CORRUPTION FROM ANTIQUE ASTRONOMY TO CONTEMPORARY EVERYDAY LIFE

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Abstract: *Physics may offer powerful tools to model social, political and economic phenomena, among them corruption. The word corruption was used in Physics and Philosophy, in Antiquity, to describe an alteration of the actual motion (behavior) of a body, with respect to that expected (due to the physical law applicable) to be, but the Physics meaning of corruption is not even mentioned in contemporary dictionaries. By analyzing the evolution of corruption in Physics the authors draw some conclusions, useful in applying Physics models to every day life.The authors give some examples starting from Physics models of the law of action-reaction, dimensional homogeneity, the use of errors besides the use of average values in Physics and apply them to economy and politics to identify, characterize and suggest how fight some types of corruption.The models fit, also, the actual situation in dealing with the State Budget deficit in 2010 Romania.*

Keywords*: Corruption, fraud on law, fiscal evasion, physics models, econophysics, action and reaction, dimensional calculus, dimensional homogeneity, error estimation*.

1. INTRODUCTION

The authors have been lead to this research by being interested to explain how it was possible to accumulate huge private wealth during world war and post-war time and more recently, after the breakdown of communist regimes in the early 1990', in Romania, Russia, Albania a. s. o., by people with low initial wealth.The media and politicians have explained this "achievements" by infringement of law, by "corruption", probably some of their members knowing it from the source. But many of the newly wealthy people, their accountants, allegate that they acted within the existing law, not infringing law. In such a case, there is being implied not the simple infringement of law but "fraud on law".

How it is defined, the term "corruption" (in French *corruption*, from Latin *corruptio)*?

In contemporary dictionaries, **"corrupt"** means : 1250–1300; ME (< AF) < L corruptus broken in pieces, destroyed; corrupted (ptp. of corrumpere), equiv. to cor- cor- + rup- (var. s. of rumpere to break) + -tus ptp. Suffix; when used as an adverb literally means "utterly broken"

In modern English usage, the words **corruption** and **corrupt** have many meanings [1]:

- Political corruption: the abuse of public power, office, or resources by government officials or employees for personal or group gain, e.g. by extortion, soliciting or offering bribes.
- Bribery in politics, business, or sport (including match fixing).
- Police corruption
- Corporate corruption: corporate criminality and the abuse of power by corporation officials, either internally or externally.
- Putrefaction: the natural process of decomposition in the human and animal body following death.
- Linguistic corruption: the change in meaning to a language or a text introduced by cumulative errors in transcription as changes in the language speakers' comprehension.
- Data corruption: an unintended change to data in storage or in transit.

Legally, corruption is an occult disregard of the law, the violation of legal provisions in their meaning and spirit [4]. This disregard of the law may be or may be not relying upon an the other law.

Frequently, in legal courts, the corruption is connected with fraud on law.

There is reckoned fraud in law, when certain legal rules are not used for the purpose for which they were enacted, but to circumvent other mandatory legal rules, that meaning when there is an infringement of a mandatory law by using an the other law.

The contemporary corruption is so important that, there are frequently mentioned institutions dealing with political corruption, from world to local levels:

- Transparency International, which since 1995, has published an annual Corruption Perceptions Index (CPI) listing and ordering the countries of the world according to "the degree to which corruption is perceived to exist among public officials and politicians". The organization defines corruption as "the abuse of entrusted power for private gain".
- Group of States Against Corruption (French: *Groupe d'Etats contre la Corruption*), a body established under the Council of Europe to monitor the implementation of instruments adopted by member states to combat political corruption.
- Independent Commission against Corruption, **ICAC,** of Hong Kong (1974). Its main aim has been to clean up endemic corruption in the many departments of the Hong Kong Government through law enforcement, prevention and community education. The ICAC is independent of the Hong Kong Civil Service.
- Anti-Corruption Trust of Southern Africa (ACT-Southern Africa)
- D.N.A. National Anti-corruption Directorate (a prosecution entity) in Romania, with national headquarters and 15+3 local branches.

In dictionaries and in media, there is not even an allusion about the Physics' origin of the word „corruption" and how Physics has been dealing with corruption along History, in spite of the fact that Physics: has being using the word corruption for 25 centuries, has explained corruption, has modeled corruption and has found ways to master, to reduce or sometimes to eliminate corruption.

The word corruption was used in Physics and Philosophy, in Antiquity, to describe an alteration of the actual motion (behavior) of a body, with respect to that expected (due to the physical law applicable) to be.

Aristotle (384–322 b.Ch.) located a gap between terrestrial and heavenly Physics. The first had laws valid in the terrestrial (corruptible and mortal) region; the second had proper laws valid only in the ethereal (incorruptible, celestial, heavens' and eternal) region.

This duality remained unquestioned until Galileo Galilei (1564 - 1642) attempted to demonstrate the mobility of the Earth. However, Galileo hypothesized that only one Physics could exist, but he did not actually apply terrestrial physics to the ethereal region.

Tycho Brache (1546 – 1601) established theoretically the super-Lunar position of transient phenomena such as new stars and comets. This meant that he undermined the Aristotelian conception of the immutability and incorruptibility of the heavens.

More, Tycho Brache and his assistant Christen Sorensen Longberg (~1562-1647), discovered and computed the main anomalies of Lunar motion. That has meant that corruption of a motion expected to observe a physical law may be explained and forecasted by an other law.

Later on, the tendency was to find general laws to include both basic laws and laws considered responsible for corruption.

Isaac Newton (1642 – 1727) established new general physical laws which were at the same time a result and a demonstration of the existence of a single terrestrial and ethereal World.Newton included the law of gravitation in his "Mathematical Principles of Natural Philosophy" (1687), together with the three principles of dynamics. He proved that such principles, valid in terrestrial regions, when joining the theory of gravitation could explain perfectly why planets followed Johann Kepler (1571-1630)'s laws. As a result, Newton's "Mathematical Principles" completely obliterated the Aristotelian gap between the terrestrial and celestial worlds and apparently eliminated astronomical corruption.

Joint consideration of the theory of universal gravitation and the three principles of dynamics became extremely fruitful. The pairing could be applied to a study of a single body revolving around a larger body, for instance, a planet or a comet around the Sun. For example, in 1684, Newton demonstrated that the path of a planet, acted upon by a force related to the inverse-square of distance, was an ellipse. Newton also concluded that comets' paths were parabolas, or extremely elongated ellipses, as in the case of "Halley's Comet".

The coupling could be also applied to the study of the influence that a third body could produce on the elliptical path of a body orbiting around a major body.

This second direction of studies became extremely productive in the 18th and 19th centuries. The discovery of an eighth planet, Neptune, in 1846, made independently by John Couch Adams (1819-1892) and Urbain Jean Joseph Le Verrier (1811-1877), established that Newton's Physics definitely applied to planetary motion. The discovery originated from a reverse application of Newton's analysis of a three-body system. Since it was observed that Uranus (fortuitously discovered in 1781) did not follow its predicted path, the planet's course probably had to be influenced ("corrupted") by the gravitational attraction of an as-yet unknown eighth planet.The new Physics was the conceptual instrument which became indispensable for solving many astronomical problems and fight astronomical corruption. Sometimes, these problems of eliminating corruption led to unsuspected results: for example, the discovery of the planets Neptune (1846) and Pluto (1930). The path was opened for a new perception of the structure and future evolution of the Universe.

From this historical approach of corruption in Physics, the authors have drawn a few conclusions:

- corruption has cosmic origins and the term designating it have been continous used in Physics since its origins (Antiquity);
- corruption means alteration of a lawful behavior because of an external influence;
- corruption may be generated by an external individual influence, a tandem or a group influence;
- the external influence at the origin of corruption is also subject to a law;
- corruption has its laws;
- the laws governing corruption may be discovered, by refining, extending or diversifying the research;
- an approach at a higher level of understanding might describe simultaneously both the basic law and the laws given rise to previously „corrupted" behavior as regards the basic law;
- the new more general law may describe „corrupted" behavior until a new kind of corruption (or a refined one, or an inter-disciplinary one or a far range one) is discovered and the cycle experimental corruption, theoretical explanation, unification of corruption laws and basic laws restarts!
- corruption laws generate system structures organized and acting (at least, partially) subject to corruption laws;
- corruption propagates from universal to local levels.

2. SOME MODELS OF CONTEMPORARY EVERYDAY LIFE'S CORRUPTION

Because Physics has large spectra of models able to describe social, political, economic, human, psychical, biological phenomena, not only physical, chemical and engineering ones, by analogy with Physics models, Econophysics seems convenient to be applied to generally deal with corruption.

By such opportunities, Econophysics is called to suggest and/or develop models, laws, principles, methods, structures and ways to control or fight corruption.

Econophysics may suggest how, where, when, in connection with what, to find corruption depending of the type of the law to be broken by corruption, identify

corruption which breaks laws, how to find the corruption laws, which kind of laws are contributing to infringe the main law, what is the mechanism and the hierarchy of the laws and of the structures implied in facilitating visible corruption.

In opposition to Physics, where laws are objective ones, natural ones, independent of humans, the social laws are subjective, being generating by human groups or individuals on behalf of the whole society referred.

The social corruption may be more versatile, refined, deep, extended, interdisciplinary, than the physical corruption.

Corruption is facilitated by such law provisions and such an institutional frame permitting incompetent or corrupt people to regulate corruption, starting from the highest level of the world society.

But there is the reversed opportunity, too, that because the social laws, are being done by humans, the laws and the human law-generators, might be under the control of the society, not independent of it (like physics laws which observe the principle of objectivity and are socially independent).

This means that social corruption could be differently mastered by society, than physical corruption is, by physicists, who can't change physics laws).

The result on human control of social laws may be not only a decrease of corruption but, also, an increase, a flourishing, an enlargement, a deepening, a diversification of corruption if those groups or individuals subjectively generating social or economic laws and regulations are corrupted themselves as individuals or as a group or incompetent or obeying orders from persons or groups interested in generating a given kind of corruption, for a given period of time, in a given region, concerning a given activity.

As regards corruption in society, where the laws are subjective, generated by groups of individuals or even individuals in front of some powerful institutions:

- corruption frame, legal and institutional, may be voluntarily created by groups or individuals interested in promoting their private interests against general interests;
- corruption is making profit of the incompetence and/or corruption or subordination to corruption interested groups or individuals of those normally in charge of fighting corruption;
- corruption is facilitated by a superior law and/or higher level structural frame permitting corrupts to regulate or promote corruption at lower levels.

Some time ago, one of the authors has explained the infringement of some financial rules in spite of stiff supervision [2] applying to a Quantum Mechanics tunnel effect model. Such a model might explain the normally unexplained capture of wealth by some individuals or groups in a not wealthy society. That model fits one of the approaches of Econophysics foreseen by the authors in dealing with corruption: to find a Physics model to explain a chosen type of social, politic or economic corruption.

Another possible approach is a reverse application of the first approach: Econophysics, is not to start from a social, political or economic phenomenon and to find a model in Physics for it, but to start from an existing Physics model, or law or method and to find social, political or economic, a.s.o. phenomena where this Physics model, law, method fit successfully.

To this approach, there is devoted the rest of the paper, based on a few examples.

A first example of this suggested approach is to apply the Newton's, **action-reaction,** third, **law** of Mechanics:

„The mutual forces of action and reaction between two bodies are equal, opposite and collinear. This means that whenever a first body exerts a force **F** (action) on a second body, the second body exerts a force **−F** (reaction) on the first body. **F** and **−F** are equal in magnitude and opposite in direction".

It is essential to understand that the reaction applies to another body that the one on which the action itself applies, at the same instant.

Simultaneity of action and reaction with the implied time constant is to be understood within the time constant corresponding to the preservation of the stability of the concerned system.

The same is valid for the momenta of forces with respect to a point and for other interactions.

The action-reaction laws are the result of conservation laws, to ensure the stability of a system in its stationary evolution within an inertial frame, not subjected to external forces or momenta or other actions, during which evolution a certain quantity characteristic to the whole system is preserved. Stability is ensured by action-reaction law for the different kinds of actions, not only for mechanical type ones.

The physical nature of the reaction force is identical to that of the action itself: if the action is due to gravity, the reaction is also due to gravity. This has correspondence in other domains, f. e.: if the action means expenses (money) the reaction would mean income (money), if the action means more rights, the reaction would mean more obligations, if the action means larger immunity for smaller responsibility, reaction would mean less immunity for larger responsibility.

To Physics action-reaction law do correspond many non physical phenomena. They might have some characteristics a little different from those of the physics law of action - reaction.

To Physics action – reaction law might correspond causality. **Causality** is the relationship between an event (the *cause*) and a second event (the *effect*), where the second event is a consequence of the first, in the special situation when antecedence (which usually postulates that the cause must be prior to, or at least simultaneous with, the effect) is reduced to simultaneity, understood as before.

Though cause and effect are typically related to events, candidates quantities in Econophysics include objects, resources, processes, properties, variables, facts, rights, states of affairs. The characterizing of the causal relationship may be the subject of much debate in each case.

Contiguity in causality, postulating that cause and effect must be in spatial contact or connected by a chain of intermediate things in contact (Born, 1949), is always implied.

Karma in Indian religions treated in Hindu, Jain, Buddhist and Sikh philosophies, means "deed" or "act" and more broadly names the universal principle of cause and effect, action and reaction that governs all life. The effects experienced are also able to be mitigated by actions and are not necessarily fated. A particular action now is not binding to some particular, pre-determined future experience or reaction; it is not a simple, one-to-one correspondence of reward or of punishment.

Karma is the belief that a person's actions cause certain effects in the current life and/or in future life, positively or negatively.

According to the Vedas, if one sows goodness, one will reap goodness; if one sows evil, one will reap evil. Karma refers to the totality of our actions and their concomitant reactions in this and previous lives, all of which determines our future.

The conquest of karma lies in intelligent action and dispassionate response.

In Theosophy, karma is affiliated with the Neopagan *law of return* or *Threefold Law,* the idea that the beneficial or harmful effects one has on the world will return to oneself. Colloquially this may be summed up as 'what goes around comes around.'

Hegel's dialectic principle of unity and conflict of opposites (contraries) stated in his "Science of Logic" is an other example of the validity of Physics action-reaction law in the world at large, not restricted to physical world.

This law was seen by Hegel as the central feature of a dialectical understanding of things and originates from the ancient Ionian philosopher Heraclitus from Efes.

The general Hegelian principle of philosophy of history, that is the development of the thesis into its antithesis which, by the *Aufhebung* ("synthesis"), may be also connected with Physics action-reaction law. The *Aufhebung* conserves the thesis and the antithesis and transcends them both. The demand and supply and the demand and offer laws in economics [3] are example of action-reaction type laws.

In the theories on Law, the rights are always accompanied and conditioned by obligations [4]. The reverse allegation is also valid.

The fraud on law is a standard doctrine in most jurisdictions: in France, it is termed, *fraude à la loi*, in Spain, *fraude de ley*, in Italy, *violazione di norme di legge*, in Germany, *Rechtswidrige Umgehung eines Gesetzes, in Romania Frauda la lege.* It reflects the need for governments to prevent their citizens from intentionally and improperly manipulating their behavior (using other law provisions) to prevent mandatory provisions in the law from applying to them, that means for using their rights to elude their obligations, that means to infringe the action-reaction law.

As the translated names necessarily imply, the key is an intention to displace the normal operation of the legal system, from a balance between rights and obligations, towards predominance of rights used to elude normally corresponding obligations. Sometimes, this intention will be express. On other occasions, it will be for the courts to decide whether a sufficient intention can be imputed. Once the intention is established, the evasive maneuver will be void and the normal legal provisions will apply to the parties.

The observation of the action-reaction law is evident in the major part of provisions of the Constitution of Romania [5], for example, Art. 57: „Romanian citizens, foreign citizens, and stateless persons shall exercise their constitutional rights and freedoms in good faith, without any infringement of the rights and liberties of others".

Another example: in the Article 138 (5) there is provided that „No budget expenditure shall be approved unless its financing source has been established" [5].

But, in spite of this constitutional provision, the State Budget Deficit has continuously increased in the last years, including the first trimester of 2010 year, the Government being obliged not to infringe existing, previously passed laws which regulate unsustainable social expenses and salaries. Therefore, the Art. 138(5) have been infringed by other laws, previously passed by Parliament, by „fraud on law".

The solution for the Government would be to amend those laws generating corruption, through the infringement of the provisions of Art. 138(5) of the Constitution of Romania.

This is regarding the reduction of opportunities for corruption created in the past.

For the future, there seems necessary, as regards legislation procedures, to improve the legislation regulations leading to the passage of laws in Parliament or of adopting Ordinances by the Government or of issuing institutional advices and reports and to increase the responsibility of all legislators, including the Parliament members which, must decide in the favor of public interest (Art. 69(1) "In the exercise of their mandate Deputies and Senators shall be in the service of the people"), but not in the private interests of some individuals or groups, deeply interested to be favored, as have been accused sometimes.

The legislators are protected when taken their decisions by the provision of Art. 72(1) „No Deputy or Senator shall be held judicially accountable for the votes cast or the political opinions expressed while exercising their office" but they are under the political control of the people, at poles, once in 4 years.

As regards the Government, it is under the continuous control of the Parliament: Art. 109 (1) „The Government is politically responsible for its entire activity only before Parliament. Each member of the Government is politically and jointly liable with the other members for the activity and acts of the Government".

An analysis of the Constitutional content, at its next Revision, from the point of view of action-reaction law (balance of rights and obligations) seems necessary.

An other typical example of breaking action-reaction law is offered by the requests of the representatives of some groups on behalf of those groups to gain financial and other gains without offering society nothing in return for their demands or at least by indicating where from to take the supplementary required resources,. One could mention, f. e., trade unions, which ask increased salaries without indicating the source of the new demanded funds (where to diminish spending) or what they offer to increase revenues of the patronage (including the State) –

for example, the unions do not ensure the upgrading of the training of their union members with regards the use of IT technologies or of the contemporary standards of quality, or of international languages. The same is valid for political parties which, during electoral extended campaigns,to gain votes, do demand uncovered budgetary future expenses, which lead to future chronic State Budget Deficits.

Another example of a useful Physics tool in modeling some aspects of politico-economical life is **Dimensional Calculus.**

The authors shall apply Dimensional Calculus in this paper to appreciate the fairness of the formulae currently used for calculating State Budget Deficit, showing a few possible frequent errors introduced to corrupt public opinion perception about the state of the Budget Deficit.

In defining of the State Budget Deficit, **D**, there are being used the following quantities: government revenues, **R** and government spending, **E,** but, frequently and the gross domestic product, GDP, here, shortly denoted by **P**.

Defined as an absolute quantity, $\mathbf{D_a}$, the absolute deficit is equal to:

$$\mathbf{D_a = E - R,} \qquad (1)$$

The quantities **R, E,** $\mathbf{D_a}$ are expressed as absolute (not relative) quantities, having the identical dimensional expressions:

$$\mathbf{[R] = [E] = [D_a] = V/T,} \qquad (2)$$

where **V** and **T** the symbols of the dimensions of the chosen monetary unit and of time, respectively.

The Principle of Equality requires keeping the reference unchanged. The condition of dimensional homogeneity has to be observed for each equation and for each term. The mentioned quantities have the same dimensional equation, the revenue, spending and the deficit, are referring to the same State Budget components. Therefore, they must be expressed in the same currency unit, per the same time interval, for the same economic system, f.e. in Euro/year, RON/trimester, including the same components, for whole Romania. Generally, there must be valid the equations:

$$\mathbf{\{R\} = \{E\} = \{D_a\}}, \qquad (3)$$

A frequent error may be not to keep the unit **{V}** of the monetary dimension **V** as a constant and to compare values of each one of these quantities **R** or **E** or $\mathbf{D_a}$ **,** for different equal periods of time, but by using different, currencies, at different instants, f. e Euro/y at the end of 2010 compared with RON/y at the end of 2009, without mentioning the chosen currencies and the evolution of their exchange rate (i. e. Euro/RON), during the interval of time implied.

Another dimensional error would be to compare each one of these quantities **R** or **E** or $\mathbf{D_a}$**,** as absolute values but for different time intervals, in spite of using the same currencies.

For example there is compared the absolute State Budget Deficit on the first semester of 2010 with $\mathbf{D_a}$ for the whole 2009, with an false optimistic conclusion for politicians and media, unaware of the trick.

Another possible dimensional error is to compare the quantities **R, E,** $\mathbf{D_a}$**,** at different instants, by using different methodology of computing them, not the same one.

The State Budget Deficit may be defined, besides absolutely, as a relative quantity, $\mathbf{D_R}$**,** expressed as the percentage from the revenue, **R**:

$$\mathbf{D_R = D_a / R .} \qquad (4)$$

More frequently, the relative deficit is expressed as $\mathbf{D_P}$ **,** a percentage $\mathbf{D_a}$ of the gross domestic product, **P** :

$$\mathbf{D_P = D_a / P}. \qquad (5)$$

An other dimensional error in operating with relative Budget deficit is that referring the absolute budget deficit for a trimester to the gross domestic product, **P,** for the whole year, $\mathbf{D_{tPa}}$, in which case the relative deficit seems to be, relatively, 4 times smaller than the actual correct figure relative to **P** when observing the condition of homogeneity in Dimensional Calculus.

The definition of the relative state budget deficit with respect to Gross Domestic Product, $\mathbf{D_P}$, is preferred by politicians and international institutions like International Monetary Fund, World Bank a. s. o., but, from a dimensional point of view, it is a rather unhappy definition and practice because the quantities: government revenue, **R,** government spending **E,** on one side and respectively the gross domestic product **P**, on the other side, dimensionally represent different types of economical quantities. Simply speaking, the whole revenue **R** may be spent by the government, but not the whole domestic product, **P**.

To better realize this essential dimensional distinction between the definitions (4) and respectively (5) of the relative deficit, let exemplify by the situation in Romania reported for the whole year 2009.

The „Budget State Deficit" was reported and largely used as being equal to ~ 8.3 %.

Looking at the detailed economical figures one may see that the report was about:

- a relative deficit, not about the absolute deficit

$\mathbf{D_a = E - R}$ (1);

- a relative deficit computed by dividing the absolute deficit $\mathbf{D_a = E - R}$, to **P** , that means as percentage of the gross domestic product, **P:**

$$\mathbf{D_P = D_a / P.} \qquad (5)$$

From this definition it would result that there is enough to splash state spending with 8.3 % to escape of the State Budget Deficit.

The correct dimensional approach had would been to use $\mathbf{D_R}$, the relative State Budget Deficit, as a percentage of $\mathbf{D_a}$ from the government revenue, **R**, quantities which have the same dimension and may be divided to offer a correct percentage:

$$\mathbf{D_R = D_a / R,} \qquad (4)$$

$\mathbf{D_R}$ is larger than $\mathbf{D_P}$, as much as **P** is larger than **R.**

- The figures for the **R/P** vary between 31% and 32% (with or respectively, without progressive taxes). Considering as acceptable for the computations done here a **R/P** value of approximately 1/3 (the revenue **R** being approximately only one third of the gross domestic product, **P**), the relative State Budget Deficit expressed as percentage of **R,** $\mathbf{D_R}$, is equal to:

$$\mathbf{D_R} = \sim 3 * 8.3\ \% = \sim 25\ \%.$$

Therefore, $\mathbf{D_P}$, the relative state budget deficit expressed as percentage of **P**, seems 3 times smaller than $\mathbf{D_R}$ and possibly, that is why $\mathbf{D_P}$ is preferred by politicians, because $\mathbf{D_P}$ is not so impressive for the laymen.

This figure of 25% of the relative deficit being equal approximately to a quarter of the revenue is the significant one by itself and exactly it has been used by the Romanian Government and the I. M. F., World Bank and E. U. when actualizing the loan agreement for the second semester of 2010.

The payments are to be done on condition that Romania slashes public spending and boosts tax revenue to reach a $\mathbf{D_R}$ = ~ 25 %

Firstly, it was convened to slash Government spending by diminishing all salaries of the public employees, paid from the State Budget, by a quarter, 25% , and a part of the social expenses, the pensions, with only 15 %.

Clearly, this had not been enough as shown by our econophysical dimensional reasoning. It would had been necessary to reduce all kinds of expenses with 25 %, including all pensions, all social aid, all bouses, all spending on goods and services and all investment spending of the Government. This has not been advertised, may be, because of possible political consequences of the social unhappiness generated by such information.

More, the Constitutional Court of Romania invalidated the law providing for reducing pensions.

Therefore, to comply with the law of action-reaction, the Government has had to increase, on the spot, its revenues to cover the failed proposed slash of expenses by equally reducing with 15% all pensions.

As a consequence, the Government has decided to increase revenues, by increasing the Value Added Tax from 19 % to 24 % from the added value in economy. That means, again by increasing VAT relatively with itself, with approximately a quarter (with 5%, from 19% of the added value, that meaning 5/19 = 26.3% of the initial value of 19%).

Again, this increase of revenue is not enough as required by the action-reaction law. It is possible that there would be necessary to: further drastically reduce expenses on goods and services and the number of state employees but these reductions are not enough, because social expenses are ~ 46 % of the revenue.

There seems necessary to more boost revenues, by: generalizing and eventually increasing the general tax on every kind of income from the present 16%, increase and add many other taxes. Austerity measures might include rising the retirement age, cracking down on tax evasion and ending public sector bonuses.

The exact steps are to be chosen following numerical simulations of different possible measures too be taken, by modeling their correlations, too. There is to be avoided that the harsh measures trigger series of solutions of public sector strikes and eventually violence on the streets (like it has happened in Greece), by taking gradual measures to allow social acceptance.

By its success in getting the IMF loan, Romania has gained a vote of confidence for the measures taken by the government. Romania has an open window to exit crisis, which may influence financial markets and this has to be honored. Payments are to be done on condition that Romania slashes public spending and boosts tax revenue.

Measures to encourage development by attracting investment local and foreign and E. U. Funds, accessible to Romania (insufficiently applied for until now) are to be taken.An other example of a possible application of an other Physics tool in socio-economic life are **Physics common procedures in processing the errors on experimental data.**

Such procedures might be used in improving the control of public expenditures when selecting a winner of a public auction for services or goods or for public-private partnership investments, by changing the current regulations, to observe common procedures in processing the errors on experimental data.

Let us suppose that the price offered by a company **X** is $\mathbf{P_X}$ and the price offered by the next ranked competing company **Y**, is $\mathbf{P_Y}$, for the same package of goods and services in their offer, in the bid concerned. If

$$\mathbf{P_X} < \mathbf{P_Y} \qquad (6)$$

and

$$\mathbf{P_Y} - \mathbf{P_X} = \mathbf{\Delta P_{YX}} \ , \qquad (7)$$

the selected company would be **X** and the agreed price $\mathbf{P_X}$.

The corruption in the public authorities allotting and implementing contracts is possible because there is legally permitted a later increase in the price invoiced to be paid, without a new auction, just by agreement of the implied parties. This increase might not be only a few percentages from the settled price but even a few times the initial price (media examples of 10 times larger are quoted!).

Knowing that possibility and based on relatively frequent leakage of information during offer time, the favored company **X** may offer a slightly diminished price than **Y** company, to be sure that it „legally" gains the auction. Later on, the price $\mathbf{P_X}$ is increased much more over $\mathbf{P_Y}$ **,** by corrupted bilateral agreement only, not being compulsory that the increase of price be subjected to third party control.

The possible actions to reduce corruption when auctioning pubic expenses would be:

- to provide for, in the public auctions law or in the auction rules on the bid, that the price is firm (for the engaged services or supplies), could not be increased and the risks belong to the company or less tight, at least:
- to provide for in the auction law that following a public auction, the final price invoiced and paid could not be increased by a supplementary agreement between the parties, at an amount larger than ΔP_{YX}, the difference between the prices demanded by firstly and the secondly ranked competitors.

The solution proposed by the Government to impose a limit on the relative increase of the price, during implementation of the contract, limited to 50%:

$$\Delta P_{YX} / P_X < 50\% \ , \qquad (8)$$

marks a progress, but also keeps encouraging corruption and supposes that the estimated profit of the winner, hidden in its offer be ~50%.

By referring to public perception of the high level of corruption in allotting public expenses on goods and services, a 25% reduction on public spending at auctions,

by legally introducing the above proposed limitation seems quite possible.

3. CONCLUSIONS

The examples of applying Physics tools and emphasizing corruption on socio-economic laws similar to the action-reaction principle, dimensional calculus and processing of errors methodology in Physics, are based upon middle school and bachelor compulsory curriculum and the application of the Physics models implied could be done by every manager, politician or media man.

Physics may guide them to think about their own concept of the phenomenon considered and then challenge it, measure it and see if it connects. „Sometimes your physical intuition may not be exactly right…It teaches you to think beyond 'the normal' …and ask what does the physics tell you?" [Feynman].

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