

Incomplete crosscuts

“Because history is learned to be a process of crisis, the present as the sudden emergence of critical ramifications, the future as a bundle of unsolved problems – there is born an existentially intensified conscience of the danger represented by failed decisions and omitted interventions.”

Jürgen Habermas

The distinctive mark of modernity is building up on innovation, as a product of rationalization. Societies lagging behind under the rule of the ritual of nature have never stepped on the track of modernity. They were spent in the excitation of emotional thinking. Where the revolt against nature took place and the obsession of the independent invention of the means of subsistence emerged, even by coercing nature to yield them faster, in larger quantities and in diverse sorts, the other natural force gained legitimacy: the human nature. Modernization is a phenomenon intrinsic to human nature. It brought with it the autonomy of this nature.

Modernization emancipated human nature but brought with it the danger of destroying the mother-nature. This assumption makes the distinction between two incomplete views: the conflicting disjunction of the two natures and the fact that the rational and the emotional are complementary. The former is specific to mass industrialism while the latter to romantic ecology and post-capitalist sociology.

Both irreducible dichotomy and forced harmony are incomplete solution to the problem of development. In one line of thought – that of opposing the two natures – the idea of progress was insinuated and in the other – that of appeasing the universals – Utopia was reloaded; illusion has become the absolute link. In the former line of thought, scientific innovation will bring us good and in the latter redemption is the unused resource of our own wisdom.

The crosscuts of our advancement are in line with human expectations. Though reality has denied them anywhere save when they were declared to be miracles. The option for one path or another – both tempting – has made the rule. History as it is can be interpreted as a succession of options for a crosscut. In more depth, we can accept it as cutting and intersection without regard to markings or to the traffic lights. A decisive way to overcome the limitations by cutting straight through the Gordian knot stopping the advancement. Betting on rationalization was an attempt for a crosscut. The complications of ethics, fixed in myth, were eliminated and norms of referential liberty were instituted.

Secularization marked by the hypothesis that science is the true power has turned the limits to ether. Everything became possible and, furthermore, permitted. The leap ahead took place both in theory and in reality. Theory per se being a reality thought as, including in its intangible forms, a virtual reality.

As man got lost in the imagined universe and rationalization touched on emotion he resorted to a second, incomplete crosscut toward a wonderful world. Matching

human nature with its original placenta was intensified by the expressive force of the paradise lost. The universe is bound to accept back at its bosom man and all the evil done. The solution seems ultimate. The crosscut taken for the great return to nature calls on emotion. The counterweight to the project of emancipating rationalization is the project of the protection of nature. Man hides his rationality in the emotional thinking of the enveloping diversity. He re-introduces cohabitation in his set of conditional reflexes in order to avoid the experience of surviving.

In a way which points to the incompleteness of the options, man responds to the dangers of un-humanization-through-excessive-rationalization by mixing post modernity's roads to the unknown. Because traditionalizing the new has failed through the myths it had destroyed, meta-narration was added to the rational in the belief that a new synthesis would be created. In fact, a new incomplete crosscut emerges, beyond good and bad, looking for the good in the communion between human nature and the mother-nature and banning the evil resulted from their former belligerent positioning.

The way to modernity cannot be followed as a return to Eden. Its sense is given by living on the implacable axis of time: prior to the future, not prior to contemporaneity. Here and now, more and faster, better and more profound, larger and more diverse, more natural and more human, global and local are the ingredients which give sense to modernity.

What matters is the larger vision in which the acting fragments and the consistency through time with the values of modernity are particularized, inclusive of – or perhaps especially in the case of post-communist transition – the values which are against the habitat laziness and the attachment to emotion and to the rhythms of nature. Justifying feebleness is counterproductive and fixes us in boarders of the forever failed modernity. Beyond the olive tree does not mean cutting it down, as organic oil does not exclude the refining machine.

Modernity is the adding of the new on performance criteria which do not alter the texture of life. It's not the access into (the return to) nature or the destruction of (running away from the bosom) nature that are crosscuts toward the coming of age of the world. Defining concepts – until now opposed for reasons of demiurgic daring – as a functional whole would comprise the solution. This whole would be consistent through successive approximations of good and through regularizing the elimination of the self-generative evil. Ad infinitum!

Marin Dinu

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R.M. Solow Adjusted Model of Economic Growth

■

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Abstract. Besides the models of M. Keynes, R.F. Harrod, E. Domar, D. Romer, Ramsey-Cass-Koopmans etc., the R.M. Solow model is part of the category which characterizes the economic growth.

The paper proposes the study of the R.M. Solow adjusted model of economic growth, while the adjustment consisting in the model adaptation to the Romanian economic characteristics.

The article is the first one from a three paper series dedicated to the macroeconomic modelling theme, using the R.M. Solow model, such as: “Measurement of the economic growth and extensions of the R.M. Solow adjusted model” and “Evolution scenarios at the Romanian economy level using the R.M. Solow adjusted model”.

The analysis part of the model is based on the study of the equilibrium to the continuous case with some interpretations of the discreet one, by using the state diagram. The optimization problem at the economic level is also used; it is built up of a specified number of representative consumers and firms in order to reveal the interaction between these elements.

Key words: reprezentive consumer; reprezentive firm; macroeconomic model; macroeconomic equilibrium; state diagram; evolution scenarios.

■

1. The model hypothesis⁽¹⁾

An economy with householders and firms - each carrying out specific hypothesis - is considered.

Hypothesis at the householders' level:

- at the economy level there is a number of identical householders $G(t)$, at the t moment;
- for each householder, the consumers are assumed identical;
- the householders number is increasing with a r_1 rate, so $G(t) = G(0) \times e^{r_1 t}$ for the continuous case and $G(t) = G(0) \times (1 + r_1)^t$ for the discreet one.

Observation: It can be noticed that the growth rate of the householders is the same with the one of employers at the economy level.

- the householders' goal is to maximize the utility for an indefinite period of time;
- the householders utility function is:

$$U(c(t), t) = \int_0^{\infty} e^{-\alpha t} \times U(c(t)) \times \frac{L(t)}{G(t)} dt \quad (1)$$

where:

- $c(t)$ - the consumption of each householder member;
- $U(c(t))$ - the utility function for each family member, at t moment;
- $L(t)$ - the employees at the economy level, at t moment;

$\frac{L(t)}{G(t)}$ - the average number of members at the house-

holder level;

$U(c(t))\frac{L(t)}{G(t)}$ - the utility at the householder level, at t

moment;

α - adjustment rate: if α is increasing, the future consumption value is lower, considering the current one;

- each member of the household offers a labour unit at each time moment;
- householders rent to the firms their capital;

Hypothesis at the firms' level:

- at the economy level there is number of identical firms, $F(t)$, at the t moment;
- each firm production function has replaced factors and Harrod technical progress⁽²⁾ such as⁽³⁾:

$$\tilde{q}(t) = \tilde{q}(a(t) \times L(t), K(t)) = a(t)^{\gamma_1} \times L(t)^{\gamma_1} \times K(t)^{1-\gamma_1},$$

with $0 < \gamma_1 < 1$ (2)

where:

$\tilde{q}(t) = \frac{Q(t)}{F(t)}$ - production at the company level;

$Q(t)$ - synthesis indicator at macroeconomic, at t moment;

$K(t)$ - total capital at the economy level, at t moment;

$a(\cdot)$ - represents a function of technical progress and shows the integration on labour factor, with the increase rate;

- the goal of the firms is to maximize profit for an indefinite period of time⁽⁴⁾:

$$\pi(\cdot) = \int_0^{\infty} e^{-\alpha t} [p \times \tilde{q}(a(t) \times L(t), K(t)) - w(t) \times L(t) - r(t) \times K(t)] dt$$

(3)

where the capital price (marginal cost of the capital) at t moment is supposed equal with the real interest rate:

$$r(t) = f'(k(t))$$

and the labour price or the real wage at t moment is:

$$W(t) = a(t)[f(k(t)) - k(t) \times f'(k(t))]$$

where the real wage on labour unit will be:

$$w(t) = f(k(t)) - k(t) \times f'(k(t))$$

- the firms are owned by householders to whom the profit reverts;

Notations:

$K(0)$ - the initial capital (wealth) at the economy level;

$k(0) = \frac{K(0)}{G(0)}$ - the initial endowment (wealth) with capital of each householder;

Macroeconomic hypothesis:

- there is no depreciation at the capital level⁽⁵⁾;
- income is split, at each moment, between consumption and savings;
- the production function at macroeconomic level is neoclastic (linear homogenous), with two replaced production factors, the labour and the capital;

$$Q(t) = Q(a(t)L(t), K(t)) \quad (4)$$

Supplementary notations:

$C(t)$ - consumption at the economy level, at t moment;

$I(t)$ - investments at the economy level, at t moment;

$S(t)$ - savings at the macroeconomic level, at t moment;

$i(t) = \frac{I(t)}{L(t)}$ - investments volume per each employee;

$s(t) = \frac{S(t)}{L(t)}$ - savings volume per each employee;

$q(t) = \frac{Q(t)}{L(t)}$ - production at the representative employee

level from the economy;

$\tilde{i}(t)$ - the investment requisite per capita, corresponding to the natural increase of the population, in conditions of maintaining the actual level of the techniques.

2. The economic and mathematic model

Considering the laws of J.M. Keynes, from a threshold the persons touch a welfare level and if the income increases, the gap between this and the consumption is higher.

In conclusion, the savings growth rate, $\frac{\dot{S}(t)}{S(t)}$, is higher

than the income one, $\frac{\dot{Q}(t)}{Q(t)}$, as $\frac{\dot{S}(t)}{S(t)} > \frac{\dot{Q}(t)}{Q(t)}$

Considering the two possible cases for the income, the psychological law determines:

- if the income increases to $\frac{\dot{S}(t)}{S(t)} > \frac{\dot{Q}(t)}{Q(t)} > \frac{\dot{C}(t)}{C(t)}$;

- in the case of decreasing to $\frac{\dot{S}(t)}{S(t)} < \frac{\dot{Q}(t)}{Q(t)} < \frac{\dot{C}(t)}{C(t)}$.

Conclusion: For an important economic growth it is necessary to stimulate the investments into the country economy.

R.M. Solow starts, for building his model, from the general condition of the macroeconomic equilibrium: aggregate demand is equal to the aggregate offer: $D(t) = Q(t)$, and

$$D(t) = C(t) + I(t) \quad (5.1)$$

$$Q(t) = C(t) + S(t) \quad (5.2)$$

we have the relation:

$$I(t) = S(t), \text{ cu } \dot{K}(t) = I(t) = S(t) = sQ(t) \quad (6)$$

and supposing that: $\frac{\dot{L}(t)}{L(t)} = \frac{\dot{K}(t)}{K(t)} = r_1$ (7)

Dividing the relation (6) with L obtain:

$$\frac{I(t)}{L(t)} = s \times \frac{Q(t)}{L(t)} \quad (8)$$

or in average terms, the condition of the macroeconomic equilibrium is:

$$i(t) = s \times q(t) \quad (9)$$

or equivalent: $i(t) = s \times f(k(t))$

From equation (7) we have: $\dot{K}(t) = r_1 \times K(t) = I(t)$.

Although it is the relation $\tilde{i}(t) = r_1 \times k(t)$, and the equilibrium condition requires the solving of differential equation:

$$\dot{k}(t) = i(t) - \tilde{i}(t) = s \times f(k(t)) - r_1 \times k(t) \quad (10)$$

which has the solution noted with .

This is the fundamental equation of the R.M. Solow model, with it can be analysed the stability of the dynamic equilibrium, using the state diagram⁽⁶⁾.

If we introduce the depreciation rate of capital, ρ , the previous equation becomes:

$$\dot{k}(t) = i(t) - \tilde{i}(t) = s \times f(k(t)) - r_1 \times k(t) \quad (11)$$

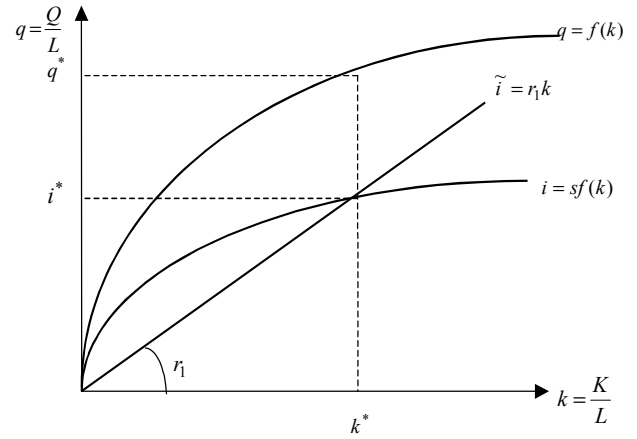


Figure 1

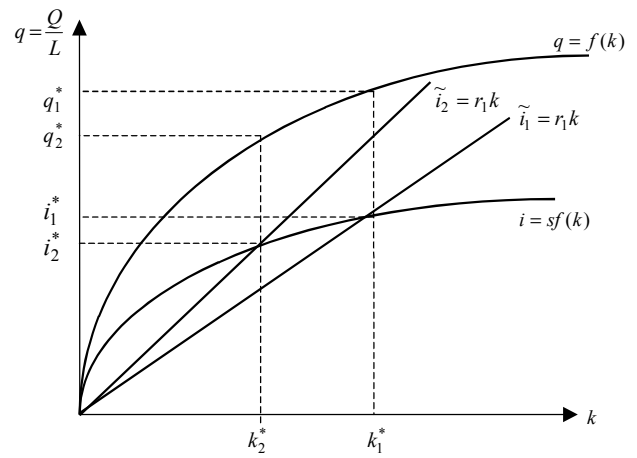


Figure 2

In figures 1 and 2 the equations (10) and (11) are represented.

Observations: 1. The saving rate change has a *level effect* and not one of increasing, doesn't altering the rate of growth of $\frac{Q}{L}$.

2. The altering of growth rate $\frac{Q}{L}$ will change the equilibrium trajectory of the output per capita;

3. The R.M. Solow adjusted model shows that the important differences between countries, considering the national income per capita, don't have as principal cause the accumulations.

Notes

- (1) R.M. Solow s-a ocupat de relaxarea ipotezei coeficienților constanți ai producției din modelul Harrod. În acest model, rapoartele capital-output și capital-muncă nu sunt fixate, ca în modelul Harrod-Domar.
- (2) a se vedea Stancu, S., *Microeconomie-comportamentul agenților economici. Teorie și aplicații*, Editura Economică, București, 2006, pp. 236-245.
- (3) $\tilde{q}(\cdot)$ este presupusă a fi o funcție de producție liniar omogenă, cu $\tilde{q}'(\cdot) > 0$ și $\tilde{q}''(\cdot) < 0$.
- (4) s-a presupus aceeași rată de actualizare ca și la gospodării.
- (5) această ipoteză poate fi relaxată, conducând la un model mai laborios.
- (6) a se vedea pentru aceasta Stancu S., *Modelarea matematică a fenomenelor și proceselor de conducere. Teorie și aplicații*, Editura Academiei de Studii Economice, București, 2007, pp. 151-156 și pp. 165-173.

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Multidisciplinary Optimization in Services Management

■

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Abstract. *Optimization methods may be applied to the services operations management. A comprehensive objective function (a cost-function to be minimized) leads to a multidisciplinary optimization, considering all aspects of a services business unit. However, this introduces a very large number of variables (examples with tens of thousands of variables are presented), making classical optimization methods inadequate. The paper introduces the use of genetic algorithms and illustrates it in two examples: air transport and leisure services. Multidisciplinary optimizations may play a crucial role in the success of any services business, and genetic algorithms are the most adequate computation resource in this type of optimizations.*

Key words: multidisciplinary optimization; services operating management; genetic algorithms; total costs and risks.

■

JEL Classification: C61, L81, L83, L93

Introduction

The multidisciplinary optimization represents a non-linear optimization model to minimize a comprehensive objective (cost) function, which comprises as many variables or criteria as possible, regarding the studied phenomenon, with respect to all relevant aspects from various disciplines, both technical and economical. In order to aggregate more simple cost functions into a multidisciplinary one, they must be measured in comparable units, like currency units. Constraints may be introduced as penalizing costs. Thus, the objective function will look like a hypersurface with steep

surrounding “walls” due to the constraints, and our aim is at finding the lowest elevation point of this hypersurface (minimum minimorum).

In figure 1 we have illustrated a bidimensional case, when only two variables are involved. The multidisciplinary optimization typically extends this to a high number of variables, but the problem formulation is the same: for which value of the vector $\vec{x}_0$ the hypersurface $F(\vec{x}_0) = \min$?

In the past decades, the multidisciplinary optimization was not very practical, for two reasons: the difficulties with

the classical gradient optimization methods when many variables are involved, and also the high demand of computing power, above the capacity of the current computers.

1. The total costs and risks objective function

One of the first cases of multidisciplinary optimization problem in our research was the optimization of a trajectory of a transport aircraft. From the beginning we came to the conclusion that the less costly trajectories are very risky. For instance, a Sibiu-Bucharest flight would climb just to overfly the Fagaras Mountains, just passing the peaks. This also applies to the economic problems, where the most profitable solutions are also the most risky (this is stated by the second principle of finance).

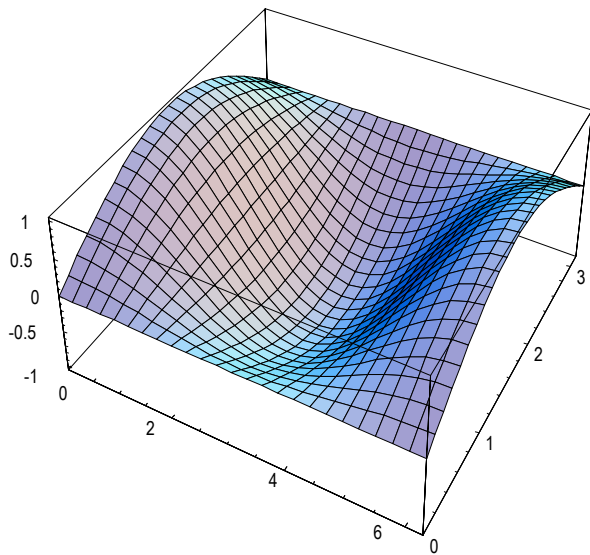


Figure 1. For which variables x_0, y_0 the surface $F(x_0, y_0) = \min$?

There are two ways to deal with this problem. The first one consists of constraints to the solution which enforce a bearable risk. For instance we could limit the trajectory to get no closer than 2,000 ft from the highest mountain obstacle in the area.

The second way is to include the risks in the objective function. To do this we will have to measure risks in the same units as costs, which is possible if we express a risk as the value of damage multiplied by the probability of the damage to occur. This is the way the financial theory expresses risks. Getting back to our example, based on the height above the peaks, the trajectories for the Sibiu-Bucharest flight would classify as follows: certain accident for negative heights (probability equals one), amounting to a damage of say 100 million Euro. A just above the edge trajectory would incur a risk of 100 million Euro multiplied

by a probability of 0.5. For positive heights, the higher the trajectory, the lower the probability. With the current accuracy of the air navigation systems, the probability would be close to nil for a height of 2,000 ft (600 m) above the peaks.

The inclusion of the risks in the objective function is the method we have successfully applied in more case studies. The direct constraints method is less natural and lacks stability in some cases (small variations in constraints lead to significant variations in solution). Also, the constraints break the overall derivability of the objective function, which troubles all derivative-based methods.

The objective function which includes all known costs and risks was named *TCR* (*Total Costs and Risks*). Figure 2 illustrates the principle of a multidisciplinary optimization of a land transport route.

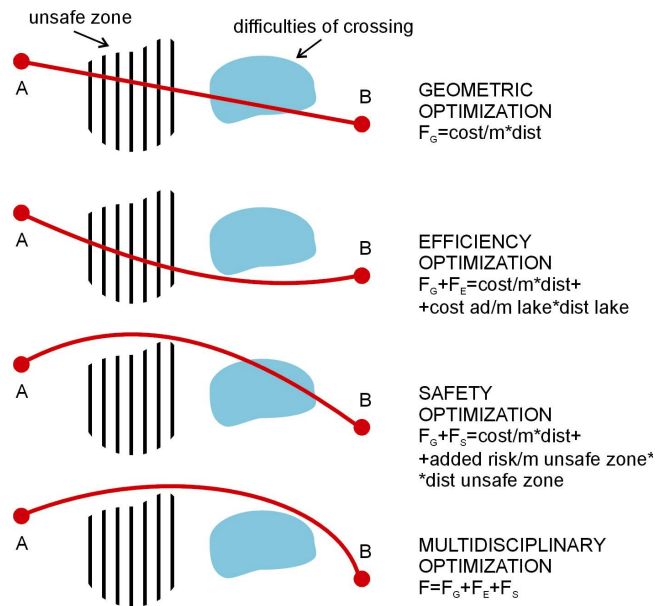


Figure 2. Multidisciplinary optimization of a transport route using *TCR*

The multidisciplinary optimization of a subsystem k will pursue the minimization of the following function:

$$TCR_k = \sum_i C_{i,k} + \sum_j p_j \times R_{j,k} = \min \quad (1)$$

Where:

TCR_k represents the value of the total costs and risks function for the subsystem k ;

$C_{i,k}$ are the costs generated by the subsystem k in the solution;

$R_{j,k}$ are the damages estimated for the subsystem k ;

p_j are the probabilities of the damages to occur, as a function of the solution.

The most interesting feature of the TCR function is its additivity, which facilitates its applications to complex systems. Thus, for a system made up by N subsystems, the multidisciplinary optimization will be the result of the minimization of the following aggregate objective function:

$$TCR = \sum_{k=1}^N TCR_k = \sum_{k=1}^N \left(\sum_i C_{i,k} + \sum_j p_j \times R_{j,k} \right) = \min \quad (2)$$

We have successfully applied this formalization in several problems, two of which are illustrated in this paper: the multidisciplinary optimization in the air transport management, where an aircraft is considered as a subsystem of the air traffic management system, and the operations management in leisure business, where a service area represents a subsystem of a “leisure mall” system.

2. Choosing genetic algorithms as an optimization method

The numerical optimization methods research is 60 years old. Today, many optimization methods are in use. We will present a classification framework and we will reveal the method of our choice for (non-linear) multidisciplinary optimization problems.

The first classification is based on the global minimum search strategy:

- complete or exhaustive search methods [C];
- stochastic search methods [S].

The former are remarkable resource consuming. The computation effort increases with the factorial of the number of variables, making them inapplicable for multidisciplinary problems, which may reach to tens of thousands of variables. The later methods are economical, but they suffer from convergence problems and with finding an arbitrary stop criterium. The stochastic methods do not guarantee finding an *optimum*, but a *quasi-optimum*, which is still very useful in practice.

On the highest degree of the derivatives of the objective function which have to be calculated in the optimization process, the classification brings three types:

- methods without derivatives [0];
- methods with first order derivatives [1];
- methods with second order derivatives [2].

The best known methods for non-linear optimization are the *gradient methods*, which use partial derivatives of the objective function with respect of each variable (Berbente at al. 2000):

$$\nabla F(x) = \left(\frac{\partial F(x)}{\partial x_1}, \frac{\partial F(x)}{\partial x_2}, \dots, \frac{\partial F(x)}{\partial x_N} \right) \quad (3)$$

The best known *gradient* methods are:

- Steepest Descent SD/Gradient Method = Gradient Search [C1];
- Conjugate Gradient Method (CG) [C1];
- Non-linear Conjugate Gradient Method [C1];
- Advanced Nonlinear Gradient Methods = Stochastic Gradient Descent [S1];
- Quasi-Newton Methods [C2];
- Davidon-Fletcher-Powell (DFP) Method;
- Broyden-Fletcher-Goldfarb-Shanno (BFGS) Method;
- Levenberg-Marquardt (LM) Method [C2].

There are also a few *non-gradient* methods, which do not require the partial derivatives of the objective function:

- Multi-Dimensional Search [C0];
- Random Search (Monte Carlo) [S0];
- Genetic Algorithms = Evolutionary Search/Strategy [S0].

As we have already mentioned, the gradient and the exhaustive search methods are not applicable to multidisciplinary optimizations with many dimensions or variables. The [S0] type methods remain the only applicable in such circumstances, of which the *genetic algorithms* proved to offer the best results as revealed after a couple of years of research.

The genetic algorithms, known also under the acronym *EMO* (*Evolutionary Multi-Criterion Optimizations*), are inspired by the methods used by the species of animals and plants to adapt to the environment, discovered and published *Charles Darwin* (Darwin 1859 and 1871). These represent the optimization of each species as an adaptation process in order to survive. The human genome contains some 40,000 relevant genes, thus the human species optimization problem has the same number of independent variables or degrees of freedom. Exhaustive optimization would lead to an overwhelming computational effort, to the order of $40,000! = 2.09 \times 10^{166713}$. Therefore, stochastic optimization remains the sole applicable to the living world.

In 1975, John Henry Holland of the University of Michigan extended the applications of genetic algorithms to artificial systems (Holland, 1975), opening the way to large dimensional multidisciplinary optimizations.

The genetic algorithms are iterative procedures operating on a “population” of “individuals”, each “individual” being represented by a finite string of symbols also known as a genome, coding a possible solution in the given space of a problem. This search space consists of all possible solutions to the given problem. This is recommended when the search space is too large to allow an exhaustive search (like the gradient methods).

Selection itself does not open new routes in the search space, and we resort to genetics for specific operators:

crossover and *mutation*. Unlike other search methods, which operate a single solution at a time, genetic algorithms operate with an entire population of solutions at any given moment.

To implement a genetic algorithm, we need to find a representation of the solution: this is known as a *chromosome*. Through crossovers and mutations, new individual solutions are created out of the existing ones. There are some methods to select candidates for breeding, all relying on an objective function measuring the *fitness* of each individual, or how close is the individual to the desired characteristics. A good choice of chromosome representation and objective function guarantee the success of the genetic algorithm no matter which version of selection method we choose, but certain variations in convergence speed could make the difference.

The two chromosome operators “borrowed” from nature are illustrated in Figure 3.

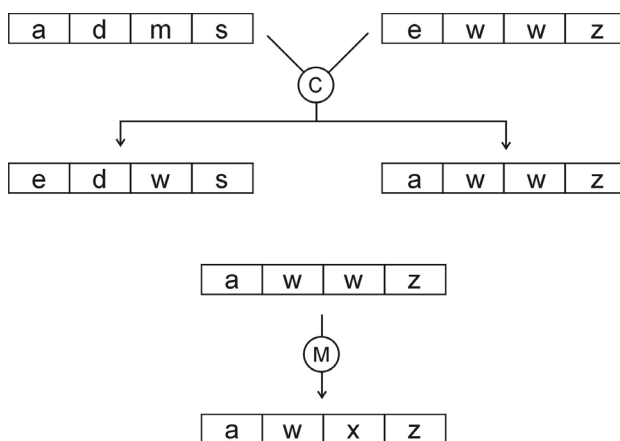


Figure 3. The chromosome operators: *crossover and mutation*

The *crossover operator* generates two or more “children” chromosomes as combinations of two “parent” chromosomes. The main purpose of the crossover is to ensure that future generations include the good genetic heritage of the current one. The probability to inherit from one of the parents is known as the *crossover rate*. This mechanism is widely used in nature, moving the whole process to more promising areas of the search space with every new generation.

The *mutation operator* introduces a random evolution in the population, and this is essential to keep the optimization process safe from the local minima traps, allowing it to progress towards the *minimum minimorum*. The generation may stay segregated (*direct inheritance*) or may merge (*generation overlap*).

To get results, the objective function needs to be converted into a fitness function, which, besides

minimization, ensures the genome diversity. The process is known as *scaling*, and it may be done in various ways:

- *Linear* - is a simple rescaling of the objective function;
- *Sigma* - those individuals who fall outside the standard distribution are eliminated;
- *Sharing* - introduces a notion of chromosome distance, and an individual is penalized proportionally with the number of similar individuals.

Based on the nature of the hypersurface of the objective function, a combination of the following *elimination methods* is usually employed:

- Replacing the individuals with the lowest fitness index (least adapted);
- Replacing the most similar or closely related individuals;
- The “revolution” - keeping just the least similar individuals.

These methods may be changed during the process, as the generation index moves forward. Usually we are after a high variety of the genome at the beginning of the optimization process, whereas further on we need to accelerate convergence speed.

The drawbacks of the genetic algorithms are the following:

- There is no theoretical demonstration of their convergence;
- Their convergence is not granted;
- There is no intrinsic stop criterium, the computation may continue to infinity (in other words they are quasi-optimum methods);
- They are big memory consumers (entire populations need to be stored at each generation);
- Computing time consumption is also an issue;
- In case of insufficient genetic diversity (which could exist from the start, or even occur spontaneously, at least in theory) the genetic algorithm may fail (diverging or entering an infinite cycle).

These drawbacks are outnumbered by the advantages important to a number of applications:

- There is a statistic proof of their convergence in many types of problems (including all examples from the biology);
- They are adequate for *N*-dimensional problems where *N* is big;
- They are also adequate for problems with a variable *N*;
- They function even if the objective function depends on qualitative variables, provided there is a quantitative representation of those (this facility is particularly useful in business applications);
- They function with Boolean variables (discreet optimization) and with any mixture of variables;

- They do not fall in the “saddle” trap;
- They can handle singularity points or areas in the hypersurface;
- They escape easily from the local minima traps, being suitable for rough or hilly hypersurfaces;
- Genetic algorithms are the fastest convergent non-gradient method (definitely faster than Monte-Carlo and Multi-Dimensional Search).

3. Air transport services management case study

The movement of an aircraft with minimum costs and risks is the key issue in the air transport services management, but the optimization process is difficult due to a virtually infinite number of possible 4D trajectories from an origin to a destination airport. The trajectories are four-dimensional (latitude, longitude, flight level/altitude and time). The candidate trajectories should be put in relationship with the current weather (in particular with the wind, which carries the aircraft along, its speed being either added or subtracted from the speed of the aircraft; likewise the turbulence areas should be avoided vertically or horizontally) and with the obstacles on the ground (mountains, high buildings etc. which should be overflowed or avoided horizontally with a margin) (Pleter, 2006).

In the TCR objective function we have included the following costs:

- the cost of fuel burned F , which depends on the time of flight and the instant fuel flow, which in turn depends on the configuration of thrust control, flaps, slats, spoilers and other aerodynamic devices;
- navigation costs N (airspace utilization charges, penalties for occupying two flight levels instead of one and penalties for sonic pollution); these depend on the country overflowed, on the distance flown in that airspace and also on the maximum take-off weight of the aircraft;
- maintenance costs M , which depend on the time of flight, the intensity of turbulence encountered, and also steep climbs and descents add to the stress of the airframe;
- operational or commercial costs D , which occur only if the arrival of a flight is delayed beyond a 10 minutes margin.

These costs depend all on the chosen trajectory solution. Other costs (labor, airport charges etc.) were not included in the objective function since they are invariant with the navigation and do not play a role in the optimization.

The following risks were also included in the cost function:

- the weather risks W (go round the storm or cross the storm trade-off, depending on the turbulence the aircraft is exposed to);
- the separation risk S (keep aircraft prudently separated or allow low separation margins for increased traffic capacity trade-off);
- obstacle and CFIT⁽¹⁾ G risks (steep climbs and descents to avoid flying in dense atmosphere or economy climb and descent, with a long early-stabilized approach trade-off).

The most economical and least risky 4D trajectory of a single aircraft considered as a subsystem independent of the surrounding traffic is calculated using the following objective function:

$$\begin{aligned} TCR_k &= \\ &= \sum_k (F_k + N_k + M_k + D_k + p_W \times W_k + p_S \times S_k + p_G \times G_k) = \\ &= \min \end{aligned} \quad (4)$$

Using a simplified dynamic model of a transport aircraft with 19 equations, integrated by Runge-Kutta of 4th order with a step of 0.1 seconds, we could evaluate TCR_k for each trajectory solution from the example presented in figures 5-8. The *genome* or the *chromosome structure* used here was represented in figure 4. For the aircraft k the following variables were considered: the 2D or horizontal *route* made of N straight segments (legs) expressed as (LAT j , LONG j), $j = 0, N$, the flight profile expressed as H j , the estimated time over each waypoint j (ETO j), as well as the desired indicated airspeed TRG IAS j . The number of waypoints N in real cases may get to the order of one hundred, thus the number of relevant genes in the optimization solution may reach the order of 500. In the next example we used $N=10$ though.

The case is a flight from Edinburgh to Bucharest with a Boeing 737-600 NG HGW with weather conditions as per 10th of April 2006, starting with the geometric optimal chromosome: the orthodrome, the shortest route on a sphere. On this trajectory, the total time of flight was 03:02:04 and the value of the total costs and risks $TCR_k = 5.628$ Euro. After 335 generations and after evaluating 6.700 chromosomes, we got a quasi-optimum chromosome with the time of flight of just 02:32:50 and the $TCR_k = 4.516$ Euro. These important savings came from using the strong westerly winds over East Germany and Czech Republic (figure 5) and a special flight profile (figure 6).

Computation was distributed over a network of 4 PCs and took 36 hours. The genetic algorithm used a scheme of *semi-superimposed generations*, *tournament selection* and *simulated annealing*, to ensure an adequate compromise between genetic diversity and convergence speed. The convergence is illustrated in figure 7.

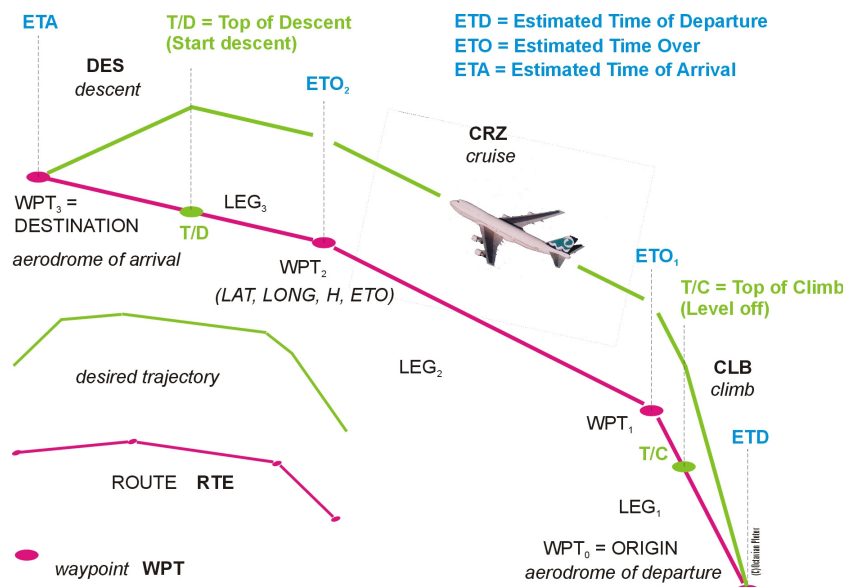


Figure 4. The genome or the chromosome structure of the 4D trajectory optimization

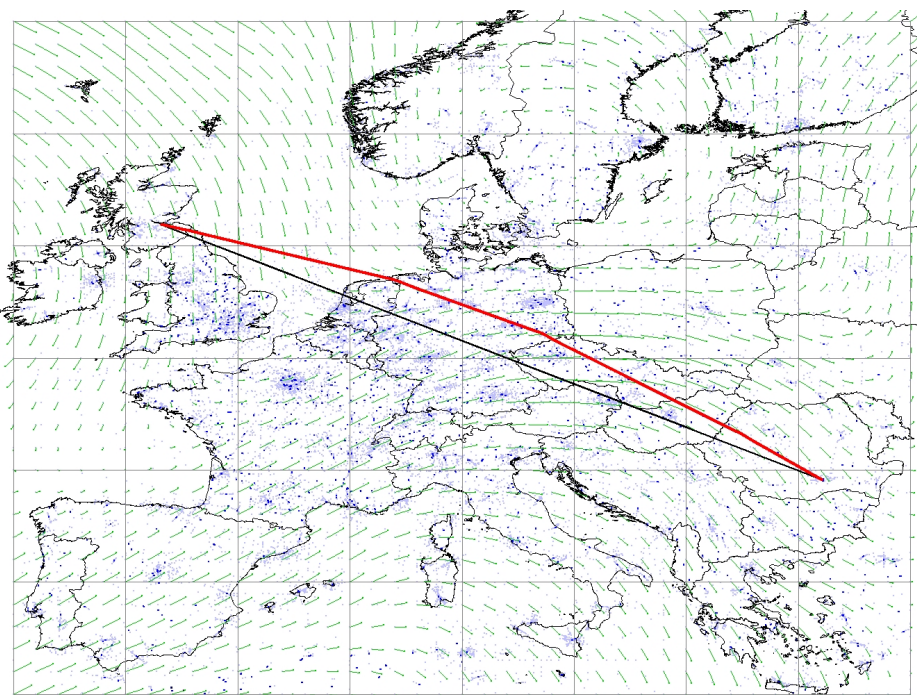


Figure 5. Edinburgh-Bucharest flight optimization with a Boeing 737-600 NG HGW

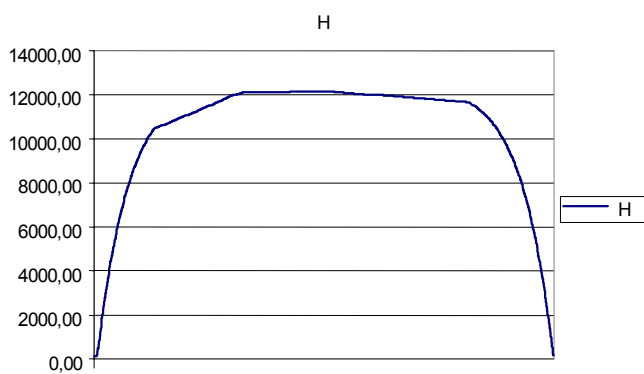


Figure 6. Very economic flight profile (H in meters above the sea level)

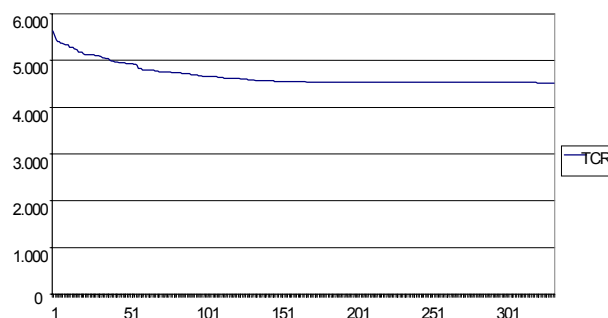


Figure 7. Optimization progress as a function of the generation index

4. Leisure mall service management case study

We tried to address the problem to optimize a space aimed at leisure and commerce services for a relatively high number of visitors (between 3,000 and 20,000 simultaneous visitors) who arrive by car (a parking place for each 1.6 visitors is needed). The optimization variables are the shape of construction, the shape and location of the parking lots, the number of levels, the shape and the size of the shops and service outlets (Downs et al., 2005, Pleter, 2005).

The *TCR* objective function in this case aimed at optimizing the following costs:

- the penalizing cost for the duration of walking from the car to the points of interest and return; the distance walked in the open was additionally penalized due to the risk of rain, blizzard, heat or frost;
- the opportunity cost with the unrealized commercial goodwill (this depends on the intensity of visitor traffic, being maximum on the corner shops; likewise, it depends on the distance in meters and in levels from the entrance; also, it depends on the size of the opening to the gallery hall, intensity of light, and the area of traffic from where the outlet is visible);
- the energy cost to ensure illumination, heating, cooling and ventilation of the volume (depends on the area of outer walls, the glass walls adding to the thermal transfer and the use of the natural light; the orientation of the building with respect to the North is also influential for the insolation);
- a penalty cost of walking to the toilet from any point;
- a conventional cost regarding the car access to the outlet through the existing roads and boulevards, which influences the outlet location.

Also the following risks were considered in the *TCR* function:

- the risk from the rapid evacuation, including the case of blocking any of the entrances;
- the spontaneous crowding risk of any passing corridors;
- the risk of equipment failure (HVAC central, artificial light).

This research is developing and we may only provide some provisional interesting conclusions:

- the optimum shape for a leisure mall is cylindrical, with four median atriums (figure 8) ground level + 2 floors;
- 4 main entrances at the ground level and 4 entrances from the roof;

- surrounding parking on ground and also parking on the roof;
- location with access to at least three boulevards with minimum two lanes each way, out of which two boulevards linking the outlet to high demographic concentration areas;
- automated HVAC systems with increased reliability.

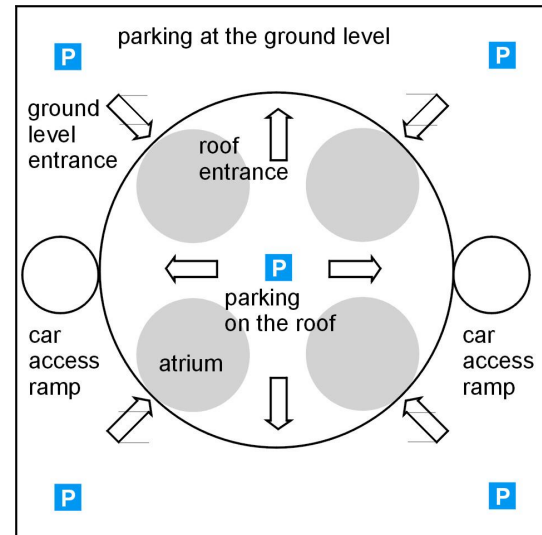


Figure 8. The shape of a leisure mall optimized using genetic algorithms

Conclusions

The non-linear multidisciplinary optimization using genetic algorithms is rich in applications in management, showing a high degree of accuracy in representing the details of the economic phenomenon under all or most aspects.

The use of the total costs and risks function (*TCR*) is an instrumental alternative to the use of more or less arbitrary constraints in the optimization process. The function is expressed directly in currency units (for instance Euro), ensuring additivity and allowing aggregation in the optimization of complex, multi-hierarchy systems.

The genetic algorithms are the only usable method in many practical situations, due to the large number of variables and to the inadequacy of the linear models. The computing time may be reduced by distributed computing in a LAN, using the distributed processing feature of the genetic algorithms.

The results in this line of research in the latest years have been encouraging, and for this reason we expect to use the method further in business applications, and also to publish more case studies for the benefit of the international scientific community.

Note

- ⁽¹⁾ *Controlled Flight Into Terrain* - impactul unei aeronave controlabile cu solul

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IAS 41 Agriculture: Fair Value Accounting

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Abstract. Issuing this standard that had to be applied for the first time for the financial statements started after 1.01.2003 meant a change of direction from two points of view: on one hand, through IAS 41 was issued for the first time an extensive standard typical for this sector and, on the other hand, for the first time were included in the income statement, independently from the sales transactions, incomes from variations of the fair value of an asset. Because of this last aspect, IAS 41 can be considered an important standard, because it represents the starting point of a consistent transition from the purchase cost principle towards a fair value accounting. IASB has dedicated to the thematic field of agriculture a specific standard, because this economic branch has a great importance for the developing countries. On the other hand, IAS 41 is also applied for the agricultural activities of the enterprises from other sectors.

Key words: agricultural activity; fair value; biological asset; biological transformation; initial recognition.

■

I. Application Field

The main reason for evaluating the agricultural activity at the point of the harvest (the current moment) results from the fact that, in this way, the transformation process is immediately represented in the financial statements and then the investor has the possibility of estimating the future economic benefit. The evaluation based on historical costs wouldn't reflect this process, because in the agriculture and in the forest economy, the production incomes appear much later. The evaluation at the acquisition cost or at the production cost doesn't reflect in a sufficient manner the increase in value over the years and at the same time, it reflects insufficiently the development phase in achieving benefit. While the biological transformation is recognized and evaluated at fair value less estimated point-of-sales costs, the annual financial statements deliver information concerning the variations of the fair value during all periods between planting and harvest.

Through IAS 41, IASB directs the accounting towards the concept of *asset/liability approach*. The following paragraphs show how ought to be realized the evaluation of all the assets submitted to IAS 41. For this purpose it will especially be dealt with the problematic of value calculation and with this standard's provisions that concern registering.

IAS 41 represents a set of rules for the registration and measurement of the biological assets and of the agricultural produce. This standard typical for the agricultural activities does not apply to the following elements:

- plots connected with the agricultural activity;
- intangible assets connected with the agricultural activity;
- government grants for biological assets that, as an exception, cannot be evaluated at fair value;
- term transactions with goods, connected with the agricultural activity;

- insurance contracts connected with the agricultural activity, such as the insurance against hail.

The objective of IAS 41 is to regulate the accounting treatment, the representation in the financial statements and the disclosures for the agricultural activities. According to IAS 41.5, the agricultural activity is defined as the management by an entity of the biological transformation of biological assets for sale, into agricultural produce, or into additional biological assets.

The biological transformation of a biological asset comprises the process of growth, genetic transformation, production, and procreation, both from a qualitative perspective and from a quantitative point of view. While the biological assets represent living animals or plants, the agricultural produce represents the harvested product of these assets, such as milk, wool, meat, fruits or cereals. IAS 41 applies to the harvested products, obtained during the agricultural activity from the biological assets, only at the point of harvest. For the following measurement, IAS 41.13 prescribes the application of IAS 2.

IAS 41.4 gives examples of biological assets, agricultural produce and products that are the result of the processing after harvest (see table 1).

The agricultural activity includes a large spectrum of activities, such as animal breeding, forest economy, fruit growing, plantations, flower growing, as well as pisciculture. Despite this variety, all agricultural activities have common characteristics (according to IAS 41.6 (a)-(c)) that should be interpreted as application criteria:

- *the ability of modification*: living animals and plants can be biologically transformed;
- *administration of the modification*: facilitating the transformation process by improving or stabilizing the conditions necessary for the process.

This criterion requires that harvesting from unprocessed resources, such as fish from the sea, doesn't represent an agricultural activity as defined by IAS 41, because is not being carried out an administration of the transformation process. In case of a processing process, a mechanical transformation or a chemical transformation takes place. IAS 41.7 emphasizes this idea, according to which the biological transformation leads to the following results:

- modifications of the asset through
 - growth by increasing the quantity or improving the quality;
 - degeneration by decreasing quantity or deteriorating the quality;
 - reproduction by creating additional living animals and plants;
- obtaining agricultural products such as latex, tea, wool or milk.

■ *measuring the modification degree*: the modification of the quality (such as the ripening extent, the content of fat or the resistance degree of the fibers), as well as the modification of the quantity (such as weight or length of the fibers) are measured and monitored as a routine function of the administration.

Examples of agricultural and forest products (IAS 41.4)

Table 1

Biological assets	Agricultural produce	Products resulted through processing after the harvest
Sheep	Wool	Threads, carpets
Trees from a plantation	Logs	Timber
Plants	Cotton	Threads, clothes
	Sugar cane	Sugar
Milk cows	Milk	Cheese
Shrubs	Leaves	Tea, tobacco
Grape vine	Grapes	Wine
Fruit trees	Reaped fruits	Processed fruits

The aspects presented so far show that the classification of the biological assets depending on their life duration is insignificant. With respect to the biological assets, one distinguishes rather between consumable and bearer biological assets. If, according to IAS 41.44, the first group includes the assets that will be harvested as agricultural produce or sold as biological assets, such as the animals meant for meat production and sale, the fish from farms or the cereals such as maize and wheat, the bearer biological assets generate on a regular basis during their life time agricultural produce or other biological assets. For instance, IAS 41.44 mentions animals destined to milk production, grape vine or fruit trees.

Similar to the classification of the assets in long term assets and short term assets, IASB recommends (IAS 41.45) the biological assets to be classified either as mature or immature assets. The mature biological assets are the ones that achieved harvest characteristics and therefore are consumable biological assets. This category also comprises the biological assets that can be periodically harvested (in case of the bearer biological assets).

IAS 41.2 states that neither the plots, nor the intangible assets (such as the production quotas) associated to the agricultural activity are included in the applicability area of IAS 41. On the contrary, according to IAS 16, IAS 40, and IAS 38, for these assets the general provisions will be observed. Since the general possibility from IAS 20 to decrease the government grants to the accounting value of the assets contradicts the fair value accounting, IAS 41.34 offers special provisions for the accounting treatment of the government grants, if the biological assets or the agricultural produce are measured at the fair value less the estimated point-of-sales costs.

II. Recognition and Measurement of the Biological Assets and Agricultural Production

1. Recognition

IAS 41.10 defines special criteria for the recognition of the biological assets and of the agricultural production, criteria that reflects the main conception of the framework concerning the recording as asset. According to this conception, these positions ought to be recognized in assets if and only if:

- the asset is controlled by the enterprise as a result of past events;
- it is probable that future economic benefits associated to the asset will flow into the enterprise and
- the fair value or the acquisition/production cost can be measured reliably.

While according to IAS 41.11, the future benefit is usually calculated by measuring the significant physical attributes, the control can be pointed out by the fact they are legally held (for instance, in the case of a cattle, by their marking when the calf is born or bought).

2. Measurement

(a) General Measurement Provisions

According to IAS 41.12, the measurement of the biological assets at their initial recognition and at each balance date will be made at fair value less estimated point-of-sales costs. Therefore, the distinction between the initial measurement and the subsequent measurement is superfluous. As a result, the depreciation and the impairment of the assets mentioned by IAS 41 are not necessary.

If as an exception, the fair value cannot be calculated reliably, the initial measurement is made at the present purchase or production costs. Unlike other standards such as IAS 16 or 40, the recognition at the present purchase or production costs is not an alternative measurement method, but rather a “credibility exception”. The reason is that IAS 41.30 states the presumption that, in principle, the fair value of a biological asset can be determined reliably and that this hypothesis can be contradicted only at the initial recognition of a biological asset. This is possible only when there aren’t prices or market values and when the alternative measurements of the fair value of that biological asset are not evidently reliable.

Example: A forester has just started to plant trees in Oltenia, too. Because of the lack of experiences, namely the lack of comparison data in this field, the fundamentals for a reliable measurement of the wood growth in this region are missing. Because of this, the method consisting in determining every year the fair value less estimated point-of-sales costs is no longer used.

If the biological assets are recorded at the acquisition or production cost, then it ought to be considered special information in the notes, besides the accumulated depreciation and the impairment losses. Moreover, the reporting entity must verify during the transformation process if the fair value cannot be calculated reliably in that period and in this way to pass from the cost model to the fair value measurement; according to IAS 41.56, these modifications have to be motivated and their effects need to be published. IASB presumes that the fair value can be determined more and more reliably, depending on the progress of the biological transformation process.

According to IAS 41.13, the agricultural produce obtained as harvest from the biological assets of the enterprise are to be recognized at the point of harvest at the fair value less point-of-sale costs. These values simulate acquisition or production costs as IAS 2 defines them. In IAS 41.32, IASB considers that at the point of the harvest of the agricultural products, their fair value can be reliably determined. The products resulted through processing after the harvest, such as processing the grapes into wine, is not measured according to IAS 41 any more, but, according to IAS 2, as general recognition provision for inventories. At this point, the production costs of the agricultural produce are determined by the fair value less the estimated point-of-sale costs at the point of harvest. A transition from the fair value accounting to the cost model takes place.

(b) Special Measurement Provisions for Calculating the Fair Value

Similar to other standards, the fair value is defined in IAS 41.8 as the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm’s length transaction. IAS 41.9 prescribes that the fair value has to be based on the current location and state and, therefore, at the measurement date it has to reflect the present state of information. As a result, for a cow we have the market price less transport costs and other costs incurred by bringing the cow on the market.

Unlike the majority of the other standards, IAS 41 contains detailed regulations about determining the fair value. From the fair value of the biological asset or of the agricultural product will be deducted the estimated point-of-sale costs at the point of harvest. In IAS 41.14 are mentioned as examples the commissions of the brokers and dealers, the taxes imposed by the regulation organs and the goods stock exchanges, as well as the transfer and custom taxes. The transport costs and other costs for marketing the product do not belong to the estimated point-of-sale costs and are to be taken into consideration directly when determining the fair value. If as an exception, the estimated point-of-sales costs are higher than the fair value and there is no binding sale contract, then recognition at the amount zero is necessary.

In order to simplify things, the fair value can also be calculated on groups. In this case, the grouping has to be made depending on the significant attributes of the biological assets and of other agricultural produce, such as: age, consumable character, reproduction capacity or quality. As characteristic for the classification has to be chosen the attribute that essentially determines the market price.

Example: For measurement purposes, a wood producer divides his tree plantations depending on their growth and, more precisely, depending on the volume per tree. The division of the afforested area is made depending on the exactly determined growth classes so that the value of the trees is calculated in correspondence with the grouping.

Dividing the biological assets can also be carried out from a regional point of view. This is the choice especially when the biological assets have different characteristics in different regions or when the cost structure is different.

Example: A wood producer with activity worldwide divides his tree plantations in the regions Brazil and Central America, because there are strong differences between the different regions concerning the thickness of the trunk and this characteristic has a decisive influence upon the fair value.

Often, the enterprise closes contracts concerning the subsequent sale of biological assets and agricultural produce. In IAS 41.16 is explicitly stated that the contract's price is relevant for determining the fair value only when it properly reflects the current market situation. If the price of the contract is lower than the fair value less estimate point-of-sale costs, then there is the risk of a loss from an unrealized transaction. IAS 37 will be used for these onerous contracts.

If there is an active market for a biological asset or an agricultural product, then the price quoted on this market is the proper basis for determining the fair value. An active market is defined by IAS 41.8 as a market with the following characteristics:

- The products traded on the market are homogenous;
- The existence of interested buyers and sellers;
- The prices are available to the public.

If the entity can retail its products on different markets, then it has to be taken into consideration the price of the most relevant markets. So as basis for the measurement of the fair value shouldn't be taken into consideration the highest realizable market price, but the fair value of the market on which that entity usually makes its transactions. Since according to IAS 41.12, when determining the value will be taken into account the current condition and localization of the measured asset, then the relevant market price is the amount that best represents the biological asset in the current stage of the biological transformation.

While for many goods the active market is just a theoretical construct, this kind of markets exists for a variety of biological assets and agricultural products. Many agricultural products are traded on institutionalized markets or at goods stock exchanges that are homogenous from the point of view of the attributes of the products. In case of the individual agricultural goods, such as many categories of cereals, we usually deal with the so-called commodity goods, for which no differentiation of the product is possible.

If no active market exists (it's usually the case of the biological assets with a long transformation process), the fair value is determined through comparable market prices. According to IAS 41.18, the determination of the fair value ought to be based on the following points, without any hierarchy being prescribed:

- the most recent market prices of some similar assets, providing that since then no relevant modification of the economic circumstances took place;
- the market prices for similar assets, the difference being treated through adjustments;
- branch standards, where the value is determined through recalculated production measures, such as the value of the cattle expressed as kilograms of meat.

Considering the presented information sources can lead to different conclusions in determining the fair value. According to IAS 41.19, by taking into account the reasons of these differences, the entity will then determine the most reliable estimation from a relatively small interval of reliable estimations.

If the assets to be measured are not available for any active market and there are no comparable prices, then, according to IAS 41.20, the fair value less the estimated point-of-sale costs is determined by the discounted value of the cash flows. This way of finding the value is necessary especially for the assets that need a long transformation process, such as timber. The net cash flows are discounted at a current market-determined pre-tax rate, so that no taxes are taken into consideration. IAS 41.22 forbids including the payments for financing the asset or for producing biological assets after the harvest, such as the costs for replanting the trees of a plantation after the harvest.

The uncertainties and the risks when calculating the discounted cash flows can be considered when determining the fair value either through the discount rate (traditional approach) or in the estimated cash flows (the estimated cash flow approach). A combination of the two methods is also possible, but the double calculus should be avoided. Moreover, when determining the fair value are not included the increases in value due to additional biological transformations and future activities of the enterprise that

are associated to the growth of the future biological transformation, harvests and sales.

In exceptional cases, the fair value can be approximated through the acquisition or production costs. According to IAS 41.24, this happens especially in the following two situations:

- little biological transformation took place since the initial costs, for instance, in case of the fruit trees planted right after the closing date;
- the price is barely influenced by the biological transformation process, for instance for the initial growth in a pine plantation that has a production cycle of 30 years.

If the measurement takes place according to the principle of the historical costs, then the guiding values for different groups of biological assets published by the authorized organisms can be taken into consideration as guiding measures.

IAS 41 doesn't contain detailed information for the measurement of the acquisition and production costs, because of the objective of fair value measurement, but, despite this, IAS 41.33 points out the correspondent regulations from IAS 2. This has as consequence, especially for determining the production costs of the regenerating assets, that all the costs that can be directly attributed to the production process and the ones that can be indirectly attributed will be included. Therefore, when determining the value one must take into account any administrative costs associated with the production, as well as the costs of the social sector.

A characteristic feature of the measurement of the biological assets appears each time they are physical connected to land, such as the trees from a plantation. Many times, in these cases there isn't an isolated active market for such biological assets, but only for combined assets. But the enterprise can use this value as starting point for determining the fair value of such biological assets by deducting, for instance, from the fair value of the combined assets, the fair value of the land where the trees are. This method consisting in calculating a difference is often used in wine-growing.

Example: At the beginning of January, an enterprise buys a vineyard at the price 12 million Euro. 8 millions Euro of this amount correspond to the land and 1 million Euro corresponds to the land amelioration. Therefore, the grape vine has a value of 3 million Euro. The fair value of the grape vine has to be determined at the end of January.

At the closing date, an expert determines the fair value for the cultivated land as being 12.8 million Euro on the whole. The not cultivated land is measured at 8.2 million Euro and the land ameliorations are recognized at an amount of 1.1 million Euro. As a result, the fair value of the grape vine equals 3.5 million Euro.

Determining the value with the „difference method” raises problems in the cases when the value of the land without biological assets is higher than the combined value, as it is usually the case of the arable ground that will be soon used. Because the negative difference that would result doesn't reflect the economic reality, the value of the biological asset associated to the land should be determined by using another measurement method. In this case it is not allowed to apply the simplification through the „method of the difference”.

Since September 2003, IFRIC is mainly preoccupied with the problems of determining the fair value by means of calculating the discounted value. An important issue consists in the requirement from IAS 41.20, that prescribes discounting the cash flows with a „market-determined rate before discounting “, although IAS 41.21 doesn't allows that when determining the current value are taken into account the increases in value resulted from additional biological transformations. In the future, this discrepancy will be eliminated by having in view that the foreseen increase is taken into account when determining the value. On the other hand, it is clearly explained the fact that the value at the point of harvest is not equivalent with the value at the point of measurement. Moreover, in May 2004, IFRIC pointed out the fact that it is not allowed that when determining the fair value the costs of restarting the cultivation are taken into consideration, too.

(c) Recording the result

According to IAS 41.26, the modifications of the fair value less the estimated point-of-sale costs, as well as the initial recognition of biological assets will be immediately recorded in the profit or loss of the reporting period, considering the incurred costs. The costs incurred during the year by increasing the biological added value can represent an important amount in the case of the biological assets with a long transformation process.

Example: At the end of the financial year N, the recorded value of the banana trees was 12 million Euro, and at the end of N+1, the recorded value increased by 13.7 million Euro. During the year N+2, the costs with the personnel and other costs incurred by the biological transformation process were 450.000 Euro. In N+2, the biological added value is 1.7 million Euro. Deducting the costs incurred in N+2, the enterprise has an income of 1.25 million Euro resulted from the variation of the fair value due to the increase.

Recording the value modification in the profit or loss from the period is justified by the fact, that, on one hand, the effects of the biological transformation are immediately made visible, and on the other hand, it is observed the principle of determining the result in correlation with the period. Since because when calculating the fair value, the

estimated point-of-sale costs are deducted, it can appear a loss even when initially recognizing a biological asset.

According to IAS 41.27, at the initial recognition, a benefit could appear each time the fair value at the point of the measurement is higher than the estimated sales costs, such as in the case of the birth of a calf. According to IAS 41.29, at the initial recognition of an agricultural product after harvest a gain or a loss could be incurred.

Example: At 31.12.2001, a calf bred within the entity is measured by the farmer at a fair value less the estimated point-of-sale costs that equals 8.000 Euro. The amount of 8.000 Euro is therefore immediately recognized in the income statement.

There are no regulations concerning the issue of how the assets that are measured at fair value and included in the applicability area of IAS 41 will be eliminated from the accounts. If the sale were recorded, the incomes would be recognized twice according to IAS 18. This is the reason why the elimination is carried out according to IAS 16.7: the gain or loss that results from the recognition of a tangible fix asset will be determined as the difference between the net cashing at the point of sale, if they exist, and the recorded value of the asset.

Example: At 31.12.2002, the fair value less the estimated point-of-sale costs of a calf is 12.000 Euro, while at the previous closing date the recognized value was 8.000 Euro. At 05.01.2003, the calf is sold for 12.000 Euro.

At the end of 2002, it has to be recorded an income of 4.000 Euro; on the contrary, the proper sale is recorded without influence on the income statement (profit or loss account).

III. Government grants

If exceptionally, the measurement of the biological assets is made at the acquisition or production costs, then according to IAS 41.37, the government grants observe the general provisions of IAS 20. But if the biological assets are measured at the fair value less the estimated point-of-sale costs, and if for them government grants are given, then the special provisions from IAS 41.34 will be in force. In accordance with IAS 41.34, the unconditional government grants will be recorded as income only when the grant becomes receivable. The deduction from the recorded value of the correspondent biological assets is not possible, since this does not respect the fair value measurement.

If conditional government grants are offered for biological assets measured at the fair value less the estimated point-of-sale costs, and these can be connected with the receivable resulted from not carrying out certain economic activities, IAS 41.35 allows the recognition of an income only when the conditions imposed for giving

the subvention are fulfilled. Moreover, the existence of an obligation of reimbursing the grant is not allowed.

Example: An enterprise cultivated an arable surface. The government offers a grant of 200.000 Euro under the condition that the surface is being cultivated for ten years. If the surface will be cultivated for a shorter period, the grant must be totally reimbursed.

The government grant will be recognized as income only after ten years of cultivation. The situation would be different if the reimbursement obligation referred to the years of not cultivating the surface. In this case, the amount of 200.000 Euro would be registered as income, proportionally with the time period, meaning 20.000 Euro per year.

IAS 41.57 defines certain disclosure requirements for the government grants. These include:

- The nature and the length of the government grants recognized in the financial statements;
- The unfulfilled conditions and other contingences associated to the grant;
- The significant decreases of the grant's level.

IV. Disclosure on biological assets and agricultural production in the IFRS financial statements

IAS 41 requires a variety of information about the biological assets and the agricultural products. On the whole, the mentions concerning the notes from the annual financial statements form approximately 25% of the entire standard. But IASB doesn't prescribe in IAS 41 where in the financial statements will be presented those pieces of information. As in the case of other standards, in the IFRS accounting, the publicity obligations are generally fulfilled through the notes.

According to IAS 1.68 (f), the biological assets will be recorded separately in the balance sheet. The enterprise will describe in words or quantified (according to IAS 41.44) each group of biological assets. In IAS 41.43, IASB encourages the enterprise to make a quantified description, differentiating between consumable and bearer biological assets and mature and immature biological assets. This differentiation is considered to have a highly informative value, because, this way, the investor can estimate better when the future cash flow will appear.

IAS 1.51 stipulates that the enterprise has to classify the assets in short term assets and long term assets. If biological assets with a production cycle shorter as twelve months are available, their recording as assets on short term doesn't raise problems. But even in the case of very long production cycles, the classification in the category of short term assets would be necessary for two reasons: on one hand, the management's intention consists in a sole use and not in a permanent use of the assets and, on the

other hand, the characteristic of short term assets regulated in IAS 1.57 (a), meaning the consume during the normal production cycle, even if it's longer than 12 months. Therefore, considering the biological assets and the agricultural produce as short term assets is the recording that is usually being made.

IAS 41.40 requires the presentation of the total amount of the gain or loss that appeared during the reporting period due to the initial recognition of the biological assets and agricultural produce and through the modification of the correspondent fair value. IAS 41.51 encourages the entity to divide even more this aggregated information about the global influence upon the result, because a modification of the fair value can take place through a physical modification, for instance through the increase and/or through a price variation. This is why IASB considers that is relevant for the investor that the modification of the fair value is divided into a quantity component and a price component for each group of biological assets. In case of a production cycle of less than a year (it's the case of cultivating cereals) this division can be left aside. If the biological assets are associated with certain risks or special burdens such as restricted property right or with engagements for the development or the purchase of biological assets, this has to be presented as values, according to IAS 41.49. The strategies of financial management associated to the agricultural activity have to be presented, too.

Because the improvement project eliminated the difference between ordinary and extraordinary events in the income statements, paragraph 53 was included in IAS 41. According to this paragraph, the cases in which (extraordinary) events such as floods, drought or frost lead to considerable elements of incomes and expenses, these will be presented separately, by mentioning the nature and the value of the event. For the investor is especially important the reconciliation (required by IAS 41.50) of the modifications of the recorded value of the biological assets during the reporting period, reconciliation that needs to be presented without influence on the income statement. For the reconciliation, the following detailed information is required:

- gain or loss from changes in the fair value less the estimated point-of-sale costs;
- increases due to purchases;
- decreases due to sales and to biological assets that are classified according to IFRS 5 as held for sale (or that belong to a group classified as held for sale);
- decreases due to harvest;
- increases resulted from combinations of entities;
- exchange course differences resulted from the conversion of the financial statements into a foreign unit;
- other changes.

As for determining the fair value, IAS 41.47 stipulates the representation of the significant methods and presumptions applied when determining the fair value of each group of agricultural products at the point of harvest and of each group of biological assets. This provision has a great importance especially if the fair value was determined by calculating the discounted value. IAS 41.48 requires the separate presentation of the fair value less the estimated point-of-sale costs of that agricultural produce that was harvested in the reporting period.

If they aren't presented accordingly in another place in the financial statements, IAS 44.46 (a) requires the description of the nature of the activities connected with each group of biological assets. Moreover, IAS 44.46 (b) prescribes that will also be presented non-financial measures or estimations for the physical quantities of each group of biological assets at the end of the period, as well as the quantity of agricultural products during the period.

Separate information is to be presented for biological assets evaluated at the acquisition or production costs and not at fair value. IAS 41.54 requires the following detailed pieces of information:

- description of the biological assets;
- motivating why the fair value wasn't recognized;
- presenting the estimation interval (if possible) in which the fair value might be placed;
- the depreciation method used, the useful life duration or the depreciation rate;
- the brut recorded value and the accumulated depreciation at the beginning and at the end of the period.

If the entity passes from the cost measurement to a fair value measurement, IAS 41.56 requires the description of the biological assets, mentioning the explanation for changing the measurement, as well as the effect of the change.

V. Conclusions

Most enterprises from the agriculture branch do not belong to the users' circle of IFRS. If they do belong, the measurement of the biological assets and agricultural produce according to IAS 41 means a change in paradigm. This happens because while the provisions of the accounting law, namely the accounting principles, require that such assets should be evaluated through guiding percents or standard production costs, IAS 41 requires recognition at fair value less the estimated point-of-sale costs. Unlike many other IFRS standards, the changes in fair value are immediately recognized in the profit or loss account, with an influence on the result.

Recognizing in the income statement of the changes in value due to the transformation process has the advantage

of a better relevance of the agricultural financial statements for the decision-making process. This can be explained by the fact that the users of the financial statements can appreciate the management's performance in each period, in correlation to the current realities of the market. This stimulates the so-called managerial approach of external reporting. On the other hand, the immediate recognition in the profit or loss account of any change in the fair value

leads to a higher volatility of the annual result and in this way, at a higher prognosis risk for the users of the financial statement. Even if IAS 41 doesn't contain an explicit regulation concerning the issue of whether in the transformation process the incomes can be distributed, for the incomes yet unrealized there should exist a regulation that forbids their distribution, because of substance conservation.

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Model Proposition for the Fiscal Policies Analysis Applied in Economic Field

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Abstract. *This paper presents a study about fiscal policy applied in economic development. Correlations between macroeconomics and fiscal indicators signify the first steep in our analysis. Next step is a new model proposal for the fiscal and budgetary choices. This model is applied on the date of the Romanian case.*

Key words: economic theory; fiscal policy; macroeconomics indicators; fiscal choice; fiscal indicators.

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The modern economic theory and its role in enunciating the macroeconomics fiscal models

In the last period, the fiscal-budgetary politics represent important marks of building the financial equilibrium in the purpose of the economic development. The economic development imposes new concepts which led to the modification of the existent perception over the fiscal theories. Thus, we can analyze, at this moment, new established models of the economic theory appeared after a post-Keynes period of the contradictory approach over the importance of the fiscal policy. Their empirical verification, although unconvincing sometimes, had a contribution in establishing an important thing for developing the economic science, meaning the existence of a connection between the fiscal, budgetary and monetary policies, which lead to the macroeconomic stabilization.

In order to underline the importance of the monetary policies, it has been developed lately – by a series of representative economists of the economic school from Chicago, with Milton Friedman (1953) – “The quantitative theory of money”, as a leader. They analyzed the correlation between the mass of money in circulation and the gross domestic product, concluding that between these two economic sizes there is a close connection,

and the mass of money in circulation represents a liable variable.

Therefore, M. Friedman proposes the annual increase of the mass of money with a certain percent which corresponds to the annual appreciation installment of the gross domestic product. In consequence, the monetary authorities should point their attention on the money in circulation, firstly, using the money issue as one of the main levers of influencing the other economic variables, too. In this way, we get to the second main element of the monetary market, meaning the money offer, which is generally made, through the money issue and the credit.

Because the money issue increases the mass of money in circulation, therefore influencing the entire economic activity, the money offer must be oriented towards the banks specialized mainly after the evolution of the material processes, respectively after the quantity of goods and services which are to be sold – bought, in a certain period, as well as after the policy of prices. On a wider plan, the banks of issue must create an optimum relation between the mass of money in circulation and the amounts of money claimed after doing all the

economic operations which are made with money. This means that in order to have a healthy circulation of money it's necessary to make a concordance between the volume and the structure of the liquidities, the volume and structure of the offer of goods and services, meant both for the productive and non-productive consumption. Therefore, the increase of the mass of money in circulation must be in concordance with the increase of the volume of production and services, as M. Friedman claims, with the annual increase of the gross domestic product.

In a series of works published in the 60's, Robert Mundell developed the analyses over the monetary policies within the open economies.

In this way, R. Mundell developed the so-called IS-LM model for the closed economies, by introducing the export trade and the movements of capital.

The model reflects the movements of capital at different rates of interest and also the reaction of the net export to the real rate of exchange. R. Mundell proved that the effect of stabilization of the policies is in relation with the international movement of the financial capitals, and the effects of the analyzed policies depend on the regime of the rates of exchange. Thus, in the case of the floating rate of change, the monetary policy becomes strong and the fiscal policy becomes weak in the opposition with the situation in which the rate of exchange is precise. In order to illustrate the model and its results, it is necessary to use a particular case.

In conclusion, we may say that Robert Mundell established a base of the theory that still governs the considerations concerning the monetary and fiscal policies from the open economies.

We live in a sophisticated world, in continuous change, a world in which the decisive factor of progress is not represented anymore by the abundance of primary material resources, but by the access at information and the capacity of promptly using it.

Today, the economic theory was constrained by realities to abandon the models – seducing, easy to understand and rather comfortable – born together with Keynes's theory, to accept the priority of the theories which take into account the information. After all, the theory of rational anticipations – as a development of the monetary school from Chicago – is built around the evidence represented by the fact that the actors of the economic scene base their resources allocation decision on the information concerning the evolutions in economy, as they are influenced by the better or less good policies of the authorities.

The economic policy's decisions are immediately critically evaluated, and the tricks cannot have the

foreseen effect. Therefore, a monetary relaxation in the hope of stimulating the economic increase and the decrease of unemployment – Philips's famous curve – is immediately sanctioned by the market, by the decrease of circulation and the increase of inflation pressures. The positive effect, if it still manifests, lasts very little and it is unconvincing, but the loss of credibility remains, affecting the results of economy for a long period of time.

Edward Prescott and Finn Kydland (1977) are the exponents of the approach based on rational anticipations. Their main common contribution – to which others were added, individually accomplished – was the work "Rules, rather than discretion: the inconsistency of the optimum plans". Written three decades ago, the work shows how the people who take decisions in the economic policy prepare the disequilibrium on long terms through deviations from the healthy objectives, of course, when they deviate from them for solving some problems on short time, like the election ones. In time, their attention was focused especially on the substantiation of the role of the modern central bank – the one of defending without any compromise the stability of prices. Therefore, it seems that the economic theory substantiate today the major orientations of economic policy, in general, and the importance of assuring the stability of prices – as essential attribute of the central bank – in special.

With their research, Edward Prescott and Finn Kydland plead for two attributes of the economic policies: stability and credibility.

The rebirth of interest in the favor of the revolutionary fiscal policy may be connected with the development of the concept concerning its influence on the prices' level, which appeared at the beginning of the 90's.

Before the appearance of this concept, the role of controlling the prices' level was given to the central bank, which induced a series of steps in the choices from the private sector or caused unexpected evolutions of GDP or determined high rates of interest on long term.

In comparison with this literature, the new theory studies the connection between the monetary policy and the fiscal policy. Its main message can be seen in the case of two different mechanisms and meaning the first mechanism which gives the possibility of an ex ante satisfaction of the Government through the presence of budgetary constraints and second mechanism when the achieving of the budgetary equilibrium involves their modification.

In the first case the authorities modify for the future the level of taxes being constrained by the rates of

interest and the volume of the national income. In the second case it is followed the identification of the prices' level to which is realized the macroeconomic equilibrium.

This model presents the interest towards the fiscal policy for stabilization, for the effect of growth, for the public debt and for the existent connection between the fiscal and monetary policy. Thus, the coordination of these two types of policies represents the key of success for stabilization within the contemporary open economies.

The application of the fiscal theories at international level becomes a problem pretty serious, existing different approach of the state fiscal philosophy which presents a high degree of volatility.

Romania's fiscal policy after 1989

Romania's fiscal policy after 1989 and until nowadays has been examined many times, having a sinuous and inconstant character being less favorable to the business environment – although many of the adopted modifications were supposed to be meant to the business stimulation. It has also suffered the impact of an economy marked by structural strain.

In 2000 there was registered the first step headed in a good direction, when the fiscal policy was consolidated and became more transparent.

In 2004 the Fiscal Code, which reunited the entire fiscal legislation in one unitary document of economic policy, came into force, thus improving the transparency, the predictability and the legislative stability in this field. In the following period the fiscal policy measures were concentrated on the reduction of the tax level and on the continuation of the alignment to the forecasts of the communitary acquis.

Concerning the observance of the criteria imposed through the Maastricht Treaty, the critical point of the Romanian economy is constituted by the observance of the inflation rate criteria; because these are not achieved implies the lack of sustainability of the economic macro-stability process.

Although the nominal convergence process may be achieved in a shorter period than the one of the real convergence, it is considered that a high degree of the last one represents the essence of an advantageous integration being necessary the harmonization of the two types of convergence.

Romania must mobilize in order to adopt the measures imposed by the post-adhesion period which it has to cross in order to integrate in the European Union.

The costs which are said to belong to the integration are, actually, the costs for the Romania's modernization, which should have been made, even without the Community's help, in the case in which Romania did not adhere.

Probably the only costs that can be associated strictly to the integration are the ones in connection with the creation of some specific institutions: of administration of the communitary funds, in agriculture, for example, but the benefits that this management system of the European financial influxes brings, are exponentially bigger reported to the costs.

Starting from the idea that the economic integration means "the elimination of the economic barriers between two or more economies", we can mention that one of the biggest advantages is the participation of Romania at the communitary market, with large possibilities of economic growth, taking into account that almost 70% of the Romania's commercial relations are with European Union.

Under these circumstances, new possibilities for foreign investments appear, and, implicitly, for the implementation of new technologies and innovations, and if one of the main benefits of integration would be the increase of foreign investments, then the main winners of the adhesion are the sectors of financial-banking, tourist and services.

To all that, we may add the access to the funds allocated to the less developed regions of the European Union. The absorption capacity of the respective funds depends, mainly, on the co-financing possibilities of the ones who receive them, as well as of the value of the projects which they make and their transposition in real life.

The problem of the integration costs being debated, the only thing remains to search the sources of covering them, which are being represented by the fiscal incomes, whose accumulation depends on the performance level of the fiscal system.

Proposal concerning the simplified model of fiscal-budgetary model

In order to establish the influences that exist over the economic environment, in general, and over the development level, in particular, we start from the necessity of studying the existent correlation between the adopted fiscal policies within the economic policies and the resulted macro economic indicators. Thus, next to the monetary policies, the fiscal policies represent marks of the lasting development.

The determination of a model starts from the premise of identifying some indicators which quantify the best the existent connections between the macro-economic

policy and its component – the fiscal policy, taking into account the requirement of function of the state and the fulfillment of its national and international obligations. Starting from the last conceptual approaches concerning the role of the monetary and fiscal policies, we will present a model which takes into account both concepts.

The model's hypotheses

- there is a national plan of development on medium and long term;
- there is a functional market economy;
- the inflation is controlled through monetary policies;
- the fiscal incomes are entirely collected.

This model has as purpose to realize a connection between the macroeconomic situation and the instruments used by the fiscal-budgetary policy for improving the results.

In this way, we will use the scenario technique, starting from the variation of the budgetary incomes, following the connection between them and the characteristic rates concerning the fiscal-budgetary activity. We will also follow the explanation of the fiscal and budgetary policies results and that's why this model has a contribution to the identification of the manner in which the Government's decisions lead to the increase of the budgetary incomes.

We will follow the identification of the connections inside the chosen model.

Therefore:

- if the incomes of the consolidated general budget diminish, the rate of fiscality increases, the budget rate increases, the rate of budgetary capitalization decreases;
- if the incomes of the consolidated general budget increases, the rate of fiscality decreases, the rate of budget decreases, the rate of budgetary capitalization increases.

The formulation of the model will follow three steps in order to allow the application, the interpretation and provision of the results.

These steps may be synthesized as follows:

I. the determination of the model's equations: it follows to establish the indicators taken into account, to determine the relations between them and to verify the calculation relations for the applicability of the model;

II. forming the matrix of verifying the results: it follows to introduce the results of the model in the general macroeconomic frame and to establish the relevance of the results;

III. simulation of the scenario with the biggest probability of achievement, it follows to assure an extrapolation of the tendencies determined through the model into a future predictable, reality, in order to allow the identification of the decisions' influences adopted on long term.

I. The definition of the model's equations

$$\Delta GGR = A \times \Delta TB + B \times \Delta BR + C \times \frac{1}{\Delta CBR} + \text{another influences}$$

With:

$$A+B+C=1$$

$$BR = \frac{GGR}{CGR};$$

$$TB = \frac{CGR}{\text{nominal GDP}};$$

$$CBR = \frac{CGCE}{CGE};$$

where:

ΔGGR = variation of general government revenue;

ΔBR = variation of budgetary rate;

ΔTB = variation of tax burden;

ΔCBR = variation of capitalization budgetary rate;

GGR= general government revenue

CGR = central government revenue;

CGCE = central government capital expenditure;

CGE = central government expenditure;

A, B, C = coefficients.

II. Formation of the verification matrix of the results

After verifying the calculation relations, we will check the results of the model by achieving a matrix which contains the base indicators that characterize the economic evolution in ensemble, instrument indicators of fiscal nature which characterize the definition of the model and the resulted indicators which are influenced by the evolution of the instrument indicators.

Together with the fiscal instrument indicators we also define the monetary instrument indicators which are observed in order to establish the concordance of the fiscal-monetary policies.

III. Selection of the scenario with the biggest possibility of achievement

The wanted situation will characterize a value with the biggest possibility of achievement. In order to identify the deviations, both the dispersion and the square

average deviation will be calculated. Thus, the application of the model starts from the definition of some possible scenarios concerning the base considered indicators:

Scenario 1:

GGR modification with the average plus or minus the deviation – probability allocated: over 62.3%.

Scenario 2:

GGR modification with another value, higher than the average plus or minus the deviation with the probability of 18.85%.

Scenario 3:

GGR modification with the value lower than the average plus or minus the deviation with the probability of 18.85%.

In the interpretation, there will be used the normal repartition of the numbers or Gauss Laplace's repartition, which catches very well the evolutions of the economy characterized by periodicities, starting from the idea that the value with the highest probability of appearance is the average value of the observed years. This average value, in order to have a deviation plus or minus the square average deviation, we give it a 62.3% probability, characteristic to the normal repartition law.

Application of the model in the Romanian economy

I. The econometric definition of the model and the calculation of the parameters starting from the relations between the fiscal indicators presented above.

The evolution of the model parameters

Table 1

No. crt.	Denomination of the indicator	Variation 2003	Variation 2004	Variation 2005	Average value	Indicator weight
1	ΔGGR	0.134	0.2649	0.06	0.152	
2	ΔBR	0.125	0.3	-0.05	0.125	0.3
3	ΔTB	0.01	-0.21	0.256	0.0186	0.3
4	$\Delta(1/CBR)$	0.02	0.24	-0.21	0.35	0.3

$$0.152 = 0.164 + \varepsilon$$

$\varepsilon = -0.012$ result which signifies the existence of the developed underground economy and macroeconomic dysfunctions in Romania during 2002-2006

II. The construction of the tendencies' matrix for the analysis of the model's results

In order to continue the analysis of this model, we propose the achievement of a tendencies' matrix of the budgetary policy instruments to help us in interpreting their evolution in the analyzed period.

The construction equation of the model starts from the relation:

$$\Delta GCR = A \times \Delta TB + B \times \Delta BR + C \times \frac{1}{\Delta CBR} + \varepsilon$$

where:

ΔGGR = variation of general government revenue;

ΔBR = variation of budgetary rate;

ΔTB = variation of tax burden;

ΔCBR = variation of capitalization budgetary rate;

ε = control variable which stabilize the nature of intensity about budgetary revenue and construction rate's model.

1. if ε equals 0 then there is no connection established between the variables of the model. We are in the case of an economy with atypical reactions to the fiscal policies and hard quantifiable;

2. if ε is negative, then there is a connection with a reduced intensity and the economic reaction at the incomes' level is not on the measure of the instruments used for their modification. In this case, we identify the existence of some economic dysfunctions like underground economy and fiscal fraud;

3. if ε is positive, then we are in the situation of an intense development of the relation between the budgetary incomes and the used instruments, relation which characterizes a developing economy.

Application of the model for a 3 years period giving the same level of importance to the coefficients, respectively $A = B = C$.

The tendencies may increase or decrease and we will mark them with "+" or "-".

Base indicators	Fiscal instrument indicators
1. Fiscal revenue (+)	1. Tax burden (+)
2. Deficit current account (+)	2. Budgetary rate (+)
3. Monetary mass (-)	3. Capitalization budgetary rate (+)
	Monetary instrument indicators
	4. Minimum compulsory reserves rate (-)
	5. Inflation rate (-)
	6. Refinancing interest rate (-)
Output indicators	
1. Economic growth(+)	
2. Medium wage income (+)	
3. Foreign direct investment (+)	
4. Net export (-)	

The economic indicators' matrix follows their logical group starting from the economic-social realities. As a result, we can see a proportionally reversed correlation between the fiscal and monetary instrument indicators.

We can see that during 2002-2006, most indicators had a suitable evolution. We can appreciate that during 2005-2006 important indicators had an inadequate evolution, namely: the net export, the tax burden, the budgetary rate. The Romanian National Bank, using rates of the minimum compulsory increased reserves and the policy of aiming the inflation, realizes its main objective concerning the stability of prices. There is a tendency of diminishing the rate of compulsory minimum reserve and increasing the credit. Therefore, the Romanian economy aims to become a consumption economy in the logic of its European development.

In this way, the budgetary incomes will increase on the account of the indirect taxes because of the increase of consumption. The increase of the consumption is based on the maximum wage of Romanians who left to work abroad producing capital which they consumed in the country. The unemployment diminished also at the microeconomic level because of this mobility of the labor force.

Taking into account the possible impact of those incomes over the economy – source, residents' transfers, who work abroad, represent an associated phenomenon (and intensely presented in the media) with the legal or not migration of the labor force towards more developed markets, which offer higher wages than the origin

country. In order to study the impact, it is necessary to determine the level of these fluxes.

At this moment the problem is represented by the lack of a clear methodology which can offer absolutely credible results, although there are some preoccupations for the harmonization of such methodology both at the states level and at the level of some international organizations, like the European Union, IMF, World Bank or the International Organization of Labor.

At international level, the number of the official transfers from work in GDP, according to the IMF and World Bank estimations, is high for a series of emergent economies, like Moldova (25%), Jordan (18%), and Albania (15%). Other countries which present relatively high rates are: Bangladesh, Bosnia, Egypt, Morocco, Pakistan or Tunisia (according to IMF, World Bank).

For Romania, this aspect has become so important, as it has in view the increasing migration of the labor force towards the European Union's market. Until 2004, the main component of the payment balance in which we can find the official transfers of the workers, respectively the transfers' balance, it offered a detailed situation only between the current transfers of the administration and private transfers. Since 2004, it has been made a division of the private transfers in the workers' transfers and other private transfers, the first value being estimated on the ground of an adjusting coefficient of the information received through official channels (almost 60% of fluxes).

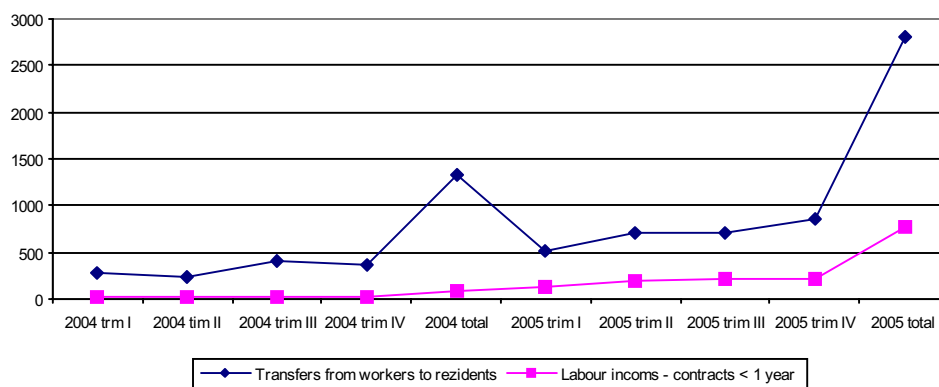


Figure 1. The balance of transfers of labor force

According to a boring made by the International Organization for Migration (IOM) in 2005, during 2001-2005 the number of families with a constant migration rate was about 10%. Besides, for the same period, the migration had a temporary character, with a medium 20 years length (IOM 2006). As a boring of the Foundation for Open Society shows, at the urban level 53% of the homes who receive transfers from work use them for covering the daily needs,

while only 4% use them to begin a new business (FOS, 2006). A detailed presentation of the theoretical aspects concerning the possible macro impact of the transfers was made by Kireyev (2006). For example, the migration of the labor force may generate an absolute contraction of GDP (the exports included) in the countries which use this factor more intensively and an expansion of GDP (exports included) where the capital is used more intensively.

After the adhesion to the European Union, Romania needs more investments in production and services destined to the export in order to counter balance the massive imports. From the impressive total of nine billions of Euro, representing the total value of the foreign investments, 15% were generated by the retail segment. Instead of more shops, Romania would need more technology, massive investments in production and services destined mainly to export. Modern factories and recent support centers would be only some of the elements which can lead to the diminishing of the current account deficit through the counter balance of the massive imports and through the increase of productivity doubled by the increase of wages.

The wages have also registered significant increase during the last two years, but these increases could not keep up with the increase of the power of buying. The direct foreign investments and the money sent in the country by the Romanians who work abroad have brought more than 12 billions dollars in the last year's Romanian economy, increasing the power of the Romanian currency, Leu, in rapport with the European currency, Euro, and cheapening the imports. The home credits have also increased during the last 24 months.

Thus, by applying the analysis of the indicators' matrix, there are established both the correctness of the results of the model and the perspective of the evolutions of the Romanian economy in close connection with the macroeconomic decisions that must be adopted.

III. Identification of scenario with the highest probability of being achieved

In order to continue the analysis of the model's results we start simulating the probable scenario and identifying some fiscal policy elections. Using the calculated indicators, we establish that the most probable scenario

of appearance is the one of variation of the average value with square deviation.

The variation of general government revenue

Table 2

Starting from the calculated values, we appreciate

Valor's of ΔGGR (from table 1)	Average	Variation of the average value	Square deviation
0.0134	0.015297	0.000108	0.01039
0.02649			
0.006			

that variation GGR for the 2006-2007 period will be between 0.0058 as pessimistic variant and 0.025687 as optimistic variant with a 62.3% probability. We can see that the scenario that we propose aims only the determination of the GGR variation allowing calculation, if wanted, of its absolute value. There are some premises that the GGR variation would spectacularly increase as a result of the previous explained factors concerning the increase of consumption. But this cannot be higher than 0.025687. At the Romania's level, taking into account that 2007 represented the year of adhesion which modifies the bases of comparison, this increase will be totally insufficient. The somber forecast needs a change of the fiscal-budgetary philosophy in order to try recovering the lagging behind the countries which are members of the European Union. We have to give up the idea that multiplying the number of taxes we will succeed in assuring the increase of GGR and we must encourage a reduction of the fiscal pressure in the social contribution field in order to assure a healthy increase of the economy and of the fiscal incomes at the same time. Beyond the partial results of the model which confirm the real situation, it is a good instrument for the identification on the ground of scenarios of some future efficient measures of fiscal policy.

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The Operational Risk in the Outlook of the Basel II Accord Implementation

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Abstract. *The financial scandals in the last two decades have determined the Basel Committee to improve the risk controls for banks in general, and for operational risk in particular. Operational risk covers all non-market or credit risk, therefore including management risk, IT and fraud risk. By the Basel II Accord, the Committee proposes three risk measurement methods, which induce increasing costs, but also greater reductions in a bank's capital reserve, and thus in its operating costs.*

Key words: Basel II; operational risk; risk management; banking; risk assessment.

In the last decades, the banking community was shaken by several large scandals: in 1995, Daiwa New York lost \$1.1 billion, due to a stream of illegal activities. In the same year, Barings, the 233 year-old banking institution, collapsed, due to the actions of a single man who eluded the internal controls of the bank.

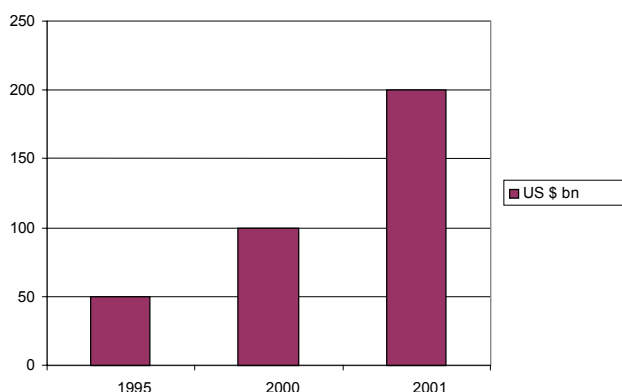


Figure 1: *In a single year, the amount of bad debt has doubled*

The Basel Committee on Banking Supervision, which is the regulatory body for banks, has taken into account

these scandals when issuing the 2001 Basel II Accord. This accord effectively increases a bank's capital requirements, unless it can control both "its credit and operational risk". Next we are going to show how these risks impact on the capital requirements of a bank, while paying special attention to Operational Risk.

According to the Basel II Capital Accord, operational risk is defined as "the risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems, and from external events". This covers the following new and growing risks faced by banks:

- The greater use of more highly automated technology has the potential to transform risks from manual processing errors to system failure risks, as greater reliance is placed on globally integrated systems;
- Growth of e-commerce brings with it potential risks (e.g. Internal and external fraud and system security issues) that are not yet fully understood. This is inherent with the complexity of the systems being used, in which security flaws are discovered and exploited every day;

- Large-scale acquisitions, mergers, de-mergers and consolidations test the viability of new or newly integrated systems;
- The emergence of banks acting as large-volume service providers creates the need for continual maintenance of high-grade internal controls and back-up systems;
- Banks might engage in risk mitigation techniques (e.g. collateral, credit derivatives, netting arrangements and asset securitisations) to optimize their exposure to market risk and credit risk, but which in turn might produce other forms of risk (e.g. legal risk);
- Growing use of outsourcing arrangements and the participation in clearing and settlement systems can mitigate some risks but can also present significant other risks to banks.

The meaning of operational risk

Operational risk covers all non-credit and market risks. This leaves a large palette, which includes the following:

Internal fraud. This can be defined as intentional misreporting of accounts, employee theft, and insider trading on an employee's own account.

External fraud. This category includes robbery, forgery, and damage from computer hacking.

Employment practices and workplace safety. For example, worker's compensation claims, violation of employee health and safety rules, organised labour activities, discrimination claims and general liability.

Clients, products and business practices. For example, fiduciary breaks, misuse of confidential customer information, improper trading activities on the bank's account, money laundering and sale of unauthorized products.

Damage to physical assets. For example, terrorism, vandalism, earthquakes, fires and floods.

Business disruptions and system failures. This includes hardware and software failures, telecommunication problems, and utility outages.

Execution, delivery and process management. For example, data entry errors, collateral management failures, incomplete legal documentation, unapproved access to given client accounts, non-client counterparty underperformance, and vendor disputes.

Management risk. This includes poor management, and risk of corporate governance exposure. According to Chorafas, management risk "is the No. 1 operational risk. It represents one out of six or seven op risk cases. Next in importance is event risk, including internal and external fraud."

Operational risk calculation methods

The Accord also proposes three methodologies for calculating operational risk:

1. Basic indicator approach;
2. Standardized approach – which is a matrix of seven risks and eight banking channels;
3. Advanced measurement approaches (AMA)

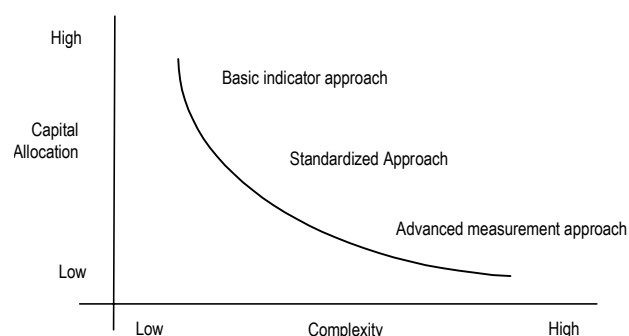


Figure 2. Capital allocation decreases as implementation complexity grows

The first methodology is the "easiest" to implement and involves the highest capital cost, while the last methodology is the most difficult to implement, but it involves the lowest capital costs. Therefore, banks have to show that they have a grip on their operational risks, in order to reduce their capital requirements, and therefore their cost of capital. To illustrate this, we will briefly describe these methodologies:

1. Basic indicator approach

Similar to the Basel I accord of 1988, Basel II allows a bank to use a single indicator (such as 20% of its average annual gross income) to determine its capital charge. There are no qualifying criteria associated with this approach, and it involves little change to current practices. In general, only small banks are expected to use this basic approach.

According to a Consultative Document issued by the Basel Committee, the indicator "...is based on the same proportion of capital (20%) for operational risk as the Standardized Approach and may need to be reviewed in the light of wider calibration. For instance, it may be desirable to set it at a higher level, although alternative means of generating such an incentive are also available, for example by making the Standardized Approach the entry point for internationally active banks. It is also worth noting that a sample of internationally active banks has formed the basis for this calibration. As it is anticipated that the Basic Indicator Approach will mainly be

used by smaller, domestic banks, a wider sample base may be more appropriate.”

2. Standardized approach

A bank that uses this approach must calculate a capital requirement using a risk indicator (such as annual average assets or gross income) for each one of its business lines. The savings in reserve charges, compared with the Basic Indicator Approach’s across-the-board 20% figure, could be large, and therefore the incentive for banks to move from the Basic to the Standard approach is clear. The banks must meet the following criteria to use this approach:

- Demonstrate that an operational risk management system is in place;
- Systematically track relevant operational risk data including material losses by business line;
- Regularly report operational risk exposures, including material operational losses, to business unit management, senior management and the board of directors;
- Have a process in place for ensuring compliance with a documented set of internal policies, controls, and procedures concerning the operational risk management system;
- Subject their operational risk management processes and assessment systems to validation and regular independent review.

The Basel Committee proposes business lines and units that mirror those developed by an industry initiative to collect internal loss data in a consistent manner. Working with the industry, regulators will specify in greater detail which business lines and activities correspond to the categories of this framework.

Within each business line, regulators have specified a broad indicator that is intended to reflect the size or volume of a bank’s activity in this area. The indicator is intended to server as a rough proxy for the amount of operational risk within each of these business lines.

Table 1

Business Units	Business Lines	Indicator
Investment Banking	Corporate Finance	Gross Income
	Trading and Sales	Gross Income
Banking	Retail Banking	Annual Average Assets
	Commercial Banking	Annual Average Assets
	Payment and Settlement	Annual Settlement Throughput
Others	Retail Brokerage	Gross Income
	Asset Management	Total Funds Under Management

3. Advanced measurement approaches (AMA)

This approach offers the most flexibility and self-discipline. To quote Basel II, “in the AMA, banks may use their own method for assessing their exposure to operational risk, so long as it is sufficiently comprehensive and systematic.” This involves the collection of historical data on losses, the analysis of this data, and the use of models to derive a probability of loss. It should be stressed that the most difficult part is the collection of the data, rather than the implementation of the models, because data might not be available for every type of risk.

Use of the AMA is subject to supervisory approval, and banks need to classify transaction incidents according to their impact on business. The Basel Committee has stated “it is prepared to provide banks with an unprecedented amount of flexibility to develop an approach to calculate operational risk capital that they believe is consistent with their mix of activities and underlying risks.”

In general, banks must first integrate an internal risk measurement methodology directly in their day-to-day operational procedures and decision-making processes. This can be very expensive to implement, and involve change in a lot of processes. But the bottom line is clear: with the AMA, the banks can use their internal loss data to demonstrate to regulators that they should qualify for reduced capital reserves. This is important because banks can innovate and implement sets of internal controls rather than single internal controls. These sets of controls can work together and reduce the operational risks, and therefore the banks should be evaluated on the historical losses rather than the choice of controls they chose to implement.

Under the Internal Measurement Approach, a capital charge for the operational risk of a bank would be determined using the following procedures:

- A bank’s activities are categorized into a number of business lines, and a broad set of operational loss types is defined and applied across business lines.
- Within each business line/loss type combination, the supervisor specifies an exposure indicator (EI) which is a proxy for the size (or amount of risk) of each business line’s operational risk exposure.
- In addition to the exposure indicator, for each business line/loss type combination, banks measure, based on their internal loss data, a parameter representing the probability of loss event (PE) as well as a parameter representing the loss given that event (LGE). The product of $EI \times PE \times LGE$ is used to calculate the Expected Loss (EL) for each business line/loss type combination.
- The supervisor supplies a factor (the “gamma term”) for each business line/loss type combination, which translates the expected loss (EL) into a capital charge. The overall capital charge for a particular

bank is the simple sum of all the resulting products.

- To facilitate the process of supervisor validation, banks supply their supervisors with the individual components of the expected loss calculation (i.e. EI, PE, LGE) instead of just the product EL. Based on this information, supervisors calculate EL and then adjust for unexpected loss through the gamma term to achieve the desired soundness standard.

In conclusion:

1. The *Standardized Approach* involves little change from Basel I, but imposes the highest capital requirements;
2. The *Basic Approach* consists of a set of recommended controls which the banks must implement; adopting this approach involves higher costs than the first approach;
3. The *AMA* lets the banks demonstrate to regulators that their internal controls are sufficient to ensure adequate protection against risks.

This demonstrates that investment in operational risk control brings a gradual reduction in reserve capital requirements which directly impacts a bank's cost of doing business.

The actual stage of implementation

The initial effective date of the Accord was set to 1st December 2006; on the 4th January 2007, Alliance & Leicester is the first European bank to implement the Basel II Accord. In general, European banks are more advanced in the implementation, compared to those in America or Asia. For Asian banks, a postponing of the date is currently under discussion, and the general opinion is that the Accord will be completely implemented only in 2009.

One of the main benefits of the Accord is the creation of an „uniform risk landscape”. But small banks can only dedicate limited funds for the Accord's implementation, and so they will be obliged to raise their required capital, effectively raising their cost of doing business. Consequently, the small banks will be at a disadvantage com-

pared with their larger counterparts, which will reduce their costs due to the implementation of the more advanced methods of the Accord. This is currently a hot discussion topic, which slows down the implementation of the Accord. Moreover, the differences in legislation (as well as economic interests) between America, Asia and Europe, further slow down the implementation. And we should mention that in the US, the Accord overlaps with the Sarbanes-Oxley law – another negative impact.

Looking back, the Sarbanes-Oxley law was relatively quickly implemented in the US, as it was only applied to a single economy. The Basel Accord is global in its scope, and thus its implementation will prove to be a greater challenge.

Practical example

Let's assume an 100 Euro credit to a company without rating. Under the standardized method, how should the risk be treated under the following circumstances: (1) No collateral is available; (2) Collateral is available in the form of 100 Euro AAA sovereign bonds; (3) Collateral is available in the form of 125 Euro AAA sovereign bonds; (4) Collateral is available in the form of 100 Euro in cash; (5) 100 Euro in gold.

(1) The risk must be covered 100%; this rule can only be overridden by the national supervisor

(2) This type of collateral must be discounted by 20%. Therefore, we only need to cover 80 Euro, instead of the full 100 Euro. In conclusion, 80 Euro are treated as having zero risk, and 20 Euro have 100% risk, and thus the risk for this exposure is 20%

(3) In this case, the risk is zero. After discounting, the collateral is worth 100 Euro, which is enough to cover all the risk of the exposure.

(4) No discounting and no ceiling is required, so the risk is again zero;

(5) No discounting is necessary, but the 20% ceiling must be applied, so 80% of the 100 Euro has 100% risk.

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Structural Instruments – the New Challenge for Romania. Investment Fields and the Beneficiaries for the Operational Programs 2007-2013

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Abstract. *One of the most discussed subjects after Romania entered the family of EU is about the absorption and allocation of the European Funds allocated using the Structural Instruments. The forecasts show that the maximum level of absorption of EEU's funds is about 3.7893% from GDP.*

In Romania case the European Funds will be allocated for convergence, for cohesion fund and for territorial cooperation, the largest amount being allocated for the convergence criterion. From this amount dedicated to this criterion (19.668 billion Euro) a share will be cofinanced by the national funds, both private and public (total amount for national cofinance is about 5.07 billion Euro).

Other criterion of grouping the European funds is that of Operational Programs for the following domains: the increase of economical competition, transportation, environment, regional, human resources development and technical assistance.

We expect to see if the forecasted level for absorption of European Funds was well done.

Key words: convergence; cohesion; Operational Program; allocation; contribution; co-finance.

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Considering the financial perspectives 2007- 2013 which were approved in December 2005, the Member States which have a medium gross domestic income/ inhabitant in 2001- 2003(PPS) under 40% from the average of EU – 25 are justified to receive Structural Instrument transfers with a maximum value about 3.7893% from their GDP.

Taking into consideration the European Council decision and the financial package for 2007- 2009 which accompanies the Romanian Adhesion at EU Treaty, the European Committee communicated to Romanian authorities, in August 2006, the allocation of Structural funds and of cohesion for Romania, for each objective and for each year, for the period 2007- 2013, such in the next table:

Structural and Cohesion Funds allocated to Romania for objectives and years, 2007- 2013

Table 1

- Euro. Current prices -

	2007	2008	2009	2010	2011	2012	2013	Total
Convergence	830.134.320	1.215.884.555	1.654.845.782	1.997.008.836	2.154.259.932	2.319.190.285	2.489.289.974	12.660.613.684
Cohesion Fund	444.944.443	638.417.107	858.507.216	1.030.210.429	1.109.470.097	1.192.582.076	1.278.291.660	6.552.423.028
Territorial cooperation	59.945.093	61.338.333	62.961.549	64.827.348	66.742.596	68.498.164	70.297.257	454.610.340
TOTAL	1.335.023.856	1.915.638.995	2.576.314.547	3.092.046.613	3.330.472.625	3.580.270.525	3.837.878.891	19.667.647.052

The total sum of structural and cohesion funds which were allocated to Romania is about 19.668 billion Euro, from which 12.661 billion Euro will be allocated through the Structural Funds as part of Convergence objective; 6.552 billion Euro were allocated through Cohesion Fund, and 0.455 billion Euro will be allocated for the European territorial cooperation objective (inclusive the transfers to IPA and ENPI).

The separation of the cohesion finances on thematically priorities in subsidiary on Operational Programs and Funds was established based on several items:

- The development stage of Romanian economy;
- The general and regional disparities in comparison with the EU levels;
- The integration of Lisbon Strategy, revised in the Romania development model;
- The huge value of the investments necessary for the basic substructure;
- The necessity to increase the economy competitiveness;
- The correlation for the competitiveness growth with the development of some human resources sufficient and well qualified;
- Adherent costs according with communarian acquis after the adhesion (the environment pledges, especially, involves a high costs level, distributed on transition periods established within the adhesion negotiations);

- Models of structural instruments allocation in EU, especially in the new Member States, whose development level is closer to the Romanian situation;
- The 1/3 allocation of Cohesion Fund from the financial type.

Thus, the following allocation of EU funds on thematically priorities of National Strategic Environment of Reference has been made:

- The basic substructure development at EU standards: ~60%;
- The improvement of competitiveness, on the long term, of Romanian economy: ~15%;
- The development and the utilization more efficient of Human Capital from Romania: ~20%;
- The consolidation of an efficient administrative capacity: ~5%.

The simulation of macroeconomic impact revealed that this distribution of Structural and Cohesion Funds with the national co-financing will result in the realization of global objective of CSNR, namely a supplementary growth about 10% of gross domestic product till in 2015, in consequence with the Structural and Cohesion Funds allocation.

Based on thematically distribution of financing and using the same substantiation described below, the Funds were allocated on the Operational Programs on which Romania prepared for the period 2007- 2013. The next table presents the EU resources distribution on Operational Programs within CSNR.

The annual estimative allocation on funds and operational programs for Romania, on objectives and years, 2007- 2013

Table 2

- Euro. Current prices -

Convergence			Comunitary participation						
Operational Program	Fund	Total	2007	2008	2009	2010	2011	2012	2013
EFARD și CF									
Economic competitiveness	EFARD	2,554,222,109	74,709,043	194,837,789	386,097,057	506,773,089	528,395,407	456,947,159	406,462,565
	EFARD+CF	4,565,937,295	308,090,115	441,348,842	603,105,515	718,406,119	774,298,450	830,470,875	890,217,379
Transport	EFARD	1,289,332,210	84,938,144	122,249,222	174,085,731	202,851,916	219,643,530	234,263,424	251,300,243
	CF	3,276,605,085	223,151,971	319,099,620	429,019,784	515,554,203	554,654,920	596,207,451	638,917,136

Convergence			Comunitary participation						
Operational Program	Fund	Total	2007	2008	2009	2010	2011	2012	2013
EFARD și CF									
Environment	EFARD+CF	4,512,470,138	311,995,152	437,302,592	568,601,613	673,445,127	751,240,426	838,908,117	930,977,111
	EFARD	1,236,652,195	90,202,680	117,985,105	139,114,181	158,788,901	196,425,249	242,533,492	291,602,587
	CF	3,275,817,943	221,792,472	319,317,487	429,487,432	514,656,226	554,815,177	596,374,625	639,374,524
Regional development	EFARD	3,726,021,762	330,168,339	404,126,047	441,135,485	523,721,833	556,767,943	663,832,914	806,269,201
Tehcnical assistance	EFARD	170,237,790	16,979,328	18,401,347	20,977,535	24,775,573	27,568,456	30,463,144	31,072,407
ESF									
Human resources development	ESF	3,476,144,996	212,973,834	330,141,809	452,584,803	538,429,514	595,593,519	666,545,305	679,876,212
Administrative capacity	ESF	208,002,622	20,162,952	28,143,236	40,850,990	41,668,010	29,865,828	24,604,847	22,706,759
TOTAL CSNR Funds 2007- 2013		19,213,036,712	1,275,078,763	1,854,301,662	2,513,352,998	3,027,219,265	3,263,730,029	3,511,772,361	3,767,581,634
Total EFDR		8,976,466,066	596,997,534	857,599,510	1,161,409,989	1,416,911,312	1,528,800,585	1,628,040,133	1,786,707,003
Total CF		6,552,423,028	444,944,443	638,417,107	858,507,216	1,030,210,429	1,109,470,097	1,192,582,076	1,278,291,660
Total ESF		3,684,147,618	233,136,786	358,285,045	493,435,793	580,097,524	625,459,347	691,150,152	702,582,971
EFARD		7,100,000,000	611,000,000	824,000,000	1,040,000,000	1,108,000,000	1,139,000,000	1,172,000,000	1,206,000,000
EPF		209,000,000	14,000,000	20,000,000	27,000,000	34,000,000	36,000,000	38,000,000	40,000,000

The annual allocations from The European Fund for Agriculture and Rural Development for Fishing were included for informational purpose regarding the demands of Council Rules nr. 1083/2006.

The next diagram presents the procentual distribution of Romanian National Strategic Environment of Reference allocations on Operational Programs.

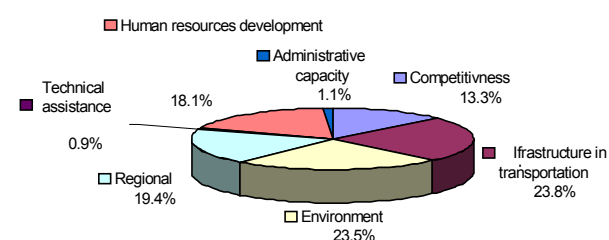


Figure 1. The RNSER Allocations on operational programs

The new rules about The Structural and Cohesion Funds forecast that the EU funds could be co-financed by the Member States. The maxim level of EU contribution is established by the Council Rules nr. 1083/2006, according the EU financial perspectives for 2007- 2013.

Romania can benefit by a financial communitarian maximum installment at the level of OP 85% for all three funds: EFARD, ESF, and Cohesion Fund.

The RNSER allocation within the “Convergence” and Cohesion Fund objective needs a national co-finance estimated at 5.07 billion Euro, proceeded from public sources (2/3 from the total of co finance) and from private sources(1/3).

The public co-financing will be assured from the budget by the Romanian Government and by the local budgets from the public authorities which will apply structural instruments for financing.

Considering the lowest financial capacity of many local authorities to assure this co-financing, the Romanian Government decided to reduce as far as possible the local budget contribution.

Thus, the principle which will be applied in the operational programs tell us that the personal co-financing which the local authority need to assure for a project will be in general 2% from the eligible value, a major exception being the projects which generates incomes.

Consequently, the approved contribution of the local authorities is under 5% from the total of national co finance. Although we must mention that the introduction of the tax unique quota of 16% from January 2005 generates supplementary incomes for the local authorities, which should improve their capacity for financing development projects.

On the other hand, a major rule was approved in 2006 to facilitate the access to the financing of that local authorities which haven’t enough personal resources for projects co-financing.

The law of local public finance nr. 273/2006, in force from 1 January 2007, raised the contribution level of local authorities from 20% at 30% from personal resources.

More than that, it was an increased share in order to equilibrate transfers from the budget to the local budgets of the allocated funds for the co-financing of the project with foreign financing.

Concerning the NGO's, there were taken into account the limited financial instruments, in the light of the major support which the NGO should give in the implementation of Structural Instruments, especially for the human resources. So, it was established that the same principle of a personal co-financing, around 2% from the eligible value of the project would be applied for the NGO, too.

The private co-financing will be necessary for the projects applied to the private beneficiaries, such as the enterprises.

For the operations implying state grants, the maximum intensity of the public support (EU funds + the contribution of the state/local budgets) will be respected.

The intense promoting of the financing opportunities appeared as the result of the structural programs contributes already at the preparation of a substantial portfolio with private projects and will give time to the private beneficiaries to plan the financial resources, so that they can assure the necessary co-financing.

During the 2007- 2009, Romania will get like pre-financing 7% from EFARD and ESF allocations for 2007-2013 and 10.5% from the allocation of the Cohesion Fund, according to the Council Rules nr.1083/2006.

The others experience from the new Member States showed that, often, the projects promoters couldn't find the necessary financial resources to assure the projects cash flows.

This aspect resulted according to either in the impossibility of starting the programs or in their delay.

So, Romania intends to use a part of pre-financing funds from the European Committee after the pre-financing, the programs approval potential beneficiaries being the central and local public authorities and the NGO.

In case that the EU pre-financing will not be enough to cover the necessary for the pre-financing for a year, there will be allocated supplementary resources from the state budget.

The Council Rules nr.1083/2006 allows the Member states to assure the constitution of a National Performance Reserve (3% from the Structural and Cohesion Funds which will be allocated in 2011 to the most performant programs).

The allocation of this reserve during programming period could generate major and non necessary difficulties.

Therefore, Romania will not exercise this operation during programming period 2007- 2013.

In the present context the implementation of the Operational Programs will be difficult without taking into consideration other factors.

The Council Rules nr.1083/2006 provide a National Reserve for unknown situations (an allocation about 1% from the structural funds which will be used just in case of emergency situations).

Because this type of reserve is new, it doesn't exist experience about the criteria of using it, so that it is quite difficult now to make anticipations now. It's not provided that Romania will constitute a reserve for the unknown situations.

Investments areas and the beneficiary of Operational Programs (2007- 2013)

Table 3

Operational program	Types of pre financing project	Eligible beneficiary
OP	- improving the development of SME and the support modalities.	- local authorities.
The growing of economic competitiveness (EFARD)	- financial assistance for the investments in SME considering the productivity growing, setting up new jobs, obtaining quality standards.	- other public authorities which organizes courses at local level, sanitary and social assistance units.
	- recommendations and consultancy for SME (marketing, exports, innovations, networks).	- companies supplying the municipally services (transport, water, gas).
	- tourism promotion.	- transport services suppliers.
The Ministry of Economy and Commerce	- technologic transfer facilities and special connected services.	- business environments and tourism agencies including the Chamber of Commerce.
	- risk capital for SME with technological transfer.	- other active NGO (in environment protection, social protection, education).
	- improving the research facilities, concerning the economic development R&D/initiatives of industrial networks.	- partners from the private field (in some conditions).
	- support for supplying services for communications substructure and information technology (IT), in the aim of solving the market failures.	- local communities groups.
	- initiatives for growing the utilization by the SME's of CTI.	- Romanian Society of Radio- communications.
	- initiatives of e- governance, e- education, e- health, e- commerce.	- The National Company "Poșta Română" SA.
	- initiatives for growing the energy efficiency and connecting at the European networks of energy supply.	

Operational program		Types of pre financing project	Eligible beneficiary
OP Transportation (EFARD/CF)	The Ministry of Transport	<ul style="list-style-type: none"> - the rehabilitation and the modernization of network system, including the lay out of passages and initiatives for pedestrians for a safety traffic. - the lay out of highways bounded at trans - European network systems - the modernization of national railway networks, including the improvement of tickets issue and information services. - rehabilitation and modernization of ports and airports, including better facilities for the travelers. - the improvement of navigation conditions in Romania. - urban transport. 	<ul style="list-style-type: none"> - governmental institutions from the transport. - the National Railways Company. - The National Company "Highways and National Roads from Romania". - other partners from private field (in some conditions). - the ports, waters and airports administration.
OP Environment (EFARD/CF)	Environmental Waters Ministry and	<ul style="list-style-type: none"> - the rehabilitation and the lay out of the substructure for: - supplying the drinking water; - the treatment of worn - out waters. - the collection of waste, including integrated systems of waste management. - air quality protection. - environment projects and initiatives for promoting: - the prevention of floods risk, gliding earth, earthquakes. - the nature conservation. 	<ul style="list-style-type: none"> - public authorities active in protection environment field. - non- governmental suppliers in environmental substructure. - other partners from the private fields. - specialized research and development institutes in environmental field. - the NGO for environmental protection.
PO Regional (EFARD/CF)	European Integration Ministry	<ul style="list-style-type: none"> In the context of regional development strategy - the improvement of polluted ground and of polluted water flows and other improvements for the protection of the environment at the local level. - the development of the emplacements for new businesses and tourism activities including the utilities supplying. - building and renovation the spaces for business and tourism. - modernization actions in undeveloped urban zones through local strategies, including the development of businesses at the community level. - local and regional transport substructure and the improvement of public transports. - renovation of health and social assistance units, in connection with the economic development. - building and renovation of the educational units, in relation with the economic development. 	<ul style="list-style-type: none"> - local authorities. - other public authorities which organize courses at local level, sanitary units, social assistance units. - companies which supplying the municipally services (transport, water, gas). - transports services suppliers. - business environments and tourism agencies including the Chamber of Commerce. - other active NGO (in environment protection, social protection, education). - partners from the private sector (in some condition). - local community groups.
PO The development of human resources (FSE)	Labour and Family Ministry	<ul style="list-style-type: none"> - preparation, guidance, consulting and staff list for unemployment. - preparation and consulting for the knowledge and productivity improvement of the staff. - special initiatives having as purpose the facilitation of women access to the jobs. - improvement actions for the access at work for the people from disfavored groups (like gipsy, peoples with handicap, or from rural fields). - the improvement of education systems - the development of educational curriculum and trainings for teachers. - actions for the improvement of the access at education for the people from disfavor groups (like gipsy, peoples with handicap ,or from rural environment). - the promotion of the continuous learning concept. 	<ul style="list-style-type: none"> - county Agencies of Labour. - education institutes. - other participants from the private field (in some conditions). - national institutes about labour, social protection, training. - institutions implicated in promoting of equal rights. - The Association of Business men. - other NGO. - universities. - school inspectorates. - national education institutes.
PO Technic Assistance (FEDR)	Public Finance Ministry	<ul style="list-style-type: none"> - socio- economic research in a close touch with the PND development. - programs evaluation. - improvement actions for experience change between different institutions which are implicated in the administration of Structural Funds. - preparation and institutional construction. - support for the Operational Program administration. - information and publicity concerning the Structural Instruments. 	<ul style="list-style-type: none"> - all institutes implicated in the administration of EU structural instruments. - the partners organizations in the implementation of Operational Program.

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The Standard-cost Method: the Best Answer for the Effective Management of the Value Side of the Manufacturing Process and Raising Economic Efficiency

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Abstract. *The determination of the production cost has a special importance in decision optimizing due to the functions this economic indicator fulfills in the industrial plants. Production potential maintenance of a plant depends on how it succeeds to recover the cost of the accomplished use values by marketing and its prosperity and rhythm of development depend on the difference between the sums cashed from selling the products and the expenses incurred in obtaining and marketing them. Operative determination of the indicators regarding production costs as well as the permanent exercising of administration control per responsibility centers, by measuring the results of the activity carried out within such centers, are requirements that the piloting of the plant depends on in order to achieve economic efficiency.*

Key words: accounting information; standard-cost method; standard costs; manufacturing expenses.

Within the general objective of raising competition, the development of the machine building industry in Romania must target, as sub-objectives, not only stimulating exports but also promoting an import policy, able to support modernizing and re-engineering the industry according to world tendencies. Promoting a coherent policy, compatible with the mechanisms of the European Union, a policy which targets to restructure the economy as a whole, develop and modernize the physical, scientific and social infrastructure, re-vitalize the industries with competitive potential, develop agriculture, support the activities based on information technology, develop tourism and services, etc., is one of the desiderata pursued by Romania between 2001 and 2004 as well as of now, in order to re-launch the national economy.

The preoccupation of any organization is mainly to cover its manufacturing costs and to obtain as possible a high profit. In the conditions of market economy, a plant

that does not cover its manufacturing expenses, which is therefore not efficient, wastes its capital and gets bankrupt. Reducing the manufacturing cost constitutes a very important side of the management of an economic activity, with major implications in maximizing the profit. In the conditions of competition economy, the selling price of the products is established by the market, by confronting the request and the offer. Profit obtaining depends on the capacity of the machine building plants to manufacture high quality goods at as low a price as possible that they can sell for competitive prices, thus valuing the manufacturing factors they have available appropriately, as long as they have no possibility to act upon either the prices of the manufacturing factors that they purchase or the prices for which they market their own products.

The decisive role in minimizing costs is held by increasing the efficiency of the manufacturing factors used depending on innovation, on improving the resource saving spirit. Factor

consumption per product depends on resource administration, on the way they are managed, on the preoccupation each plant shows in reducing or avoiding waste.

Before cost calculation, irrespective of the calculation taken into account (forecast or effective), a complex analysis must be made as to manufacturing expenses in order to select and define them for the main plant activities, for the areas or sectors that caused them, according to the finishing degree of production, as well as according to the period of time it takes for the production causing such expenses to be manufactured. This way, in each calculation period (month, semester, year), only those expenses directly or indirectly connected to the manufacturing of the products during such period must be included within the manufacturing cost, irrespective of the moment when such expenses have occurred.

The model of cost calculation must determine production expenses according to their type, according to their nature, on cost places that caused them and by allocating them from places to calculation objects, should establish the cost per final expense bearers (products, works and services) that consists the object of activity of the plant. According to such cost calculation models, the budgeting, accounting, control and operative analysis of manufacturing expenses per types, places and final cost bearers can be made. These models provide information as to what regards the level of pre-established expenses (budgetary or standard) and of the effective ones. By comparison, the deviations necessary to appreciate economic efficiency and adopt the decisions regarding the management of the value side of manufacturing should be assessed according to types and causes.

The main purpose of improving and varying cost calculation methods in the machine building industry is to make them more operational and efficient in supplying the information necessary to the management in taking its decisions. The present cost calculation methods used in the machine building plants – global method and the method per orders – by which a historical cost is determined a posteriori used in deducting and post factum justification of manufacturing expenses does not offer the management the possibility to fully satisfy its need for information. This derives from the fact that such methods do not allow the efficient determination of the effective expense deviation from the pre-established ones (budgeted) in order to be able to interfere while “on the job” in correcting the non-conformities that produce disorders in carrying out the manufacturing process and bringing back to its normal framework. Applying such methods only a post-operational determination of the effective expense deviation from the pre-established ones can be made upon the accountancy deducting performed at the end of the administration period, when the non-conformities that have produced disorders have either

grown in proportion or been remedied in the meantime and therefore, the moment that the non-conformity was produced has been overcome and when, more than often, the conclusions drawn by analyzing the deviations are no longer necessary and timely.

The standard-cost method provides information regarding manufacturing costs with effective, forecast and operational character. *We consider that, in the machine building industry, these objectives can be achieved by using the standard-sole cost alternative of the standard-cost method.* This way managerial accountancy becomes from a registration with historical character that registers and reports the facts that have taken place, having no operational and efficient power of informing, a modern managing instrument.

According to concept of the standard-cost method, unit manufacturing costs should be calculated in advance using pre-established measures in this aspect and while the manufacturing process is being carried out, efficient follow up of the expenses it causes is organized, so that, by comparison with the standard costs, the deviations on expense places and on causes may be established so as to perform a rigorous control of the costs.

In the original acceptance of the method, the actual cost should no longer be calculated because the standard cost is considered scientific cost and real cost at the same time, for which reason any deviation of the actual costs from standard ones is considered a deviation from the normal and must therefore be ascribed directly to the financial results. Nevertheless, according to the Romanian regulators, the possibility of calculating the actual costs of the obtained production is not excluded. This is done by adding to or, as the case may be, subtracting from the standard cost the deviations taken over from the administration accountancy, which shall be followed up not only according to expense places and causes but to products, as well.

An advantage in using the standard-cost method is also that, although it is based on the concept of total costs using manufacturing expense classification as direct and indirect, it also uses manufacturing expense classification as variable and fixed, which allows cost analysis compared to manufacturing volume and the calculation of certain indicators specific to the direct-costing method (balance point, point of optimum activity, coverage factor, coefficient and safety interval), necessary in adopting scientifically based decisions.

Therefore, with the aid of this method an efficient control of the way in which material and live labor resources are consumed is performed by distinct, permanent and full follow up of the deviations throughout the carrying out of the activity and not at the end of the administration period as in the classical methods, both in efficient registration as well as in accounting, globally and according to causes, from the moment of their occurrence, their identification, respectively, and until they are distributed upon the financial results.

Deviations have a central position in the general concept of managerial accountancy based on using standard costs. They reflect the extent to which the activity is organized, keeping or not keeping with the stage scheduled in the manufacturing, supplying and marketing process. As of which decision orientation regarding the administration of machine building plants makes it critically necessary to know these deviations as a premise for effective informing the decisional factors in the machine building plants as to the non-conformities occurred during the manufacturing process.

The premise of improving the organization of direct manufacturing expense accountancy applying the standard-cost method in machine building plants is knowing the technological process and the manufacturing schedule for a one-year period.

The following are comprised in the category of direct manufacturing expenses within plants in the machine building industry: raw material and direct material consumption; semi-fabricated consumption from its own production; direct salaries and contributions to insurance and social protection. All these represent distinct calculation items in the structure of the manufactured production cost and hold around 65% of it.

Direct standard expenses are calculated by applying the quantity pondering procedure with the prices or tariffs; the consumption and time regulations or standards are multiplied to the supply prices or the standard or regulated salary tariffs to the manufacturing quantity scheduled to be manufactured in the respective department, respectively.

Organizing and carrying out the manufacturing process in the basic departments of the plant also causes, besides direct expenses, a series of indirect expenses caused, on the one side, by the maintenance and operational activity of the equipment and, on the other hand, by the organization and management of the manufacturing process in the main departments. They consist of several simple expense elements of different nature and have a different economic destination. In the structure according to calculation items of the standard cost, these expenses are to be found as overhead expenses.

Specialty literature (Călin, Cârstea, 2002) recommends two procedures for the calculation of standard indirect expenses that are overhead expenses: the global procedure and the analytical procedure according to groups and types of expenses. In machine building plants, we recommend an analytical procedure be used as a procedure which provides much more accuracy.

When the analytical procedure is used, the overhead expenses are established according to their type, having the same calculation basis as above, but taking into account their invariable or fixed character.

Due to the fact that within the structure of standard cost overhead expenses turn out on as a global position, on the one hand it is necessary to deduct the expenses of the auxiliary departments on main departments and, on the other

hand, it is necessary to distribute the general administration and selling expenses on the budget of general manufacturing expenses (overhead expenses) of the main departments.

The works of drawing up the cost standards according to calculation item regulations is completed by filling in the standard cost charts per product. A last stage in establishing the unit standard cost is to distribute overhead expenses upon the costs per product.

In the plants of the machine building industry, distributing indirect manufacturing expenses in the cost of the manufactured products is made by using procedures based on certain criteria or conventional distribution keys. Upon choosing there procedures, it is especially important to take into account the fact that there must be a causality connection between the indirect expenses to be distributed and the distribution basis or criterion, reason for which it is necessary to vary the distribution procedures and criteria of such expenses.

After calculating the standard expenses with the raw and direct materials, it is the important task of managerial accountancy to follow up, highlight and register the effective expense deviations from the established standard level.

Deviation establishing is of great importance in quantifying accurately the effectively achieved consumptions. This recording must be organized so as to provide establishing deviations in an operational manner throughout the manufacturing process, according to types, places and generating causes. Deviations from the standard expenses with raw and direct materials may be deviations from the standard consumer quantities and deviations from the standard supply prices.

Within the plants in the machine building industry, we suggest that quantity deviations be determined by issuing documentation, or material return, respectively. According to primary recording documents of expenses with raw and direct materials – consumer receipts and limit consumer chart – the additional consumptions are centralized and the returns are registered in different columns within such documents.

At the present moment, efficient follow up of raw and direct material consumption within the machine building plants is achieved through consumer rules, which limit themselves to the quantitative aspect and is made for statistical reports and not so much for informing the decision factors within the plant. Direct reflection of the deviations in the issuing documents is performed in case additional quantities are requested (over the standard ones). The additional requests may have different causes: re-conditioning and replacing factory rejects, use of materials with non-conformities from qualitative point of view, etc. The raw materials and materials not used or saved are reflected separately in handing over, return receipts to the warehouse.

In these conditions, applying this method of determining the deviations in the machine building plants may lead to getting accurate information and reflect efficiently upon quantity deviations.

The assessment and analysis of the deviations from the standard expenses with the direct wages, including the due insurance and social protection contributions, is an important problem that needs to be solved during the production process. In order to effectively assess the deviations, managerial accountancy and cost calculation must be organized so as to ensure, through systematic registrations, the comparison between the standard costs with manual labor to the actual costs.

The deviations from the standard costs with manual labor can be deviations from the standard working time and deviations to the standard wage tariff⁵. The causes of these deviations in the machine building industry can be: executing additional operations, unforeseen in the manufacturing process, using improper machinery or machinery other than the ones provided for when forecasting the cost, non-conformities in the manufacturing process, etc.

The other expenses regarding manual labor, social insurance, health insurance and the unemployment fund contributions, respectively, are determined by applying the existing percentage quotas in force on that date to the standard expenses with the salaries and, to the deviations, respectively, in whole and according to causes.

The direction for improving the accountancy of the indirect manufacturing expenses take into account, on the one hand, the calculation and documentary assessment of the deviations to these expenses and, on the other hand, the analysis of such deviations in order to establish the causes that triggered them and consequentially the decisions to be taken.

The identification and the effective monitoring of deviations in indirect manufacturing expenses present certain particularities towards the other calculation items (direct expenses), due to the complex and uneven character of making such expenses throughout the administration period. For this reason, the methodology for determining and effective identification of the deviations in this calculation item differs according to the expense elements comprised in its structure, depending on the methods used for budgeting such expenses.

The directions for improving managerial accountancy of manufacturing expenses in the auxiliary departments aim to effectively identify the effective expense deviations from the standard ones and analyze the deviations on fields and causes and deduct them, for the purpose of calculating the actual cost of the resulting production. These requirements are solved similarly as in the main departments.

In the case of the general administration expenses, the effective identification of actual expense deviations from the standard ones, as well as their analysis and deduction with the purpose of calculating the actual production cost, represents one of the improvement directions. These problems are solved in similarly to those of the general expenses of the department.

The actual costs for the machine building industry plants are determined methodologically passing through a series of stages carried out in a well-established sequence, as follows: first, the actual costs for the auxiliary production are calculated; the actual costs for the main production are calculated. This order of sequence is determined by the fact that the expenses occurred with auxiliary activities can be found, from calculation point of view, as expense elements, either on main department level or on the level of the administration and management sector of the plant as a whole or on marketing production level, depending on the destination of the production supplied by the auxiliary departments.

As a conclusion, with the aid of the standard-cost method, an efficient control can be performed with respect to the way in which material and live labor resources are used by a distinct, continuous and full follow up of the deviations throughout the activity and not at the end of the accounting period, as in the classic methods, both in effective registration and in accounting, on the whole and according to causes, from the moment they appeared or were identified, respectively, until the moment they were distributed onto the financial results.

Management on the basis of pre-established measures such as standard costs, corresponds to the principle of the management method based on objectives and confers accounting a major importance, in its position as supplier of useful information for taking decisions and corrective measures.

In these conditions, accounting becomes more and more, at the level of plants in the machine building industry, an administration instrument, an instrument used in managing the plant, since its main mission is no longer to determine the manufacturing cost, but to control if this cost, previously determined, was observed by the heads of the activity departments. This way, it gains an active role in determining the economic consequences of the measures taken, in following up the effect of such measures and, implicitly, in reducing the due costs of the products obtained.

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The International Trade in Global Economy



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Abstract. *The intensification of the globalization of the world economy is the result of the amplification and diversification without precedent of the material, financial and human flows between the world's states.*

The international commerce has known in the last period a strong expansion, almost uninterrupted, surpassing the industrial production growth and PIB on a world scale.

Among the PIB evolution and the evolution of the world commerce there is a strong relationship of correlation, fact shown by the linear correlation coefficient.

The structure on exports of country categories confirms the fact that the process of globalization has been fully completed in the world.

Romania, through its achieved economic opening, has boosted its participation to the international economic trades. In this way there is a chance for Romania's economy in the future to become more competitive, even though in the present our country faces serious problems concerning the strong deficit of the foreign trade balance.

Key words: global economy; linear correlation coefficient; competitiveness; trade balance; economic opening.



Globalization is a trendy concept in social sciences, a term frequently used by economists, a reality politicians often pertain to. The beginnings of globalization started with the first exchanges of merchandise between the various regions of the world and finally between national states. Basically, what we considered for a very long time to be world economy was grounded only on the exchange of merchandise and services made by the countries of the world.

We can appreciate that globalization is an evolutionary process. In a commercial aspect, the amplification of the export and import activities emphasizes the actual process of globalization.

The last 285 years, with a sole exception recorded between 1913 and 1950, were characterized by the rapid

growth of the international commercial exchanges, in comparison to the world economic growth. During 1720-1913 the growth of the international commerce was 1.3 times larger than the GDP increase. The period 1913-1950 included the two world wars and the great economic crisis of 1929, fact that lead to an outmatch of the international commerce growth by the economic growth on the level of promoting protectionism, with the latter being pretty anemic. Throughout the last 55 statistically emphasized years, the international merchandise commerce has evolved in value from 61 billion dollar in 1950 to 10,120 billion in 2005, which represents a multiplication of approximately 166. This accentuated dynamics was partly due to the growth of the physical volume of the merchandise traded

outside the border and on the other hand to the growth in the prices of these merchandises or the depreciation of the exchange rate, especially the American dollar. The evolution of the annual average growth rhythms of the world commerce in this last period was as follows: 6.4% (1950-1960); 9.3% (1961-1970); 20.3% (1971-1980); 8% (1981-1990); 6% (1991-2000); 14% (2001-2005). For comparison we must mention that the increase recorded by the exports of merchandises was approximately 1.65 times larger than the growth afferent to the global production.

When analyzing the evolution of the value of exports we must consider the tendency of the prices, which is generally growing. Thus the average growth of the international prices in 2005 in comparison to 2004 was 6.5%, which can be considered to be reduced if we take into account that in 2004 an average increase of 11% was recorded in international prices, unlike in 2003. In 2005 the international prices grew in comparison to the previous year, varying from 3% with produces to 35% in the case of oil and derived products.

The territorial distribution of the growth of merchandise exports was, by far, considered to be uniform. During 1950-2005 western Europe (from 31% to 39%) and Asia (from 13% to 28%) recorded growths of the weights of their own exports in the world total and decreases were recorded by north America (from 27% to 14%), Latin America (from 12% to 3.5%) and Africa (from 7% to 3%). After a significant increase recorded in Central and Eastern Europe in exports with merchandise in the 70's, the former socialist countries

in this area recorded a sudden decrease of the value of exports, holding, in 1991, a weight of only 2.6% of the world total. The evolution of the 19 countries straightened – 8 of them accessed the EU in 2004 – in regard to exports, whose weight in the world total reached 7.7% in 2005.

The accentuation of the international interdependencies through commercial fluxes resulted from a major mutation, which took place in the area of world commerce: the cross from basic products types of reports structures versus manufactured products (interdependencies between sectors, characteristic to the first half of the century) to manufactured products types of structures versus manufactured products (interdependencies between sectors) and then to the exchange of products within branches of the industry or within groups of products (industrial interdependencies). The development of the industrial commerce mirrors the progressive deepening process of the international work division in the decades that followed the ending of the last global conflagration.

On the other hand, the statistic data concerning the distribution of the world commerce on categories of countries show that the process of internationalization did not take place homogenously in the global economy. In 2004 the weight of various groups of countries in the international merchandise commerce was as follows: developed countries – 63.0%, developing countries – 33.5% and countries with economy in transition from south-eastern Europe and CSI – 3.5%.

The structure of the global export of merchandise on categories of countries

Table 1

Economic regions	Years										
	1980	1990	1995	1997	1998	1999	2000	2001	2002	2003	2004
World	100	100	100	100	100	100	100	100	100	100	100
Developed Countries	65.27	72.04	67.78	68.03	69.98	68.77	65.72	66.29	65.54	64.84	63.07
Developing Countries	29.47	24.26	27.61	29.31	27.65	28.98	31.64	30.93	31.64	32.09	33.46
South-Eastern Europe and the CSI	5.26	3.70	2.62	2.66	2.37	2.24	2.64	2.78	2.82	3.07	3.47

Source: World Trade Report 2006.

The analysis of the global commerce of services must always start from their characteristics, namely: they can not be stocked, there is simultaneity between their production and use, they can not be resold etc. For this reason the weight of services in the total global exports is relatively small: 19.3% in 2005. During 1990-2005 the multiplication coefficient of the value of exported services (2,9 times) was relatively close to the one recorded by

exported merchandise (2.8 times). We must not forget that due to the fact that services are not transferable, the majority of FDI stock entries on a world level (61%), at the end of 2004, endorsed this sector of activity.

A significant liberalization of the national markets took place in the last 20 years, in the services area. Be that as it may, we can say that except for financial services there are few global markets in this domain.

The evolution of merchandise and services exports on regions

Table 2

The Region	The Category of Export	Years							
		1991	%	1995	%	2000	%	2005	%
World Total	Products	3515	80.9	5122	81.1	6430	81.4	10121	80.7
	Services	826	18.1	1191	18.9	1465	18.6	2415	19.3
	Total	4341	100	6313	100	7895	100	12536	100
Europe	products	1712	80	2404	80.9	2774	79.2	4642	78.5
	services	428	20	566	19.1	726	20.8	1268	21.5
	total	2140	100	2970	100	3500	100	5910	100
North America	products	549	76.6	777	77.6	1058	77.3	1478	77.8
	services	167	23.4	224	23.4	310	22.7	420	22.2
	total	716	100	1001	100	1368	100	1898	100
Latin America	products	145	87.5	229	83.8	359	85.6	351	83.7
	services	31	12.5	44	12.2	60	14.4	68	16.3
	total	176	100	273	100	419	100	419	100
Africa	products	100	84.0	112	81.1	148	82.6	296	83.8
	services	19	12.5	26	18.9	31	17.4	57	16.2
	total	119	100	138	100	179	100	353	100
Middle East	products	123	100	152	100	261	88.1	529	90.7
	services	-	0	-	0	35	11.9	54	9.3
	total	123	100	152	100	296	100	583	100
Asia	products	886	83.0	1448	81.3	1830	85.7	1826	83.7
	services	181	17.0	331	18.7	303	14.3	548	16.3
	Total	1067	100	1779	100	2133	100	3374	100

Source: calculated based on the World Trade Report 2003 and 2006.

There is a direct connection between the dynamics of global exports and the dynamics of the global GDP. The fact that throughout the entire analyzed period – except for the period between the two world wars – the annual average growth rhythm of merchandise and services exports outmatched the one recorded by the GDP, entitles us to say that the global market's ability of absorption increased.

In order to emphasize the connection between the dynamics of the global GDP and that of global exports, during 2001-2005, we can use the linear correlation coefficient:

$$C_c = \frac{\sum_{i=1}^5 (e_i - \bar{e})(p_i - \bar{p})}{\sqrt{\sum_{i=1}^5 (e_i - \bar{e})^2} \times \sqrt{\sum_{i=1}^5 (p_i - \bar{p})^2}}$$

Where:

C_c – linear correlation coefficient;

e_i – the deviation (growth or decrease) of the value of export in the year i in comparison to the year $i-1$;

$\bar{e}$ – the arithmetic mean of the annual deviations of exports in the five analyzed years;

p_i – the deviation of the value of GDP in the year i in comparison to the year $i-1$;

$\bar{p}$ – the arithmetic mean of the annual deviations of the GDP in the five analyzed years.

The meaning of the results is the following:

- $0 \leq C_c < 0,2$ - there is no significant connection;
- $0,2 \leq C_c < 0,5$ - there is a weak connection;
- $0,5 \leq C_c < 0,7$ - there is a medium intensity connection;
- $0,7 \leq C_c < 0,95$ – there is a strong connection;
- $0,95 \leq C_c \leq 1$ – there is an extremely powerful connection.

The evolution of the annual global deviations of exports and the GDP during 2001-2005

Table 3

Indicator	years				
	2001	2002	2003	2004	2005
The annual deviation of exports (e_i)	-251	405	1313	1904	1403
The annual deviation of the GDP (p_i)	-524	1223	3944	4422	3714

Source: estimates made by the author based on the data offered by UNCTAD.

$$\bar{e} = \frac{-251 + 405 + 1313 + 1904 + 1403}{5} = 954$$

$$\bar{p} = \frac{-524 + 1223 + 3944 + 4422 + 3714}{5} = 2555$$

$$\begin{aligned} \sum_{i=1}^5 (e_i - \bar{e})(p_i - \bar{p}) &= (-251 - 954)(-524 - 2555) + \\ &+ (405 - 954)(1223 - 2555) + (1313 - 954)(3944 - 2555) + \\ &+ (1904 - 954)(4422 - 2555) + (1403 - 954)(3714 - 2555) = 7234155 \end{aligned}$$

$$\begin{aligned} \sum_{i=1}^5 (e_i - \bar{e})^2 &= (-251 - 954)^2 + (405 - 954)^2 + \\ &+ (1313 - 954)^2 + (1904 - 954)^2 + \\ &+ (1403 - 954)^2 = 2986408 \end{aligned}$$

$$\begin{aligned} \sum_{i=1}^5 (p_i - \bar{p})^2 &= (-524 - 2555)^2 + (1223 - 2555)^2 + \\ &+ (3944 - 2555)^2 + (4422 - 2555)^2 + (3714 - 2555)^2 = \\ &= 18012756 \end{aligned}$$

$$C_c = \frac{7324155}{\sqrt{2986408} \times \sqrt{18012756}} = 0,98$$

The result that fits the last category of evaluation shows that there is a determining connection between the evolution of global exports and the evolution of the global GDP.

The intensification of the international commercial relations in the contemporary period is the result of various factors, such as:

- The technical and scientific revolution generated, through technical progress, a deepening of the international work division with direct consequences on production specialization;

- Promoting a liberal politics in the international exchanges area, GATT/OMC playing a decisive role in the elimination of cost barriers from the commerce between countries;
- The amplification of the regional economic integration processes, which took place in all the corners of the world, at a different extent, including all the categories of countries.

In regard to the territorial expansion, but especially in regard to the intensification of the commercial exchanges, we can state that the world is globalized. Comments must be widened with appreciations concerning foreign direct investments fluxes, international migration of work force, the activity of multinational firms on foreign markets etc.

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The Stress' Management and Time Budget



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Abstract. *The present study has as central objective the introduction of a succession of concrete findings, more precisely the spotlight of the relation between the time budget, stress and behaviour (A or B) in a military organization. The study's premise lays on the assertion that military environment, a petitioner environment takes to the growth of stress because of the negative disparity between the weight of time destined discharging job tasks and the weight of time earmarked relaxation and other needs.*

Key words: stress; eustress; distress; stress' management; time budget; behavior A and B.



5F in REL system

Perhaps never before life haven't been as stressing as in the third millennium or perhaps each one of use has the tendency to appreciate his "time" as an apogee of all tasks. In modern life conditions our capacity to adapt is more and more asked for. The quality of adaptive answers is permanently subdued to new exigencies: the growth of intellectual worked up behaviours; the increase of social competition; the necessity of taking important decisions in a very short time; and time elapses in a different way in "speed's century". Before time wasn't that short, the fight for existence that violent, the people that nervous. Time had become a mainspring of everyone. It is present everywhere, starting with economic medium, where it identifies with gain and ending with relaxing moments, it seems time is never enough. Captured between the desire of enjoying our spare time and the desire of fulfilling our professional duties we found ourselves fighting, of course, against time, fighting against us. The tensions that follow from this fight, that has time as common denominator have repercussions on us, causing a succession of psycho-conductor alterations, varying from confusions and depressions to aggressive answers or, on the contrary, to blocking answers.

I . Introduction in stress problems

The stress phenomenon is, nowadays, intensely studied, the beginning been made especially in the inter-war period, when stress was appreciated as a mass phenomenon, as a disease of great extension, generated by the complexity and accelerated rhythm of social life.

The word stress comes from Latin word "stringere" which means to embrace, to injure and that gave birth to French word "detresse" and to English word "stress". The later signifies the notion of compulsion, of force, of solicitation and designates any aggression coming from the environment or any tensional mood created by that.

The stress concept was introduced for the first time in the scientific language by Hans Selye (1907-1982), concept with who he revolutionized the medicine. In his opinion stress means the ensemble of body's non-specific reactions to external actions, determinate the general syndrome of adaptation. Stress, in the same author conception, runs three steps: the alarm reaction (or threat reaction) in which the organism hunts out the stressor and gets ready to confront it; the resistance reaction in which interfere the adaptive mechanisms to reduce the stress' noxious effect; the exhaustion reaction as last stage, which appears when the

stressor hadn't been neutralized due to lassitude of body's resources to fight against stress.

To stress means, generally speaking, "any force that applied to a system causes important changes of it's shape, usually with the connotation that change is a deformation. The term is used regarding body, social and psychological shape" (Brate, 2002, p. 86).

In other scientists' conception stress is defined as "the person's reaction at situations or events that ruins or threat to ruin his physiological or mental equilibrium; a physiological or mental mood, as answer to a stressor (person, situation, event from the environment)." (Iluț, Chelcea, coord., 2004, p. 348).

According to other theory, "stress is a discrepancy subjectively perceived between the environment's tasks and self-evaluation of one's own capacities" (Lazarus, Folkman, 1984). To forestall each person ways to adapt in different situations there have to be known both the stressors and the individual resources, looked as expression of personality's efficiency. As it is revealed out of Selye's conception, stress sends not to the situation that caused the tension mood, but to the organism's reaction: "Not what happens is important, but the way you react". The differences between the persons' reactions, as expression of their psychical features, become even more discernible when the persons are in time crisis, when the tasks are even more petitioner and thus trough their ampleness, duration and complexity put to the test the psychical and physiological functional capacities of persons. "The same stressors causes negative stress to some (distress), positive stress to others (eustress) and leave impassive others" (Arădăvoaicei, 1993, p. 16).

The personality's features concretize in certain adaptive styles and the research of correlations between personality's features and the conduct in difficult situations, caused by activities' solicitations made evident the adaptive ways characteristic to certain types of personality. The cardiologists N.D. Friedman and R.H. Rosenman (1974) showed that in a continuum of behaviours at one side lies the A behaviour type and the other side lies the B behaviour type. There are proves that there is a behaviour pattern describes as "A type personality" (Matthews, 1982, pp. 293-332). The major characteristic of A behaviour type is the permanent struggle with time, perception that keeps the person tensed and strained, being predisposed to cardiovascular diseases. The B behaviour type is motivated in work more of certain material advantages, using stress in his benefit, as a biological stimulant. In our study we have had precisely this relation: time budget, behaviour type (A or B) and stress.

Stress is a reality more than present nowadays. The cues frequently used: "I'm overworked", "I'm stressed" are very strong arguments in this sense. In these conditions terms as

stress or neurosis pass from the scientific language to the daily one. Being stressed means to feel overwhelmed of circumstances without knowing what to do. Stress, although seems something regular, inevitable, still when we are stressed we solve harder our problems or make decisions.

In work activity stress appears as a consequence of insufficient psychical resources to face the tasks and professional exigencies. In this case we speak of occupational stress which is often considered to have a good character to employees' performances; this is defined as *eustress* and mobilize the individual resources. It's opposite is called *distress*, it's effects affecting negative the health (Jurcău, Moldovan, 2003).

The psychical stress could be defined as an interaction modality between person and environment, involving the person's confrontation with a situation that threatens his good mood and integrity, concretized in a tensioned disposition generated by the frustration or repress of motivation moods (needs and aspirations) or by the difficulty to solve certain problems.

Thus it is necessary to consider at least two aspects: first of all the stressful condition and second, the stress mood. The stressful condition is the cause of stress, is the sum of stressors and the stress mood represents the emotional shock, the situation mental tensed at individual or group level.

As mood of psychical disposition stress reveals itself as product of the variety of pressures and forces with whom then environment act on person, as body's unorganized answer to the environment's tasks. Being released by factors that act intensely or persistently or perceived as threaten, the psychical stress is characterized by a pregnant affective presence. Even in optimal conditions of emotional equilibrium, the emotional reaction might be un-adequate to stimuli, un-adapted when the body's emotional capacity to resist is outshined by the tasks' intensity or by the violence of affective traumas.

The scale of psycho-conductor unrests specific to psychical stress is large and shaded, determined both by the nature of stressor and personality's possibilities but also by the real conditions in which stress sets.

The image of psycho-conductor modifications of stress presents itself as a diverse scale, from emotional unrests (mania, scare, psychical depression and so on), of cognitive processes (confusion, blanks) to behaviour (gesture and vocal), from the plain disorganization of activities to aggressive answers, or, on the contrary, to blocking.

II. The organisation and stress management

The stress management can be seen as an attempt to vary the subordinates level of stress towards an optimum point to achieve the maximum performance, avoiding the mental traumas associated with excessive stress. In this

process are included: the estimation of self position on stress-performance curb; the constant and active evaluation of person and environment to identify the potential stress sources, selecting and adopting the most adequate strategies to diminish stress' effects; the efficiency's evaluation of those strategies.

Management can be defined as an important social technique, as guidance and control of efforts of a group of persons in order to achieve a common goal. "A good manager is the one that makes it's group to achieve the goals in terms of a minimum expense of resources and efforts" (Mackensie, 1969, after Cornescu, Mihăilescu, Stanciu, 2003, p. 2).

Each person invested with managing responsibility at one level or other showed a specific way in thinking and acting. Style, in the context of psychosocial approach, means behaviour constant and consistency in thoughts and actions. A competent manager reveals his qualities of leader especially in tensed situations. His will stir up the others, his power reverberates in the persons he leads to achieve the organisation's (economic or normative - schools, army) goals.

1. The leader as stress manager

Managing stress differential and nuance, helped by adequate strategies, the leader can help the subordinates to change the perception upon the tasks and to adapt it to their capacities.

People react different in front of same stressors due to different perception of it's nature and also due to their different capacities to confront them. That's why the leader, as stress' manager should introduce the task differentiated, depending on the person's position on the stress-performance curve. When the personal performance is satisfying and there aren't any signs of wrong function the stress' level mustn't be adjusted.

A stress management more active should be applied when the leader plans his activities or when there are bigger or smaller signs of stress. In managing stress it is important the recognition of stress signs and decipher it's significations. Among stress signs we enumerate: incapacity to sleep or sleep without rest; irritability; the growth or the diminution of appetite; suddenly burst into tears; the lack of control and patience; confusion; the feeling that things aren't going well; difficulties in working with others; constant task of perfection for self and others (Vernon, 2006, p. 58).

At the same should understand that the number of signs and their frequencies determine the extent of somebody's stress level; a frequent sign shouldn't worry, but more signs felt frequent and during a long period of time indicate a real problem.

2. Stress sources in organizations

Identifying situations and irrational beliefs that contribute to stress emergence, in other words localizing excessive stress sources is another important stage in stress management.

The stressors are, virtually, everywhere in environment. The leader's problem is to identify the stress sources which are relevant to a strategy of stress management. Also the leader should examine systematically the environment to determine the most noteworthy stressors for particular cases. It shouldn't be forgotten that the leader, through his conduct, is always the first candidate to stress sources.

The group members can be a source of social support, but, at the same time, a source of sensible stress. Also the competition with equals for allowances, favours, promotions may generate a significant stress, especially when them, in usual situations, are looked upon as social support (they are friends, colleagues). The relation with superior may become a stressor particularly when the superior establishes the performance's standards and tasks and evaluates the achieved performance. Also the social events may represent an active stress source within the organization; in such situations the effect is rather indirect and complex.

3. Strategies of stress management

Stress management involves using "healthy" techniques and "unhealthy" techniques. The healthy techniques demand for using reason in behaviour, acting by anticipating a problem and achieving steps to impede the development of event or minimizing it's effects by taking on preventive measures. The rational thinking might be a good way to reduce the intensity of a stressor. "If we use time to think and establish priorities, some things would be unavoidable postponed and other even eliminated" (Wood, Tolley, 2003, p. 43).

The majority of techniques to adapt to stress accentuate especially the the cognitive dimension of behaviour: on one hand the situation's evaluation, on the other hand the behaviour register, which the varied it is, the more growth the chances of an efficient adaptation. The cognitive training to adapt stress has as goal to eliminate or to minimize the stress sensation by teaching the person to call, any time he needs, a pattern of rational analysis. In difficult situations we needn't to react which involves not to anticipate the problem and as a consequence to react after it had occurred. The "unhealthy" techniques (cigarettes, alcohol, drugs) aren't so useful because they often brought an increase of stress level causing a series of negative effects.

The leader can use three ways to accomplish stress management: 1. the manipulation of perception and present tasks on subordinates (strategies regarding the requirements); 2. the evaluation and, subsequent, the improvement of present perception on subordinates' capacities (strategies regarding the capacities); 3. the attenuation of dysfunctional answers of subordinates (physiological, mental and conductor answers – strategies of moulding).

The stress management general procedure starts when the leader, through varied evaluation methods, establishes that the level of individual stress is not at the optimum of performance. Generally speaking, if the leader notices the stress level is too reduced, he can increase the tasks to such a point that demands overcome the capacities. On the other hand, if the demands excess is dysfunctional, the leader should investigate the probable causes and to reduce the demands to a tolerable level or he could improve the subordinates self perception about their capacities. A third option is to try to relief the stress effects, focusing even on the demands, even on capacities or answers or any other combination.

The stress management strategies can focus on subordinates' capacities, on observing and stimulating/accelerating subordinates' abilities to accomplish their tasks. This strategies are usually focused either on adopting/amending subordinates' abilities through training, or on attempt to improve self-confidence to accomplish the task.

In most cases the leader may influence the requirements to discharge the employees' duties either by specifying the ways to accomplish the requirements either by imposing the performance's standards, but the growth of requirements' level is more tolerable if it is made gradually. A relevant example about the effect of changing the performance's standards is the preparation for an athletic competition. The performance's levels growth progressively to the optimal physical condition, corresponding to capacities and demands.

Another source of manipulating by requirements that leader may use is to negotiate resources' assignment to execute the tasks. It is not a custom leader to hold back deliberately the resources to produce stress; anyway time constrains can be used to manipulate the demands' level. If the leader ignores comments such as: "I can do that, but I need more time!" there is the possibility of dysfunctional stress. Sometimes a demand like: "We must do this report immediately!", may diminish subordinates' lethargy/inertia, improving their performance.

Changing the demand or the procedures to achieve the demand could be major sources of stress, controllable by leader. The subordinates tend to see the change as overwhelming their abilities, especially if the current procedure was installed for a long time.

Modifying subordinates' abilities by preparation can be done either through a simple correction, either by training or in school. To achieve that leader should be conscious of the essential condition that of existing the needed skills and of the difference between the existing skills and the asked dexterities.

The leader's role is not only to administer the subordinates' stress by communicative and supportive

behaviour, but also to control his own stress to maintain his capacity to action. The social support is an important process in maintaining the psychical and physical health of person, in it's accommodation, in the growth of self-esteem and in helping the person to trust people and to feel comfortable.

The group's cohesion, developed even in hard conditions, the accent on the group's role to support in the socialisation process was the factor that determined the German soldiers to keep fighting even if their defeat was almost a certitude. The same cohesion determined the Vietnamese soldiers to fight in very hard conditions during their confrontation with USA.

Exercises to built the team, controlling the socialisation process help soldiers to achieve the desired performances and to overcome the stress. Many authors suggest that fight itself causes the string of social contacts at micro-group's level.

The opened and direct communication between officer and soldier may reduce the ambiguity of the situation; in addition, asking the soldiers to talk one each other during the war reduce the psychical isolation frequently associated with stress on the battle field.

Among the important psychological factors in preventing and combating stress an essential role is hold by the high perception of personal efficiency, a person's belief that he or she can accomplish a specific task. Such beliefs influence the person's behaviour, generating more perseverance in front of obstacles and frustrations and, implicit, more chances to reach success. Exposure to stressors has diverse effects: at he negative pole, when there is a consciousness of a reduced efficiency as depressives have, there is a fast decompensation in confronting the stressors that feels up to the immune system in sense of system's reduction; at the same time, exposure to stressors, in circumstances of trust in self efficiency, doesn't lead to adverse physiological effects (Bandura, 1989, p. 420).

The self image doesn't remain a simple epiphenomena; it is associated with changes on the entire scale of bio-psycho-social system of a person. The level of self-esteem affects strongly the performances in all activities, the mechanism of causal circularity functioning uncommonly striking: the ones with a higher self appreciation have more trust, mobilize more and succeed better, which consolidate the positive appreciation about himself/herself. On the contrary, a reduced self-esteem increases the risks of failure and determinates an even sombre vision on himself/herself (Constantinescu, 2004, p. 205). The persons with grown self-esteem believe that can overcome the obstacles, stress being perceived in a reduced manner. These beliefs can be learned in time, being a very efficient possibility to combat stress.

The control place out of assigning theory distinguish two categories of subjects; those with an internal control, who considered responsible of what happened, and those with external control, considering that what happened is due to hazard or others. From these two categories the persons most affected by stress are those that felt they didn't have control on the way the events occurred (Jurcau, Moldovan, 2003). Through therapies based on the assigning theory these beliefs can be modified in order to obtain a higher internal control to reduce stress.

All psychological factors of preventing or controlling stress may impose "a series of interventions at personal level; out of these we can mention the cognitive-behaviour therapies, the relaxation techniques, the bio-feedback techniques or training programs aiming stress or time management or improving the social skills" (Bogathy, 2004, p. 184).

There are, as well, a multitude of psycho-sociological factors that may influence the stress level, such as A or B personality type, the time budget (as we have shown above and that constituted the variables of research), the self-esteem level, the optimism level and so on.

III. The empirical research regarding the relation between time budget and stress management in military organization

The methodological background of undertaken research

The research's purpose concerns the investigation on how the military use their time budget, more precisely how they use their time within a working day and a rest day (24 hours).

Research objects

The present study has as central object exhibiting a succession of findings made up from real investigation. The present research's objects are multiple and various. As main objects we found: clearing up machineries of growing up stress level against the restriction of spare time; grasping aspects of relation between the spare time volume and the volume of time spent to solve job's tasks; the analysis of time budget's structure; proving that individual differences from subject's answers are signs of their personality's particularities.

The research assumptions

The work assumptions:

- 1) if the subjects perceive the environment as been very petitioner, then the score obtained at life events scale will be high.
- 2) if the subjects are officers, then the responsibility for fulfilling their tasks will be higher and the stress level will grow.
- 3) if the time assigned to cultural-educative activities is reduced, then the stress level will grow.

The sampling

The sample is made up of 60 militaries. From 120 militaries, we selected 60, calculating a statistic step ($p=2$). In order to respect sampling's rules, it was calculated the same statistic step both for selection of officers, and for the selection of non-commissioned officers. The sample thus obtained is representative for the investigated population.

The main characteristics of studied population reveal that the population is relative homogeneous, the only particularity is the dichotomy depending on rank variable.

The sample characteristics

Table 1

Sample	No.	Environment		Sex		Legal status		
		Urban	Rural	Mail	Fem.	Not-married	Married	Divorced
Officers	40	92.5	7.5	85	15	7.5	90	2.5
NCO	20	85	15	80	20	20	80	0
Total	60	88.75	11.25	82.5	17.5	13.75	85	1.25

Methods and techniques of research

The main methods and techniques we operated with are:

1. *the investigation*: the investigation based on questionnaire; the investigation based on interview;
2. *the psychological tests method*: the scale of life events; the identification of conductor type;
3. *the observation*;
4. *the conversation*.

1. The investigation

The investigation based on questionnaire

The questionnaire was built on time budget dimension.

To operate the concept it was elaborated a list with the main activities carried on in an ordinary day by a military, the activities being grouped in: I. Activities regarding to work and II. Activities regarding spending the spare time

The investigation based on interview

Method alike the investigation based on questionnaire, *the investigation based on interview* involves spoken relations between participants, the interview being conceived as personal interview, with free answers, focused on "time budget" variable.

2. The psychological tests method

The scale of life events

This scale have been projected by T.H. Holmes and R.H. Rahe (after H.Pitaru, 1988, 61). They based on the idea that a stimulus category able to product stress are those that can interfere in a moment or other of our daily life, marking it in a certain direction (life events). Holmes and Rahe conceived a list of events through which it is possible to evaluate and accumulate some incidents that may happen during a year and may influence the health due to their stressing character.

The identification of behaviour type

The studies undertook by Friedman and Rosenman (1974, after Pitaru, 1988, p. 65), and also those that followed circumscribed the possibility of dichotomy

persons after a conductorial scheme or behaviour syndrome into persons of A type and persons of B type, not being a typical variable of personality as in Hippocrate, Sheldon or Cattell's case. Thus the persons associated with A type are characterized through a powerful desire of affirmation, competitiveness, impatience, they are always in time crisis, their gestures and language are straight and present an excessive hostility. They involve always in multiple activities, obstacles and harassing. The persons associated to B type of behaviour are the reverse of A type, being more relaxed and fight against stress in a manner less phrenetic, having a reduced level of hostility.

3. The observation

The observation, a method used in research, consisted in selective pursuit of subjects' behaviours, of their behaviour during the investigation, their reactions at some

questions, their aspect at work. For research the method was useful because it allowed to catch unaware natural behaviour in usual conditions at work.

4. The conversation

The conversation included the talk with officers and NCOs, situational conversations, depending on the particularities in which they occurred. The conversations were free and spontaneous. The advantage of this method consists in allowing getting a significant number of information in a short period of time.

The statistic transformation of research data

One of the problems the research went way to was the identification of share of each chapter in the total of time budget in a working day and in a rest day. In consideration of our purpose, the statistic transformation of research data involved especially the analysis of data obtained through the investigation based on questionnaire.

Activity weight in time budget (%)

Table 2

day activities	Programme activities	Activities outside the unit	Cultural- educative activities	Sportive activities	House keeping active.	Shifting	Diverse activ.	Physio logical needs
Working day	36.61	2.65	11.82	1.78	4.66	4.10	2.47	35.91
Rest day	3.57	3	22.82	4.79	10.97	3.98	6.15	44.70

Legend:

- 1 - programme activities, going on in the unit;
- 2 - programme activities, outside the unit;
- 3 - cultural-educative activities;
- 4 - sportive activities;
- 5 - housekeeping activities;
- 6 - shifting;
- 7 - diverse activities;
- 8 - physiological needs.

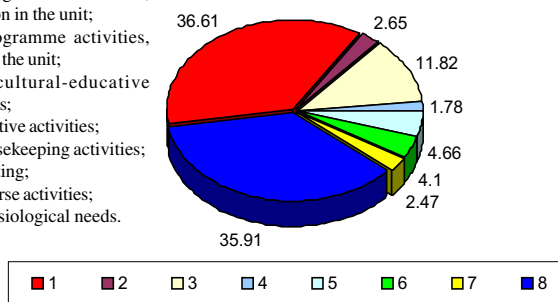


Figure 1. Activity share in a working day

The global distribution of time during the week of work reveals the conclusion that the biggest share in time budget is held by the programme activities inside the unit. Adding 2.65% that represents the time assigned to programme activities outside the unit, it notice that almost 40% of time budget is dedicated to programme activities.

After the programme activities (inside and outside the unit) it follows, as naturally, the activities regarding the physiological needs. Afterwards, arrange gradually the cultural-educative activities, the housekeeping activities,

the shifting, the diverse activities. On the last position there are the sportive activities.

Another instrument used in our research was the scale of evaluating the life events. Further on it is presented the table with position indicators (mean, median and mode), but also the maximum and minimum values obtained after testing the subjects.

Position indexes and results for stress level

Table 3

	N		Mean	Median	Mode	Minimum	Maximum
	Valid	Missing					
Stres coef.	60	0	166.77	168.00	168.00	36	351

In the following we present, the scores obtained at life events scale.

Out of the total of 60 subjects:

- 23,75% have obtained scores under 150;
- 58,75% have suffered a slight life crisis, their scores integrated themselves between 151-194;
- 13,75% have suffered a moderated life crisis with scores between 210 and 297;
- 3,75% have suffered a major life crisis. Thus 76,25% of investigated subjects had a life crisis.

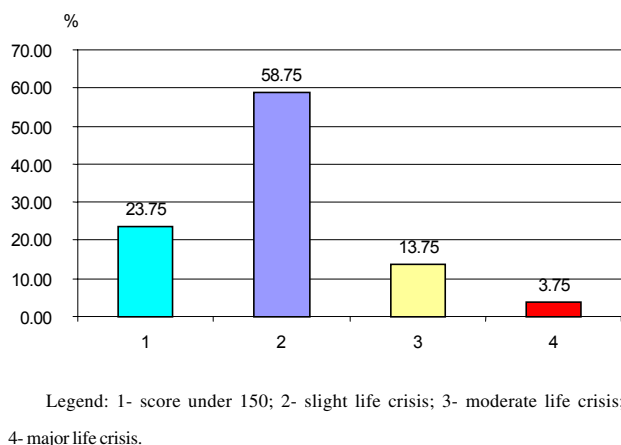


Figure 2. *The scores for the life event test*

The third instrument applied was the test to establish the subjects' behaviour. After transformation of data, we reached the following results (table 6):

Results for subject behaviour test

Table 4

	Frequency	Percent	Valid percent	Cumulative percent
Valid	36	60.0	60.0	60.0
Type A	24	40.0	40.0	100.0
Type B	60	100.0	100.0	
Total	60	100.0		
Total				

60% of subjects possess the A conduct and 40% - the B type of conduct.

The statistic transformation of obtained data included the calculus of Pearson correlation coefficients between the instruments used in the research. The correlation tables are presented further:

Correlation between test instruments

Table 5

		Sex	Rank	Behaviour	Physiological needs
The score obtained at life events scale	Pearson Correlation	.278*	.056	.625**	-.323*

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed).

The score obtained at life events scale correlates significant positive with sex ($r = 0,278$ and $p = 0,05$). At the same time it correlates strongly significant with type of behaviour ($r = 0,625$ and $p = 0,01$). The score correlates significantly negative with the activities of satisfying the physiological needs ($r = 0,323$, and $p = 0.05$). The score obtained at life events scale does not correlate with rank.

Out of correlations results that the score from life events is tightly tied with type of behaviour. Thus, the two variables correlate strongly significant, conforming the hypothesis according to the subjects that belong to A type of behaviour gather a higher score at life events scale, having a higher level of stress.

The fact that the score correlated significant positive with sex variable means that the masculine gender subjects are more stressed; consequently, the military of masculine gender have a higher level of stress.

The physiological needs correlated with the score from life events scale, but they correlated negatively, pointing out the fact that the reduced time conferred to satisfying the physiological needs during the working week has a strong implication upon the stress level.

Between the score and rank there is no correlation. Thus the hypothesis according to the tasks of an officer are more stressing than an NCO's is refuted. The stress level doesn't depend on rank or the hours spent at programme. Also, the stress level didn't correlate either with the number of hours spent by militaries at the programme.

In working days the variable time for cultural-educative activities correlates significant ($r = -0,426$ and $p = 0,01$) with the variable time assigned the programme hours, because, as it was expected, the numerous number of hours spent at programme restricts the time of the others activities.

In the correlation's tables there had been other activities that correlated, but we considered them unimportant to the undertaken research and, at the same time, logical consequences of the alteration of each daily activity weight day (working or rest) and of the interference between the chapters of time budget.

IV. Conclusions

The World Organization of Health placed, as far back as in last years, at forefront on the list of diseases with growing spread coefficient, the psychical affections. Stress lies at the ground of many such diseases, often incurable. One of the areas in which stress may appear, showing itself, is the professional area.

At work stress appears when the professional exigencies overcome the resources the human being dispose it. The professional stress is determined by the person's impact with physical and intellectual work process.

Stress is not only the result of major events, but also of daily tensions and pressures. The later, through their frequencies, have an important part in professional environment and affects more the person than the rarely major negative events.

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