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Econometric Determinations for Safe Operation and Control of Risks Productive Systems in the New Economy

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ABSTRACT: *The article presents specific elements in econometrics practice from productive economic systems considering thesis that the simultaneous equations are simple and just imperfect "look" and not always expresses "total quality safety". Cybernetic and automation formalization of production is based on initial and final subjective intervention in economic-productive systems overall management through "golden decisions" that always belong to man. It is recommended taking into econometric account the final sustainable consumption of resources, unaffected by residual costs. In all cases some auxiliary components whose materials recovery bother environment must be included in a strategic conservatism. Total quality management strategy is safe development success in the New Economy. The article motivates the idea of taking in consideration the concept of "total quality safety" to combat risks of productive economic systems in the New Economy.*
Keywords: *management, econometric determinations, operational safety, control of risks, productive economic system, the New Economy*

I. INTRODUCTION

Literature review

In modern economic-productive practice, for operational lines, in any situation equation data does not reflect the total physical tangible reality. Therefore *“Models must be well developed and validated to demonstrate that they are working as expected. Outcomes analysis is also necessary to ensure that the scores derived from applying the model to new data are accurate and to verify that model performance remains satisfactory.”* (Robert Chu, David Duling, Wayne Thompson, 2007) Even if it occurs cybernetics and automation approach of production, reveals that always remain subjective or real attention requirements for intervention in productive economic overall management. It is "the first decision" (initialization process) and the "final decision" (outcomes). We can be considered "gold decisions" and always belong to man. In context, to base of these essential decisions calls the stochastic specification which includes estimates and taking into account the errors as relational "*scrap*". In modern practice firms are found *“The evolution of production models raises a number of questions on the changes which are taking place, on the continuity of or break with consolidated models, and on whether new production paradigms are emerging. (...) the principal interpretative approaches (is): the emergence of lean production as the dominant model; the indeterminacy of production models and the unpredictability of their evolution; the existence of a number of different models which are strongly dependent on context; the asymptotic convergence over time of different models on a single point of reference which is not lean production, while the latter will decline or be revised; and the emergence of a new unifying paradigm which leaves room for and even requires specific variations and adaptations”* (Emilio Bartezzaghi, 1999, pp. 229 – 250)

It notes that econometrics resources role in essential decision making can be focused on *predicting* and *testing* models. It is also useful to *“…develops an econometric methodology for estimating dynamic production models with sequential intermediate input decisions. Two problems arise (...) of intermediate inputs: intermediate input decisions may be endogenous to final output, and intermediate inputs are likely to be correlated with each other and other variables, making identification and estimation difficult.*” (John M. Antle, Stephen A. Hatchett, 1986, pp. 939-949)

Econometric measurements in this framework are useful for safe operation and control of risks productive economic systems in the New Economy.

II. ECONOMETRICS RESOURCE IN PRODUCTION LINES

Specific operational alignments in econometrics practice of productive-economic lines for operation / production is found in *econometric methods and applications*. Individualized simple equations and simultaneous equations, in our assessment are just "images", always imperfect, but in many cases close to productive economic reality.

As such, *"A model predictive control approach is applied to a closed-loop supply chain where remanufactured items are as-good-as-old. Three stocks are considered, one for newly produced items, one for returned items, and one for remanufactured items.*" (Ramdane Hedjar, Ajay K. Garg, and Lotfi Tadj, 2015).

It appears that the general economics econometric methods still lack adequate expansion of the set of alternatives for resolving complete optimization of resources. Consequently, the crowd of macro or microeconomic models, in actual production systems, should be under the econometric incidence, even conditional restrictive and insufficient methods in the field.

We find that "*The econometric model measures the productivity of intermediate inputs, taking into account the (...) sequential input decisions and input productivity differences (...). A multistage Cobb-Douglas model (...) is used to illustrate the proposed methods*." (John M. Antle, Stephen A. Hatchett, 1986, pp. 939-949). In exploitation and enhancement practice of production lines, has been to highlight of delivery methods to ordered results and economic picture of reflecting the efficiency of processing resources, in principle we exclude the change in qualitative or differentiation qualitative inventory of potential materials (which are considered always that there are rare), employees (it is estimated that there is always somewhere available workforce), the source of funding (it is considered that banks, investors and others were expressions of interest for the investments) etc.

This impression is increasingly dominant, as technologies become high performance of automation and cibernetics mitigate scarcity. For example, a production project framework and set of economic indicators are often not formulated for high performance technology for a quasi-accepted quantity and quality state of resources. But productive rationality is frequently affected by the simplification of considering a certain level of costs.

Salow R.M. and *Wan F.Y.* (1974; 2001) stresses the need to redrafting theme of optimal use of resources by giving special attention on differentiated production costs by the scale and qualitative accumulation and possession variation of resources, which can lead to so-called final sustainable consumption, unaffected by residual costs.

Starting from this situation reported by the authors, still describe a contributory vision in area to justify the call to general safety considerations in econometric foundation of productive economic activities.

Please note that this *conception reliability* proposition is included in the general safety of productive economic systems.

Considering the work of making a good hatchbacks, record production needed to be done Q *(output)*. This requires resources that can be directly consumed, in full, *qualitative indicator* that is denoted by C. Production can be gained in a so-called *reproducible capital stock,* noted K.

Given the size of the labor force engaged in the operation of manufacturing lines, that production yield compared with the volume of *inputs.* Production function has the classical expression:

$$Q = F(K, R, L) \qquad (1)$$

where R = the used resource (consumed) in the process for the production of a production unit.

If the size of the labor force in manufacturing activity is kept constant, then L = 1.

In this context, the production function can be assimilated and evolving representative *Coob-Douglas* curves, as follows:

$$Q=K^{a} * R^{b} * L^{1-a-b}; (a>b) \qquad (2)$$

It noted that the production process cannot be carried out without consumption of material resources (raw materials, energy, etc.) denoted by R. The New Economy resources in question may be intangible, i.e. the nature of knowledge. In practice, to obtain a production unit Q encounters limits are not immutable parameter R, but its assuming the normative or levels indicative strict imposed by programmatic issue.

Typically, the proportionality between Q and R is conditional upon the availability of flow elements (consumed resources in production, capital, and labor). It is important to note that the interrelationships above is not the presence of technical progress, which will influence the absolute volume of achieved production, but the size of the absolute values of input elements *(inputs)* that can cause final elevated productive.

The resources shown in the production function as data, underlying the accumulation (stocks), with or without the possibility to increase further dimensional and quality and production, and designed implemented flow for objective characteristics, may be considered homogeneous background.

Theoretically, if stocks are considered constant in terms of quality, it is expected that only parameter to be restrictive in recovery time t. (Gâf-Deac I.I., 2007) *(Figure 1)*

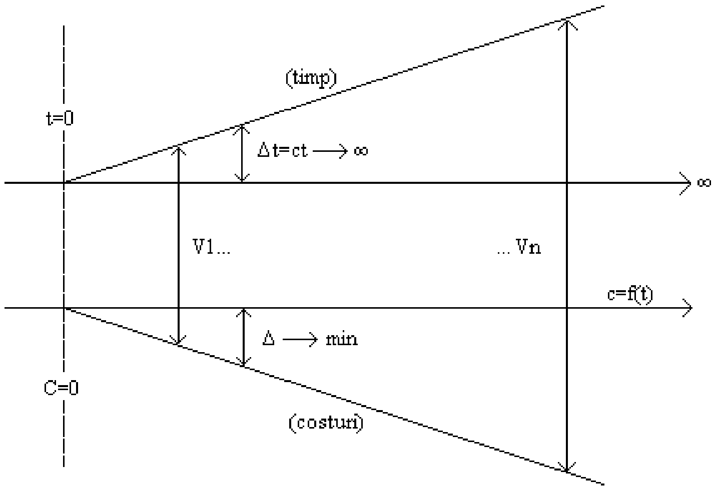

Fig. 1. *Increase the constant time (t) and decreasing average costs (c) on the valuation of stocks for tangible and intangible resources in New Economy*

In this situation, that is the expression of recovery dynamism:

$$\int_0^{\infty} R(t)dt \leq \overline{R} \qquad (3)$$

But it is obvious that in practical reality any accumulation of resource (stock) is characterized by variation in quality from of the preexisting signals data, with objectively as appearance and physique, structural material of the itself resource, each is unique, distinct crowd-standard units of the quantitative and qualitative measurement.

Qualitative differences, synthetically represented by Θ, expressive quantify by measuring the number of production units obtained using a unit of supplies resource in the production process.

Equally, representation may be of the number of units of supplies used resource in the production process to obtain final units controlled / planned production. Infinite limit of integration is a natural measure of the associated (related) cost of consumable resources in the production process.

The volume of supplies involved resources in transformation, from baseline *(start)* of operating production lines, described a theoretically function of density, denoted f(Θ)dt, which gives the possibility to evaluate the cost per unit of final production, located between Θ și ∞+d Θ^2. (Gâf-Deac I.I., 2007). When resources are defined as "finite" time (moment) of initial start operation of production lines, they quantify the expression:

$$\int_0^{\overline{\Theta}} f(\Theta)d\Theta = R \qquad (4)$$

Mention that ∞ notation is a theoretical significance to the highest possible cost for consumable resource. Moreover, the practice is not never reach the limit of "infinity" (any size no matter how unlimited) of resources supplies.

There is no cost indefinitely, as there are no infinite material resources. Considering Θ(t) recorded by the quality of resource consumption at the time t, it can provide a relational expression between R(t) and Θ(t) as follows:

$$\int_0^{t} R(u)\,du = \int_0^{\Theta(t)} f(u)du \qquad (5)$$

For each moment can be obtained differentials following:

$$R(t)=f[\Theta(t)]\Theta'(t) \qquad (6)$$

Equation (6) may be substitute in the production fonction:

$$Q=C+K+\theta R \qquad (7)$$

wherein: C = final consumption for production; K = invested capital (net investment in non-productive capital); ϴR = cost for natural resource extraction. In this context, it is possible to generalize the above equational by expressing a cumulative recovery functions (operating production lines). In the same framework, resources consumed by time, denoted R(t), can be considered as variables decision. (Gâf-Deac I.I., 2007)
Frequently, (Δ) comparisons are between the final volume production units produced (Q) and consumable resources while [R(t)]:

$$\Delta=Q-\theta R; [Q>R(t)] \qquad (8)$$

Essentially, technological and economic practice harnessing those resources allocation decision comes entries to get switchable output values (outputs). Optimum problem of production lines and resources exploitation is the technical and economic decision and aspects sizes net to be taken by practitioners entries (as values still not ordered) and outputs (as values switchable) in the context of maintaining constant level of performance, limiting the size of consumables and capital resources initially found, including employment costs.

Rawls criterion (maximin) (max-min) is applied in inter-temporal context, betting, while the so-called *conservative variations* (changes in control parameters).

In fact, the role is manifested decision to fully capitalize, or only within certain limits/ partial stock capitalization. It appears that not all stocks are subject to such conservatism.

For example, stocks of basic materials in manufacturing fall, usually in the incidental decision recovery as possible full (until exhaustion), while some auxiliary materials components whose recovery disturb the environment can be found in the so-called *strategic conservatism.* (Gâf-Deac I.I., 2007)

Uncertainty of future applications and possible developments resolution mainly manufacturing technologies motivates "keeping" very short-term resources for future valorization.

On the other hand, decision-makers of an entity can develop productive alignments of large insurers availability of certain types of useful resources in the future by being formalized release resources under uncertainty evolving markets and economically productive environment. It is noted that in all situations makers take into account the quality and the passage of time. In essence, there is rationality exploitation Production Line / technological accumulations that own (stocks) resources for sustainable manufacturing processes.

III. SAFETY OF OPERATION OF THE PRODUCTIVE SYSTEM

The production plan of a company can scientifically develop after to design the each simple process type of organization of each production line in its optimal variants, allowing the production of certain processes under restricted conditions and restrictions imposed: maintain a certain ratio between the volume of production and volume of resources; inducing a specific preparatory work scheme between production and the number of production lines; maintaining a certain quality of production; maintaining minimal ensuring security and comfort of labor; ensuring maximum productivity of labor and a minimum unit cost.

Planning must ensure the whole system safe counteracting economic risks. As a starting point it is necessary to scientifically plan by including organized projects in optimal variants for each of simple processes that enable a whole conjugate values for product as ordered.

Optimizing apply a rule developed model rather simple process that it represents.

Probability, even limited, the occurrence of irregularities and disturbances in enforcing the organization requires studying and taking measures in advance to ensure the functioning of the entire safely system with minimum risk.

Considering model of inflexible production process and information system from a company, it is found that they appear as a series of elementary subsystems connected in parallel, concurrent operation with elements of different input and output sum able subsystems groups.

Dependability of an aggregate system formed by connecting in two industrial cyber systems series, depends on the time period considered for the operational safety of each. (Gâf-Deac I.I., 2007). If the probability is denoted by q_i downtime and system I, in which

$$0 \leq q_i \leq 1, \qquad (8)$$

aggregate operating safety of the system is:

$$p = \prod_{i=1}^{n} p_i = \prod_{i=1}^{n} (1 - q_i). \qquad (9)$$

Production process-processing system consists of two units in series, and must ensure maximum safety in operation. Analyzing industrial cyberspace in each system part, it is noted that the production system of a company is made up of a number of basic subsystems connected in parallel.

The processing system is usually composed of two or several parallel processing lines, acting as the basic subsystems connected in parallel.

In this way, the operational safety of the entire system increases as a result of multiplying the basic subsystems in parallel, in the train.

Considering that cyber elementary subsystems all flow lines connected in parallel, they differ in that the entries in each subsystem are different. *Figure 2* (Gâf-Deac I.I., 2007) shows the sum able to bring together in parallel subsystems encountered in a company, group.

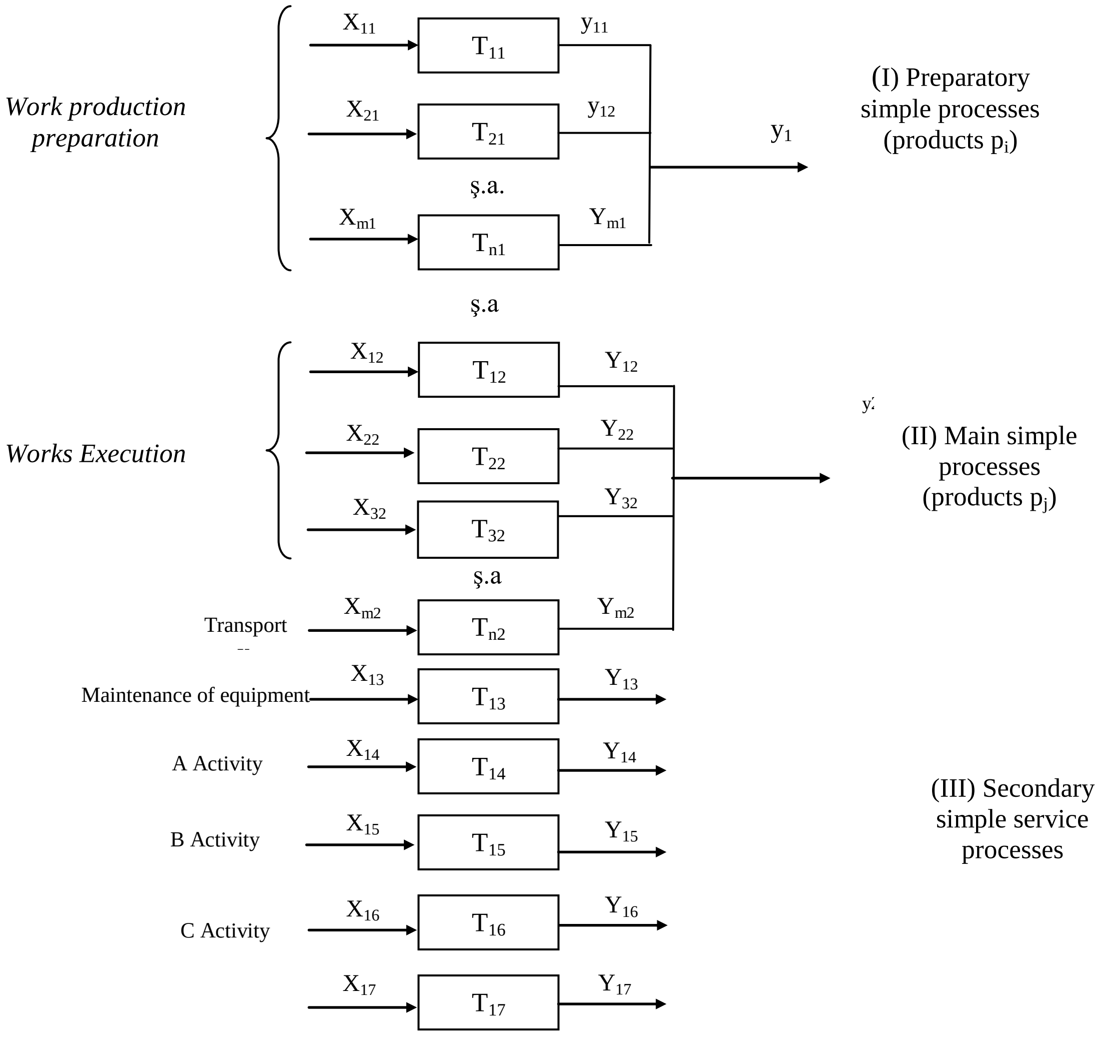

Fig.2. *Bringing sum able subsystems in parallel groups in a productive system of a modern company*

The subsystems *i* are combined in parallel and in subsets *j*, as follows:
- For preparatory work for the production (group *j* = 1) are identified:

$$\left.\begin{array}{l} y_{11} = T_{11}x_{11} \\ y_{21} = T_{21}x_{21} \\ \dots\dots\dots\dots\dots \\ Y_{m1} = T_{m1}x_{m1} \end{array}\right\} \quad (9)$$

- For construction works (group $j = 2$), there are:

$$\left.\begin{array}{l} y_{12} = T_{12}x_{12} \\ y_{22} = T_{22}x_{22} \\ \dots\dots\dots \\ Y_{m2} = T_{m2}x_{m2} \end{array}\right\} \quad (10)$$

- For secondary simple processes (transportation, equipment maintenance) serving simple main processes are identified:

$$\left.\begin{array}{l} y_{13} = T_{13}x_{13} \\ y_{14} = T_{14}x_{14} \\ \dots\dots\dots \\ Y_{1n} = T_{1n}x_{1n} \end{array}\right\} \quad (11)$$

The outputs of these subsystems meet the entries in each of the subsystems (10) and (11). Considering that in the development and optimization models simple processes, consumption benefits as *inputs* determine every subsystem (which condition all other entries, without which the process simply cannot happen), the *outputs* of each subsystem number of products, physical quantity, material, and labor productivity transformation as operators for each simple process, we can write:
- For preparatory work for the production:

$$\left.\begin{array}{l} Q_{11} = W_{11}M_{11} \\ Q_{21} = W_{21}M_{21} \\ \dots\dots\dots \\ Q_{m1} = W_{m1}M_{m1} \end{array}\right\} \quad (12)$$

- For construction works:

$$\left.\begin{array}{l} Q_{12} = W_{12}M_{12} \\ Q_{22} = W_{22}M_{22} \\ \dots\dots\dots \\ Q_{m2} = W_{m2}M_{m2} \end{array}\right\} \quad (13)$$

- Secondary simple processes:

$$\left.\begin{array}{l} Q_{13}= W_{13}M_{13} \\ Q_{14} = W_{14}M_{14} \\ \dots\dots\dots \\ Q_{1n} = W_{1n}M_{1n} \end{array}\right\} \quad (14)$$

The operator transformation (if considered, labor productivity) can vary, exceeding or remaining below the planned each subsystem having its own behavior in this regard. If in a certain time period is associated with a safety operation of the entire system:

$$pQ = pWM \quad (15)$$

So functional safety systems is productive decision-shaping factor in modern companies based on high technology, it is a constant concern for containing the systemic configuration parameter intrinsic technical and functional lines of technological flows.

IV. SAFETY OF TOTAL QUALITY PRODUCTION PROCESSES

Total quality management strategy has become the main element of success, namely the development in the New Economy. Price was replaced by quality from the point of view of the consumer. At the same time, it has passed the quality control from the control management. The tactics of introducing total quality manufacturing processes to reduce economic risks, such as phases comprise: 1) preparation; 2) a more pronounced level of communication; 3) promoting team spirit and 4) empowerment of employees in different conditions. In modern times, it is inserted the phrase *"total quality safety"*. This is greater than the total quality management because it is terminated on all sides of the production process, including the reflective quality.

V. THE OPERATIONAL MANAGEMENT OF RISKS IN PRODUCTIVE SYSTEMS

Productive economic systems, namely manufacturing, the risk has definitions and meanings such as "probability of losing", "possibility of losing", "uncertainty about a result", "chance or possibility of losing." Risk is defined, especially through the negative, unwanted potential to influence economic change course project objectives in the economy.

The risk may intervene in the economy due to the fact that they appear looks unplanned or planned that a target is not met according to schedule. "Loss" can take in case of a production economy, following forms: final products of dubious quality or lower than originally projected; costs of goals for making the final products are greater than originally foreseen; resources have not been exploited effectively, they are depleted or damaged; term for "delivery" for the conclusion of the final product and production cycle has been exceeded; the project is considered a failure.

The risk in the economy, namely the productive systems is even greater as: production cycle takes longer; the time between the planning and execution phase is extended; experience manager, the team and the company is narrower; methodology and technology to which called for the development of the production cycle is newer and less known. The operational management of risk in the economy is a process that is conducted in three stages:

a) ***Diagnosis / risk mapping:*** Those who are responsible for risk management within a production cycle must have the ability to translate information on the objectives and resources of the economy, a true "map" of risk. It should be updated and improved by developments in the real environment; considering what can happen, why and how it can happen.

b) ***Risk treatment:*** Identified and mastered the tools that risk is avoided or transferred to other areas, for the impact to be as low as possible. If the materialization of the risk situation can not be avoided, those responsible for risk management must have the ability to reduce, to keep under control the impact, given to develop and implement the plan of risk management when it would become potentially manifest.

c) ***The control and monitoring resources*****:** The evolution of risk and potential risk situations in the economy, namely the productive systems, taking account of factors is monitored inside and outside the real productive. Based on monitoring, risk management plan is corrected, improved, updated.

In a more comprehensive management of operational risk in the economy include: fixing / description of the context; risk identification; evaluation / analysis and risk hierarchy; Risk management plan development; taking and implementing risk management plan; monitoring the results and correct / improve the original plan.

The risk in the economy, including the New Economy can be defined by reference to the objectives productive projects and the economy as a whole, the criteria for successful projects. Not all risks can be "treated" and in any case all at once; therefore, setting priorities is an important step for concentrating managerial efficiency efforts.

Economy risks falling under the *impact* and *probability* problems. They are considered as potential situations, being necessary to identify the probability that the potential to become manifest, effective, and what is their impact on projects. *The first dimension* depicts the probability that a potential risk situation becomes effective; *the second dimension* captures the impact, consequences that manifest risk would have on the economy. Evaluation is done on the impact in qualitative terms, and the probability is exposed on a scale of prediction. After determining the values identified for each dimension there is provided a matrix which comprise the possible combinations between them.

VI. CONCLUSIONS

In contemporary economic-productive activities, including operational manufacturing lines, equational systems ever developed by man expresses total reality. Cybernetics and automation and production is based on subjective ideas, surging 'the first decision' (start process) and the "final decision" (the expected results of the process). These are the "golden decisions" purely subjective and belong to man. Decisions are considered essential if the stochastic specifications could quantify the errors as "scrap" relational.

Simple equations and the simultaneous are just "images" imperfect productive economic reality.

In practice, in principle, still be taken of any variation or qualitative differentiation potential of stocks of materials, employees, funding sources given that the technologies are high performance, and automation and cybernetics compensates scarcity.

We feel that account must be taken decisively final consumption sustainable unaffected by residual costs, based on econometric evaluations in measuring the overall safety of productive economic activities.

Safety productive economic systems are quantified and in relation to decisions being taken in view of comparisons between your final volume production units and consumables while resources.

In any case, some components of which auxiliaries bother recovery environment must be included in a strategic conservatism. Since the point of view of the consumer price tends to be replaced by quality, total quality management strategy is safe development success in the New Economy. However, the context described above motivates the idea of taking the concept of "total quality safety".

Those who are responsible for safety management systems and economic productive must now have the ability uncertainties mapping to translate information on the objectives and resources economy in a true "map" of risk covered issues of impact and probability.

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