THE DETECTION OF CORRUPTION USING INDICATORS: A MATHEMATICAL MODEL

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Abstract

"Corruption is detected because it is harder to be hidden".

Susan Rose- Ackerman

The long-term experience of democratic states around the world on the war against corruption has revealed the need of implementing active provision for the reinforcement of the detection and punishment of corruptive activities. The survival and the "metastasis of corruption cancer" favored maximally by the absence of monitoring the behavior of the state officials, using corruption indicators presented in this study. We propose a set of precautions which will make possible to a great extent the detection of the corruptive activities committed by the officials in the public sector. Therefore, this study is useful to the Albanian Republic Government in order to effectively fight the actual corruptive system, especially in the economy, juridical system, ministries, health system, municipalities and Albanian universities. The implementation of this study might change in a few years the perception of corruption from "an activity with less risk and greater economic benefit" into "an activity with great risk and zero economic benefit". This study needs to be applied as soon as possible especially in the areas where the system of corruption is destroying the economic development and impeding the functioning of main state institutions (e.g. customs, tax offices, ownership rights and appropriations, ministries, municipalities, law courts and offices of state attorneys, universities, etc.).We develop a mathematical model for calculating the probability of detecting corruption of public sector officials by monitoring their behavior by a set containing 47 indicators. There are two types of corruption indicators: neutral indicators and specifics indicators. These indicators are considered

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acceptable by Scientific Research in Criminology, as well by the general social opinion. The indicators of corruption provide different contributions in the detection and punishment of corruptive activities, some of these indicators are more important than others. We associate each indicator with corresponding probability, that the official monitored will be corrupted. The detection of corruption through monitoring the behavior of public sector officials by indicators is a scientific method, which combines contemporary achievements of the Scientific Research in Criminology with Probability Theory. This scientific method is powerful and general, because it can be applied in different fields: economy, judicial system, education system and in each time period. The indicators of corruption implicate real life facts; they are not simply assumptions or hypotheses. The main results of the study include the formulas (1) – (4).

Key Words: Corruption, Detection, Indicators, Monitoring, Probability.

1. INTRODUCTION

Corruption has always been an obvious and recurring phenomenon throughout the human history. It has been present in all the socio-political systems of different levels and forms. The Hamurabi Code specifies penalties based on the law against corrupted employees, especially against corrupted judges. In the fourth century B.C. Kaulitiliya, the prime minister of the Kingdom of India, has written the book Arathasatra, in where he has discussed about corruption. Aristotel, Plato, Tuqidhidhi, Makiavelli and Russo have all studied the government corruption. Dante has placed the corrupted officials in the deepest circle of hell, thus displaying the medieval abomination for the corrupted people. Shakespeare has given corruption a prominent place in some of his plays. The American Constitution considers bribe as a pure crime, which justifies the charges against the President of America. Well-known politicians (presidents, prime ministers, minuisters) have lost their positions because of the corruption and in rare cases; political classes have been replaced entirely.Corruption is an evil activity that is caused by a psycho-social lack of the norms of human behavior that aims at producing illegal benefits for one person or his/her family, friends, or political allies. Corruption is a multi-dimensional concept or a group of concepts with supplementary meanings that are part of the economic, political, psychological, and mathematical sciences. According to the public meaning, corruption means abuse of the government position to benefit non-governmental advantages. The catalogue of the corruptive activities includes bribe, threat, use of power, embezzlement, fraud, favoritism, payment of money, nepotism, etc. Corruption exists not only in the government sector, but also in the international organizations. A human activity, whether in the public or private, America or Italy, Japan or Russia, has tendencies to become a corruptive activity if one person (or a group of people) has monopolized the power over an item, good or service, is free to judge, act and decide on the offer and price of this good or service and this person (or group of people) is not accountable to anyone (is not responsible) for this activity. Metaphorically,

$$K = M + L - P,$$

where K denotes the corruption. M denotes the monopolization of the power. L denotes the freedom of judgment and action, and P denotes the responsibility or accountability. The improvement of government is crucial for the essential economic development of a country and for the increase of the life standard of poor people. But these main objectives are threatened by corruption. The good government program has at the center the anticorruption strategy. (see [1], [2], [9]) . We must never underestimate the need that corruption has for the political power support. Corruption is assisted and promoted by the same party brought in power position for a long time. Distinguished scientists in the theory of corruption (S. Rose- Ackerman, R. E. Klitgaard, etc) have argued that corruption present in the countries in transition that have weak political institutions, and relatively weak administrations. In these conditions, the corruption can be transformed into a system, according to the meaning of the Applied Systems Analysis. This means that the system of corruption must be fought against through the anticorruption system (see [4], [5], [8], [9]).

A typical case studied by Professor R. E. Klitgaard is the systematic corruption in the countries in transition, where the leading party in power and the opposing party are temporarily powerless to win the battle against some of the corrupted leaders and businessmen. This typical case is of interest for Albania. When the governmental institutions suffer from the "disease" called "the systematic corruption" the majority of the people suffer loss, while the corrupted politicians, businessmen and clerks make huge benefits. The systematic corruption consists of two components: the centralized and decentralized corruption, where the former component is the most important. The strategy of anticorruption system is focused in the corruption system and not only in the individuals, who don't respect the state laws and the credibility given. We should think that this war must be focused on systems that are tangible and suspected of doing illegal activity (for example, the justice system, the education system, the health system, the bank system, etc.)

Two essential factors in the survival of the corruption are the absence of monitoring the behavior of the officials by using indicators and the lack of political will to penalize corruptive activities.A very important factor influencing the efficiency of the anticorruption system is the probability of detecting the corruptive activity through the inside and outside controls. The greater the probability, the more effective the war against corruption will be. In order to evaluate the probability of detecting corruption mathematically, a set of indicators of corruption, proposed in the Theory of Modern Corruption and Criminology will be used.

2. INDICATORS OF CORRUPTION

The indicators of corruption are not really obvious. They provide different contributions in the detection and punishment of the corruptive activities, meaning that some of these

indicators are more important than others. If these indicators recur or are combined with each-other, then they will help not only in the raising of suspicion, but also in the beginning of the proper penal procedures against the government official accused of corruption.

A subset of the anticorruption indicators set should never be used in any anticorruption control, because this may minimize the real level of the corruption activity. There are two kind of corruption indicators: neutral indicators and specific indicators.

2.1 Neutral indicators of corruption

The neutral indicators of corruption are examined by the behavior of the government officials at the workplace and outside of it. These indicators are considered acceptable by the social opinion as well. The neutral indicators of corruption observed more often during corruption activities throughout the last three decades in different states are listed below:

1.The unjustified amount of wealth through legal means. An unexplained change in the living standard. A luxury living, that cannot be provided through the personal or family income. For example, building or buying a private home, or purchasing of a second home or apartment by the seaside, buying of an expensive car, excessive expenses, for holidays and different entertainment, especially gambling.

2. Social and personal issues like nepotism, strong dependence or obligations towards another person;

3. A second employment outside of the institution which is very similar to the government job (i.e. which is against the institutional interests).

4. Acceptance of different invitations by businessmen to spend weekend in villas or luxury hotels, lunches, dinners in expensive restaurants, private visits to companies, or international fairs, etc.

5. Unusual special agreements to buy things or services, extreme discounts or favors for the payback period.

6. Excessive generosity in sending gifts (addressed to homes); fake generosity towards the boss.

7. Frequent participation in private meetings with bosses, people who make offers, (businessmen participators in tenders), participation in private or business events.

8. Allows himself to be needful at the workplace; for example goes to work even though he is sick, to avoid situations that other workers know in detail about "stunts" he has done.

9. Fraudulent (for example, a politician frauds in the declaration of a property; a justice police officers frauds by distorting the fact of an investigation).

10. Takes home important work documents.

11. Correct treatment of difficult or delicate cases, though the official has no theoretical-scientific background, the necessary training and work experience.

12. Unexplained loneliness, talks less to his bosses and directors

13. An immediate change of the personal opinion; for example supporting a project which previously he had opposed.

14. Baseless refusal to do a reevaluation or advancement of work, especially when these have to do with technical, technological and methodological advancement.

15. Lack of complaints or conflicts when these are common or expected.

16. Unusual tone of voice or careless with bosses, directors or subordinates.

2.2 Specific indicators of corruption

Unlike the neutral indicators of corruption, the specific indicators of corruption must be considered as signals or warning signs, which must lead to the increase of suspicion for the existence of legal irregularities or trespassing.

The experience of corruption in other states of the world throughout the decades suggests that the specific corruption indicators observed more often in the corruptive activities are these:

17.Inexplicable decisions that were never made before in the same way.

18. Different evaluations or treatments of cases that have similar data.

19. Misuse or biased interpretation of the personal power of freedom of judgment or action.

20. Lack of performing controls or reviews, even though they are reasonably needed.

21. Manipulation of the treatment of a case which has been previously studied and evaluated by other officials inside of the institution.

22. Overriding of the boss' authority on critical cases and unacceptable extension of legal power.

23. Repeated practice of meeting outside the institution without a credible explanation about their relevance to the work.

24. Preference to repeat the support of some participants in tenders.

25. Entering in negotiations that are not in favor of the institution.

26. Lack of responsibility during the talks about the contracts.

27. Lack of receipts for the payment of services, or lack of official stamp in all the official correspondence with participants in tenders or other contractors.

28. Complaints by the contractors or participants in tenders, where irregularities in the procedures implemented by the government officials are noticed, especially in cases when these complaints have been disregarded by the respective public institution.

29. Disappearing or hiding of decision-making documentation, important contracts, or other inspections done.

30. The government official plays an unfair game with one or more clients.

31. Regular visits of some businessmen, contractors or clients in the office of the government official.

32. Open discussions of some government officials in confidential environments, displayed by the improper behavior, which will result into personal benefit, if it is used.

33. Tendency to procrastinate certain controls or estimates.

34. Notable company, private meetings of the government official with criminals, or former prisoners, mafia and corrupted people.

35. Opposition or disregard of the government official towards the charges and accusations brought by certain individuals, companies or institutions.

36. Unexplained revelations of confidential information by the government official.

37. Approval of an order or instruction given by the directors that a critical case be treated like an ordinary one.

38. Disregard for the suspicion about the application of the law in the previous works.

39. Unexplainable speeding or slowing down or interruption of a case.

40. Weakening of the inner control; for example, the closing of a useful institutional department or the allowance of some officials to become independent.

41. Overlooking of tenders; lack of variety in their offers.

42. Request to purchase and install old ineffective technology at more expensive prices than the ones in the market.

43. More expensive purchases than the ones offered by the stock exchange; double receipts.

44. Rapid changes and frequent purposeful mathematical calculations in the contract or tender documentation.

45. Corruptive stains from the past of this government official.

46. Powerful sponsoring (even simultaneous) of several main political parties in election campaigns by private companies or businessmen.

47. Unexplainable and purposeful obstacles by the government official of the investment or the domestic production in a specific area, because personal benefit interests or monopoly interests might be threatened.

In the above lists we have listed 16 neutral indicators and 31specific indicators of corruption, altogether amounting to 47.

Practically, it could be difficult or even unachievable to control all this corruption indicators for each government official. Therefore it make sense to use the so-called "monitoring level" of corruption, which is equal to the divisor of the number of indicators controlled over the general number of the indicators of corruption. It is clear that the level of corruption monitoring for each official is a number between 0-1. the 0 value of the monitoring level indicates the complete lack of monitoring of these official's corruption activity. In this case, though the official may be corrupted, chances are equal to zero to discover any corruption thereby. The 1 value of the monitoring level indicated the complete monitoring of the corruption activity of this official. In this case chances for discovering the corruption activity are higher and with a lot of clarity whether this official is honest or corrupted. Intuitively, it makes sense that the higher the monitoring level of an official's corruption, the greater the probability of detecting the corruption done by him/her (if he/she is corrupted). In the following paragraph, this statement will be illustrated and proved mathematically.

An important conclusion of the corruption indicators monitoring is the creation of an adverse anticorruption environment.

3. THE PROBABILITY OF DETECTING CORRUPTION

An ordinary official is examined in the government sector; for example a minister, a mayor, tax inspector, customs officer, judge, prosecutor, university professor, etc. his activity will be monitored through the 47 corruption indicators. Suppose that indicator nr: Let's call

A_k − the event that this official is corrupted.

A'_k − the opposite of the event.

$P(A_k) = p_k -$ the probability of the event A_k

It is thought that in the activity of this official m corruption indicators are noticed, whereas (4-m) other indicators are not noticed. In order not to overload our study with mathematical symbols, these m indicators will be renumbered/ recalculated 1,2,...m respecting this supposition and renumbering, we will use the following numbered;

$B_k -$ the event of the case that an official be corrupted, if in his activity indicators have been noticed.

$B_k' -$ the opposite of the event B_k, për $1 \le k \le m \le 47$

$A -$ the event that the official is corrupted, if in his activity have been noticed m indicators of corruption

$A' -$ the opposite of the event $A_k -$

$P(B_k) = p_k -$ Probability that the official is corrupted.

C – the event that the corruption of this person be detected by the anticorruption group (for example by the Corruption Investigation Bureau within the Institution or the National Anticorruption Agency or the Superior State control or by SHISH).

P(C/A) indicates the conditional probability, whereas the $P(C \cap A)$ indicates the unconditional probability of the government official examined.

The result is

$$A = B_1 \cup B_2 \cup ... \cup B_m.$$

Applying the conditional probability formula we find that:

$$P(A') = P(B_1' \cap B_2' \cap \cdots B_m') = P(B_1') \cdot P(B_2' \mid B_1') \cdots P(B_m' \mid B_1' \cap B_2' \cap \cdots B_{m-1}').$$

As a result we will have

$$P(A) = 1 - P(B_1') \cdot P(B_2' \mid B_1') \cdots P(B_m' \mid B_1' \cap B_2' \cap \cdots B_{m-1}') \tag{1}$$

If in formula (1) we apply De Morgan's Rule or the Duality Principle of S. N. Bernstejn, then we obtain the conditional probability formula:

$$P(B_2' \mid B_1') = \frac{1 - P(B_1 \cup B_2)}{1 - P(B_1)} \, ,$$

$$P(B_3' \mid B_1' \cap B_2') = \frac{1 - P(B_1 \cup B_2 \cup B_3)}{1 - P(B_1 \cup B_2)} \, , \, \dots$$

$$P(B_m' \mid B_1' \cap B_2' \cap \cdots B_{m-1}') = \frac{1 - P(B_1 \cup B_2 \cup \dots \cup B_{m-1} \cup B_m)}{1 - P(B_1 \cup B_2 \cup \dots \cup B_{m-1})} \, .$$

Therefore the evaluation of probability is very important $P(B_1 \cup B_2)$, $P(B_1 \cup B_2 \cup B_3)$, ... , $P(B_1 \cup B_2 \cup \dots \cup B_{m-1} \cup B_m)$.

If $B_1, B_2, \dots, B_m$ are independent random events, then formula (1) takes a compact form:

$$P(A) = 1 - (1 - p_1) \cdot (1 - p_2) \cdots (1 - p_m) \tag{2}$$

For a detailed study of the conditional probability and the independences of the random events see [6].

Experts on the field of the activity that the official does in corporation with professors of the Theory of Probability use the statistical or subjective definition of probability to evaluate the probabilities

p_1, p_2, ... , p_m dhe $P(B_1 \cup B_2)$, $P(B_1 \cup B_2 \cup B_3)$, ... , $P(B_1 \cup B_2 \cup \dots \cup B_{m-1} \cup B_m)$.

Since in our country no regular statistical data for the discovery of corruption through monitoring are provided, it results that the subjective definition will be used for the evaluation of the above mentioned probabilities (the so- called the Method of Von Musses- Kollmogorov) see [6]. According to this method, experts of different fields use the experience in work, opinions and other personal information to evaluate the probabilities p_1, p_2, ... , p_{47}., this means that the estimation of probability p_k by one expert expresses his belief about the reality of the equality/equation $P(B_k) = p_k$.

The subjective probabilities p_1, p_2, ... , p_{47} change occasionally from expert to expert. These probabilities are otherwise called personal probabilities. After the estimates are made by the experts about the above mentioned probabilities, they get elaborated statistically and in this way the desired results are obtained.

Referring to the list of 47 corruption indicators, we suggest this guiding preliminary estimate of the probabilities $p_1, p_2, p_3, \ldots, p_{46}, p_{47}$:

$p_1 = 0.9$	$p_2 = 0.6$	$p_3 = 0.9$	$p_4 = 0.5$	$p_5 = 0.8$
$p_6 = 0.2$	$p_7 = 0.4$	$p_8 = 0.5$	$p_9 = 0.9$	$p_{10} = 0.3$
$p_{11} = 0.4$	$p_{12} = 0.1$	$p_{13} = 0.6$	$p_{14} = 0.3$	$p_{15} = 0.3$
$p_{16} = 0.4$	$p_{17} = 0.8$	$p_{18} = 0.8$	$p_{19} = 0.9$	$p_{20} = 0.8$
$p_{21} = 0.8$	$p_{22} = 0.8$	$p_{23} = 0.2$	$p_{24} = 0.7$	$p_{25} = 0.8$
$p_{26} = 0.3$	$p_{27} = 0.8$	$p_{28} = 0.6$	$p_{29} = 0.9$	$p_{30} = 0.8$
$p_{31} = 0.2$	$p_{32} = 0.5$	$p_{33} = 0.3$	$p_{34} = 0.9$	$p_{35} = 0.5$
$p_{36} = 0.9$	$p_{37} = 0.8$	$p_{38} = 0.6$	$p_{39} = 0.8$	$p_{40} = 0.5$
$p_{41} = 0.6$	$p_{42} = 0.8$	$p_{43} = 0.9$	$p_{44} = 0.9$	$p_{45} = 0.8$
$p_{46} = 0.8$	$p_{47} = 0.9$			

The formula of multiplication of probability is true.

$$P(A \cap C) = P(A) \cdot P(C \mid A) \tag{3}$$

I emphasize that the conditional probability of the detection of corruption depends on the level of professionalism, dedication to work and integrity of the anticorruption system workers. The extreme values (limiting) of this conditional probability are;

$P(C \mid A) \approx 1$ (high level of professionalism, dedication to work and honesty).

$P(C \mid A) \approx 0$ (anticorruption system is completely corrupted).

A direct consequence of the formula (1), (2), (3), is this: if together with the corruption indicators previously monitored another corruption indicator will be monitored, then the unconditional probability of the detecting of corruption shall increase.

Remark 1. The set of corruption indicators is dynamic, because the probabilities $p_1, p_2, \ldots, p_{47}$ change as time goes by. Therefore these probabilities need to be reevaluated by experts every other year. The completer the information the more effective the application of the statistical

definition to evaluate the probabilities $p_1, p_2, ..., p_{47}$ is. The dependence of the assertion (statement), is deducted by the Kollomogorov Teory of the stability relative (see [16]).

Remark 2. Some of the subjective probabilities $p_1, p_2, ..., p_{47}$ may change and depending on the profession of the official like customs worker, tax inspector, university professor, police officer, prosecutor, etc. these specifications are useful and needed to be made by the expert's group.

The mathematical model of this study consists of four components:

> **1**. The probability that the government official monitored is corrupted.

> **2**. The probability that his corruption is detected.

> **3**. The probability that the official be charged, on condition that his corruption be brought to light.

> **4**. The probability that the official be penalized, on the condition that he is legally charged for proved corruption.

The first and second components are related to the anticorruption body, whereas the fourth is related to the court.

Another important application of this study is the calculation of the unconditional probability of the penalization of corruption.

Suppose that *p, q, r, s* are the probabilities of the four above mentioned components, whereas P is the probability without the condition of punishment of the official with the accusation for corruption.

$$P = p \cdot q \cdot r \cdot s \tag{4}$$

This formula shows that the probability without this condition is small, if the corruption is present in the anticorruption system, prosecution, court. It is important to be emphasized that the corruption of the anticorruption official, the prosecutor or the judge be brought to light as well through the 47 corruption indicators as well.

Example

Throughout the monitoring process of an official's activity in government by means of the 47 corruption indicators, only indicators with ordinal numbers 2, 15, 18, and 29 have been noticed.

> **I**. That the probability of the random event that this official is corrupted is calculated.

II. That the probability without the condition of the detection of corruption of this official, given that the probability with the condition of the corruption detection be equal to 0.4 is calculated.

III. That the probability without the condition of charging the official for corruption, given that this probability with the condition of charging the official has the value of 0.8 is calculated.

IV. That the probability without the condition that this official is charged, given that the value of this probability is calculated 0.5.

Solution

Indicators of corruption with the ordinal numbers 2, 15, 18, and 29 correspond respectively to the occasional events A_2, A_{15}, A_{18} dhe A_{29}. It is noticed that these events are independent among themselves, from the perspective of the Theory of Probability. Based on the preliminary evaluation of the corruption indicators probabilities, the respective values are found as follows;

I. The probability that this official be corrupted is calculated with the following f formula (2).

$$p_2 = 0.6, \ p_{15} = 0.3, \ p_{18} = 0.8, \ p_{29} = 0.9.$$

II. The probability without the condition of the detection of corruption of this officialis calculated with the formula (3):

$$0.9944 \cdot 0.4 = 0.398$$

III. The probability without the condition of the accusation of this official for corruption is calculated with the analogous formula:

$$0.9944 \cdot 0.4 \cdot 0.8 = 0.3184$$

IV. The probability without the condition of the penalizing of the official for corruption is calculated with the formula (4):

$$P = \ 0.9944 \cdot 0.4 \cdot 0.8 \cdot 0.5 = 0.1592.$$

The interpretation of the results for this example

$p \ = \ 0.9944$ shows that this official is practically corrupted , whereas P=0.159.... shows that the probability without the condition of the penalty of this official is really small.

This negative phenomenon (meaning, the minimal penalty amount of corruption) is caused by the fact that the corruption in this example is present in some fields; practically in the anticorruption body and in the court. We emphasize that it is worth exercising with the probabilities of this example p and P, even though the numerical data of the probabilities with the condition q,r,s, are only hypothetical.

Conclusion

1. The detection and punishment of corruption through the monitoring of the behavior of state officials and politicians using indicators, based on the formulas 1 & 4 is a scientific method, which combines a contemporary achievement of the Scientific Research in Criminology with the theory of Probability. This scientific method is powerful, universal, because it can be applied in every field (economy, judicial system, ministries, town halls, education, health) and in every period of time, punishing according to the law corrupted people regardless of their political convictions, social status, gender, age, personal income, or history of their corruptive activities. The corruption indicators include facts that are real. They are not simply suppositions or hypothesis. Therefore these indicators have investigative power. Because of the monitoring of the 47 corruption indicators, this scientific method results as successful to detect and punish the sophisticated corruption activity.

2. Two very important factors of the corruption system survival are the lack of corruption indicators' monitoring and the lack of political will to punish corruptive activity. The monitoring through corruption indicators should be done from the top to the bottom (for example from the minister to the ordinary employees, or from the general prosecutor to the police officers in the municipalities). Corruption survives unless uprooted in all segments of the government. Malaysia Indonesia, Nicaragua, and Brazil have offered specific examples of evidence of total failure of the war against the corruption system in the 80's because the corruption was not uprooted, though corrupted ministries, mayors, prosecutors and judges were punished hard.

3. The detection and punishment of the corruptive activity, in essence, are random events. Therefore it is reasonable and useful to use calculations for the detection and punishment of the corruptive activity.

4. The originality of this study is in the application of some formulas for the calculation of probability for the detection of this corruption, through the monitoring of state officials using indicators.

5. The corruption indicators are not equally important, because some of these indicators contribute more than the others in the detection of corruptive activity.

6. The decision for the monitoring of state officials using corruption indicators shall be taken by the Prime minister, whereas its implementation and application may be done by the National Anticorruption Agency in collaboration with the Anticorruption Bureaus in the respective ministries, city halls, prosecuting offices, courts and the Superior State Control. If the monitoring shall not be done in all the territory of the Republic of Albania or will not be consistent or will be done ineffectively, then the war against corruption will result in loss. The worse shameful case is when a considerable part of officials in the anticorruption system become corrupted. Therefore it is important especially to monitor the anticorruption agents themselves against corruption. The quality of monitoring of the corruption indicators is really crucial to win the war against

corruption. This quality is also a measurement of independence of the anticorruption system activity from interventions of corrupted politicians or businessmen. This monitoring must be done with great honesty and responsibility.

7. The practical application of this study requires a preliminary evaluation of the $p_1, p_2, ..., p_{47}$ and $P(B_1 \cup B_2), ..., P(B_1 \cup B_2 \cup ... \cup B_{m-1} \cup B_m)$ probabilities as well as probabilities with the condition that *q, r, s,* of formula (4). Since in our country no such thing as regular data is available to detect, accuse and punish corruption through monitoring of corruption indicators, it is logical that for the evaluation of the above mentioned probabilities the Von Mises-Kollmogorov (used for the subject probabilities) should be used. This preliminary evaluation would be done for a group of math experts and professors. Specialist from the Head Bureau, Ministries, the Superior Government Control and other professors of Tirana University are expected to be the adequate expert candidates.

8. Direct impacts of this study are the increase of the probability of detecting corruption and the unconditional probability of the punishment of the corrupted officials. As result, officials with corruptive tendencies, when monitored through the corruption indicators; even when they are involved in corruptive activity, will be detected and punished according to the law. The practical application of this study will enable within a few year the change of general perception on corruption "from a small-risk, with a huge benefit activity" to "a high-risk, no benefit activity".

9. If corruption is low levels for all the administration for a ten year period of time, then a trajectory (curve) would be generated that would show the stability of low level of corruption.

10. This study must be applied especially in those systems where the corruption destroys the economic development and damages the function of main state institution (for example, in the customs, taxes, property rights, property titles, ministries...) special attention must be shown to the politician's activity. After collecting the monitoring data, the Math Statistical method of some statistical hypotheses must be used. For example,

Ho: Albanian politicians are not corrupted.

Ha: Albanian politicians are corrupted.   or

Ho: less than 30% of the Albanian politicians are corrupted.

Ha: not less than 30% of the Albanian politicians are corrupted.   or

Ho: Albanian politicians are less corrupted than other people.

Ha: Albanian politicians aren't less corrupted than other people.

The proposal for the above-mentioned statistical hypothesis control is based on the contemporary scientific research for the detection of corruption in some European countries (see [2], [12], [13]).

11. The corruption survival is often disputed through the principle of the negative collective reputation of generations; young people inherit a bad reputation from old corrupted persons. As a result part of the young generation is influenced by the corruptive experience of the older generation. As a direct result of this argument there is a considerable amount of students infected by corruption. You can imagine the damage in families and all the Albanian society, caused by this kind of corruption. The mathematical results presented in this study must be applied also for this kind of corruption.

12. Some authors define corruption as any kind of abuse of government, state position, to provide for personal benefits (see [1], [2]). Though this definition enables the judicial analysis of a wide set of corruptive activity, unfortunately it leaves out some evil strategies based on legal agreements made in the parliament or the previous government, which generate corruption. Regardless of these shortages, which can be present even in Albania, the monitoring methods of the corruption indicators allow the calculation of the probability of detecting corruption.

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