,50977	25,484379	13,42757
7.	442000	5,64542	875	2,94200	8,65536	38000	4,57078	20,97438	16,60882	25,85478	13,47371
8.	493000	5,69284	830	2,91907	8,52096	41000	4,61278	21,27773	16,61779	26,25981	13,46502
		43,89657		23,64173	69,86081		36,18346	163,69031	129,69031	198,625648	106,92182

$Q = g \cdot L^{\lambda} \cdot K^{\mu}$ Q = 0,000000083

$\lg Q = \lg g + \lambda \lg L + \mu \lg K$

It obtained: g = 1,011, λ = 0,79, n = 0,31 and in production function which supply the production evolution related to operating capital and number of employees is:

$Q = 1{,}11\ L^{0{,}79}\ K^{0{,}31}$

The results obtained lead us to conclude that during the analysis period the fixed capital contributed at a rate of 27,92% to the production and work at a rate of 72.08%.

This shows that the emphasis was on growth of working factor against capital, which did not allow the promotion of technological processes in machines bearing technical progress.

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