

The Synergy of Subtle Reverberated Information Transfer

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Abstract

The real business environment phenomena study starts from the undifferentiated real economic relations, its manifesting forms, as well as from the observers and benchmarks used in recording evolution of phenomena. Before assuming any intervention against energy/information available from a certain context, at a certain moment, one observer should understand both the core information and related context/moment of the record. Above all, this is a matter of coherence, compatibility and concomitance to the concerned all around reality.

Any abatement from established contract jeopardizes the image of both provider and client organizations.

On a certain mark of organization's image it is possible to count the attraction grade assigned to an interested organization to cooperate in a joint venture. Each organization should build a database comprising marks from all related business partners reactions', on either direct or indirect relations. The continuous cybernetic organization's image improvement must be represented as an act operator based on reverberation phenomena of direct and indirect actions.

Keywords : Communication, cybernetic, space-temporal, subtle sets, channeling.

1 Reverberation as a Cybernetic Operator

Real business environment phenomena might be represented by subtle sets theoretical means. This study starts from chaos definition, the one of general status of great confusion, huge disorder, mix-up, disorganization, to which opposes the concept of discipline, defined as the totality of committed behavior and order rules for one community members.

To this aim we shall involve the concept of reverberation, defined as a sound persistence in a closed room, due to sound reflection, after the source of the sound stopped the issue, or repeated heat reflection on the walls of a special incinerator. The computing model will focus on the subtle concept definition regarding:

- one observer who is sensible, understands the tiniest details, who is able to observe the most fine happenings, sharp,

- more facts, the ones to be discovered only by a concentrated research, hard to be recognized.

Along the economic analysis development, we shall use the concept of communication as referring to the means by which a link acts among defined points, a contact. Similarly, we refer to information transfer as to an act of communication and its result, relation, link.

We start from the image of chaos that comprises the undifferentiated real economic relations, its manifesting forms, as well as the observers and benchmarks used in recording evolution of phenomena. A sound representation meets a lot of constraints generated by the multi-criterion anisotropy and gradients of this conglomerate, as from the customary structured and discontinuous representation of some aspects, extracted from all around reality by a limited correlation report. Chaos rather seems to be the expression on not integrating disciplines of study the way they are defined and learned by means of contemporary methods, techniques and machinery.

One considered element might prove a sensible manifestation according to a space-time reflection, considered to be the dominant correlation in that element's area, showing characteristics bounded in an isotropic margin. The possible number of expressions related to which that element's manifestation should be defined exceeds by far the range of scientific disciplines at researchers' disposal today. The dominant correlative characteristics used in that unique element definition might be used to similar, as material structure and shape, or isotopic elements. According to dominant characteristics of similar and isotropic set of elements, one observer defines distinct space-temporal mix, easy to reveal in a strong relation to compatible dimensions and criteria sets. Throughout the discontinuous issues coming from the whole, a certain correlated mix might reveal "points" through that "links" occur among several correlated elements' manifestation mix.

One certain observer, considered to be a materialized element, might show different correlation and compatibility grades related to some events. These events' characteristics might overpass the space-temporal correlation margin on which the observer manifests. The research approach methodology in such cases is based on subtle sets' theory, combining determinist, probabilistic and fuzzy study means. The subtle approach heads toward a much closer formal representation of real world phenomena's to what they really are, escaping from scientific benchmarks of today's human knowledge.

The multi-criterion and multidimensional discontinuities might conduct toward similar effects to "varied landscape" (related to "semi-infinite spatial" model), or "bounded area" (related to "finite spatial" model). An observer might sense the most probable elements' sequences of manifestation upon correlated space-temporal mix, as being three:

1. *generator element* – having the own or induced capability to issue, on a correlated space-temporal mix, a sensed energy/information flow
2. *absorbing element* – having the own or induced capability to capture, on a correlated space-temporal mix, a sensed energy/information flow

3. *neuter element* – having the own or induced capability not to manifest, on a correlated space-temporal mix, against a sensed energy/information flow.

Causes and effects might not be both insensible (either for a duration/distance too long or too short facing a correlated space-temporal mix, or the manifested element being in neutral sequence against a sensed energy/information flow), or sensible (frequently only partial, because of a not exhaustive space-temporal correlated mix, on which a sensed energy/information flow and observers occur). A study, developed by subtle means (probabilistic and fuzzy), might conclude if either insensible events, or events related to which the group, formed by the element and a correlated space-temporal mix, prove to be in neuter sequence, generate subtle causes having sensible effects, on the observed correlated space-temporal mix.

Here we find again the problem of representing the gap between the sensible records made upon disjunctive, but compatible, space-temporal mix. Bringing into the analysis of space-temporal semi-infinite or finite effects, generated by chaos; all energy/information flows, sensible or not upon the correlated mix, might compose inside the neighborhood defined by the family of elements correlate manifested. Aiming to ease such a representation, researcher should “borrow” similar phenomena from optics, electronics, electromagnetism, hydraulics and solid mechanics, as well as from psychology. Applying these principles might overpass the coherent margin of the analyzed correlated space-temporal mix and/or the compatibility margin of disjunctive space-temporal mix, comprising elements, flows and their observers.

Consider that the coherent and concomitant margin accepted by the observer (for the above mentioned disciplines) includes sensible results of complex phenomena manifested upon correlated mix. Then, one part of inharmonic pulsation of correlated mix resulted from energy/information generation and absorption sequences, together with the inertial ones, issued by the neutral sequences, could interfere at the level of manifested elements. Manifested elements on correlated mix, proving a different coherence, compatibility and concomitance grade from manifested isotopic elements’ one, “coagulate” as wires. The continuity and lasting of such wires’ manifestation might either remain sensible only at the correlated mix level, or become sensible to other space-temporal correlated mixes levels. But, the “main” space-temporal correlated mix represents the all around reality manifestation, related to a limited criteria family. In parallel, elements’ wire “melting” processes occur, contributing also to changes of segregate continuum characteristics.

Several levels of coagulation for elements’ wires manifested upon a space-temporal correlated mix could be estimated:

- a) *partially coagulated wires* – structures with a coherence and concomitance grade belonging to a minimum sensible manifestation margin.
- b) *consolidated wires* – structures with a coherence and concomitance grade belonging to a stabilized sensible manifestation margin.
- c) *communication channels* - structures with a coherence and concomitance grade belonging to several common space-temporal correlated mixes sensible manifestation margin. The nucleic compatibility grade overlaps the maximum

coherence boundary of space-temporal correlated mix, estimated to belong to another coherence and concomitance margin.

One observer could redefine elements and space-temporal correlated mixes using values for compatibility, coherence and concomitance belonging to undetermined acceptability margins. Therefore, without actually ever cease, the information transfer within segregated continuum/all around reality/chaos will manifest by self-compatible shapes, along sensible or insensible duration, related to a considered space-temporal correlated mix.

This situation is recorded as a fuzzy multi-criterion one only from the moment that the observer senses coagulated wires and communication channels formed by elements that not all of them are of the same sequence related to energy/information flow on the space-temporal correlated mix. There are two information transfer levels, as resulted from the above mentioned:

- a) *elementary level* – the energy/information flow is captured from the correlated mix by parts of consolidated wires or communication channels, transferred through the outer part of nucleus (case of communication channels) and either aspired by other parts of consolidated wires or communication channels, or reflected by partial coagulated wires, “sent” towards other space-temporal correlated mix(es).
- b) *structured level* – the multi-criterion compatible energy/information flow to several space-temporal correlated mixes has a nucleic generation, transfers by reverberation through the communication channel’s nucleus, being nucleic absorbed.

It might be recommended that, before assuming any intervention against energy/information available from a certain context, at a certain moment, the observer should understand both the core information and related context/moment of the record. Above all, even above the subtle sets’ theory, this is a matter of observer’s sense, education and culture, it is a matter of coherence, compatibility and concomitance to the concerned all around reality.

In spite of being percept as a segregate continuum, chaos/all around reality offers numerous superior harmony moments, always of a surprising simplicity, contrasting with the complexity of space-temporal contexts. Chaos cease to be undetermined for the observer sensing the “majority” of apparently disjunctive correlated elements’ manifestation upon a mix of space-temporal correlated mixes, expressing, at the limit, the unique totality. From this point of view, the chaos as a whole proves not to be a primitive and not manifested mix, but represents the multi-dimensional and inter-compatible manifested mix having the supreme aggregation grade, that overpass the representation means offered by one single space-temporal correlated mix.

The inharmonic vibrations issued by generating or absorbing energy/information flows could not provide the continuity level required by information transfer. On this purpose there is a need for order in representing manifestation, so that the latter become an aggregate continuum at the minimal correlation level of space-temporal mixes. The order might be sensed concomitant to a constant frequency harmonic oscillation, invariant against any considered correlated mixes. This seems to be the inner characteristic of all around reality by which sense, select, amplifying and fading

energy/information flows on the communication channel manifest during the self-coherence nucleic maintenance.

The inharmonic vibrations and the not differenced manifestation of elements on a space-temporal correlated mix lead to a consistent probability of redundancy, occurring within the segregated continuum information transfer, in other words to an almost nil value of information transfer effectiveness. The ordering act, the harmonic oscillation (represented similarly by optics or electromagnetism or hydraulics disciplines) might manifest, by interference, energy/information self-filtration zones. More over, it manifests the continuum aggregation that, by reverberation, reveals phenomena similar to cybernetic representation, in other words a regularization of information transfer effectiveness throughout all around reality. By determining the resonance manifested upon energy/information flow propagation by means of nucleic reverberation throughout communication channels should result the nature of the act operator, by which an observer might stimulate the considered energy/information flow.

The flows manifested upon space-temporal correlated mixes accept modeling similar to optic phenomena, as a reference to disciplined manifestation. When composing two or more energy/information flows, with frequencies inside a convenient margin, it should manifest both, on one hand, light strips and, on the other hand, a spectral re-composition of flows according to dominant resulting frequencies. It might be estimated that on any space-temporal correlated mix, energy/information flows (the invariant and relative flows) lead to elements concentration sequences, as in light strips phenomena.

Related to correlated compatibility and concomitance characteristics, the observer might record several cardinal situations affecting information transfer within the aggregate continuum:

- a) *strip gap* – corresponds to a combination of oscillations and vibrations that exhausts energy/information flow from generation or reflection on coagulated bodies of elements, proving incompatible and/or not concomitant manifestation with the flows (neuter direct and indirect reactions).
- b) *spectral decompose (reverberated halo associated to full strip)* – corresponds to a combination of oscillations and vibrations that subtly energy/information flows on manifested elements on space-temporal correlated mix (hostile direct and indirect reactions).
- c) *full strip* – corresponds to a combination of oscillations and vibrations by energy/information subtle and manifested flows' resonance (favorable direct and indirect reactions).

By applying the subtle sets theory on this representation, the study of subtle transfer of information manifestation reverberated effects should be developed. When optimizing the propagation of an energy/information flow upon a space-temporal convenient correlated mix, the approach of the three cardinal situations could reveal the amplifying and/or filtering of the necessary priorities for the expected manifested effects of act operator application.

The full strip cardinal situation might be interpreted as favorable to necessary coagulation of communication channel nucleus manifestation. The set of manifested

elements upon a space-temporal correlated mix comprises the observers, assigned to definite grades of autonomy against correlated mix.

Consider a space-temporal correlated mix on which there are e_1, e_2, e_3 and e_4 , four scalar, discrete manifested elements, economic organizations in particular. Any of these is generally described by $e_i(x_i, \tau_i, q_i)$, using parameters like x – contract value related to agreed quality, τ – contract period and q – equivalent quantity. Two vector function families could define the manifested relations among these organizations:

1. on discrete components $\bar{f}(e_1, e_2, e_3, e_4)$, recorded by O observer and
2. on continuous components $\bar{f}(x_1..x_4, \tau_1.. \tau_4, q_1..q_4)$, recorded by O' observer.

The nature and shape of expression for these function families represents a result of applying the act operator, specific to a compatible, and some times concomitant, observer with the space-temporal correlated mix. According to the observer belonging grade to the marginal correlation on which elements and relations among them manifest, there could either be an isolated observer, correlated only to e_i element, who will record data expressed by vector function on discrete components, or an observer correlated to $e_1..e_4$ manifested elements and their mutual relation mix, who will record data expressed by vector function on continuous components. The reverberated synergy degree assigned to relations amongst all elements will depend on the energy/information of direct action. Considering the e_1 to e_4 direct action a_i , the over all effect will result by combining also the effects of $e_1-e_2, e_1-e_3, e_2- e_4, e_3- e_4, e_1- e_2- e_3, e_1- e_3- e_2, e_1- e_2- e_3- e_4$ and $e_1- e_3- e_2- e_4$ collateral actions, as shown in figure 1.

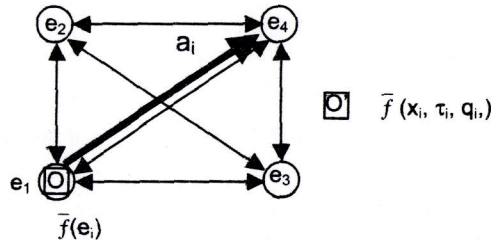


Figure 1: Elements: manifestation, action and representation

2 Model of Macroeconomic Subtle Reverberated Information Transfer

The economic processes take place among organizations (firms, agents etc.), that correlate their activities to the specific market demands. When achieving common targets, the ventured organizations establish contracts according to manifested relations on the market. The transfer of information related to contract terms determines several material and financial flows among the organizations within the specified business environment.

Considering the $E = \{e_1, e_2, ..e_n\}$ set, then between two organizations e_i and e_j ($i \neq j$) might occur conflicts of interests (represented by antagonist objective functions). By applying to an act operator headed to objective disjunction reduction, the threat of general unbalanced issues (incompatibility among elements or groups of elements

belonging to the system) varies inside an undetermined bounded margin, manifesting the shape of reverberation. For example, effects' chain propagation of inflation trends amplifies dangerously. According to a classical approach, the gap between demand C and offer Of , generates inflation when $C \gg Of$, better reflected by the $K = \frac{C}{Of}$ ratio,

compared to 1. Considering fuzzy and subtle sets' theory, we assume that e_i is a provider organization and e_j is a client organization for the P_h provided service. The comparison between demand and offer will be based on the different points of view of two observers, belonging to e_i and e_j organizations. At t moment, the following comparison could occur:

- from e_i provider organization point of view:

$$K'_{ih} = \frac{C'_{ih}}{Of'_{ih}} \quad (1)$$

where C'_{ih} - cumulative demand as perceived by e_i organization for P_h service at t moment (from e_j and other clients), Of'_{ih} - P_h service offer of e_i organization at t moment.

- from e_j client organization point of view:

$$K'_{jh} = \frac{C'_{jh}}{Of'_{jh}} \quad (2)$$

where C'_{jh} - estimated demand of e_j client, for P_h service, at t moment, Of'_{jh} - actual offer as perceived by e_j client, for P_h service, at t moment.

The fee for P_h service will be influenced also by both the U'_{jh} utility index of e_j client, for P_h service, at t moment and the ρ'_{jh} solvability index of e_j client, for P_h service, at t moment. In general, the accepted fee by e_j client, for P_h service, at t moment, will have the shape:

$$P'_{jh} = \rho'_{jh} * K'_{jh} * U'_{jh} * P'^{-1}_{jh} \quad (3)$$

From the e_i provider organizations' point of view, there must be accepted as a given fact two parameters: ρ'_{jh} solvability of e_j client for P_h service, at $t-1$ moment, and the fee actually paid by this client at the previous moment $t-1$. Thus, the fee charged by e_i organization will have the shape:

$$P'_{ih} = \rho'_{ih} * K'_{ih} * U'_{ih} * P'^{-1}_{ih} \quad (4)$$

where K'_{ih} results from (1), U'_{ih} - e_i organization service utility, for P_h service, at t moment (the measure of compared advantage against other services).

In general, the fee demanded by the organization is higher than the fee offered by the client:

$$P'_{ih} > P'_{jh} \quad (5)$$

Case of $P'_{ih} - P'_{jh} \leq \epsilon_a$ (6)

with ϵ_a – acceptable margin, the average trunk fee value is applied for the transaction.

Case of
$$P_{ih}^i - P_{jh}^i > \epsilon_a \quad (7)$$

then between the two partners a negotiation begins. If the result of negotiation converges towards two fee values satisfying relation (6), then the process continues till a contract is established between the two parts (e_i and e_j). Usually, the contract limits chaotic trend of direct relationship between partners.

Reaching the above mentioned conditions, relations (3) and (4) unify, so we get to:

$$P_{ih}^i = a_t * P_{jh}^{i-1} \quad (8)$$

with a_t taking values that will be discussed later.

From relation (4) conclusion is that beneath the demand-offer ratio, a rise in P_h service necessity plays an inflation amplifying role, especially in monopoly or oligopoly situations. Headed towards fading this role, it is advisable the provision of substitute services. The positive role of solvability index in inflation fading is only an appearance, because the client's solvability is not always followed by effectiveness and quality of contracted services, the latter leading to channels' block situation. The real solution concerns the rise of organization's competitiveness by investing in quality management and technology transfer, as shown in figure 2.

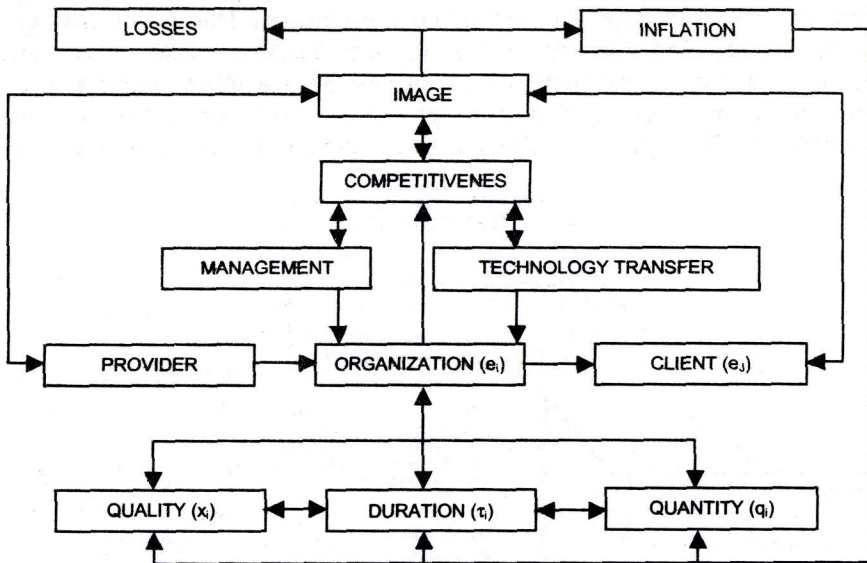


Figure 2: Organization and its characteristics

Inflation has other subtle and very deep causes too, therefore even investment and technology transfer undertaken measures could be not sufficient. From figure no. 2 issues that a negative role in macroeconomic growth is paid by losses, possibly of several shapes:

- technology losses (losses in networks);
- economic and financial losses;
- political losses (due to corruption etc).

After establishing the contract, the providing stage follows, that, favorable case, could conclude after (τ) duration, with the (q) specified equivalent quantity, at requested (x) quality reflected in consented transaction value. Any abatement from these jeopardizes the image of provider organization. The procedures related to client's obligations must be observed, meaning the fee disbursement, after (τ) duration, as written in the contract. The abatements jeopardize the client's image, like during a reverberation phenomenon comprising apparent and subtle issues.

3 Image Improvement by Reverberation Upon Business Environment

The reverberation phenomenon within the consonantal concept of Stefan Odobleja is considered to be an amplifier of reversed belonging grade (afherentatia). By its own actions, one organization acts directly and indirectly upon different e_i organizations in the environment (economic, social, natural etc.) it belongs. Under this impulse, e_i organization acts further upon other organizations in the considered environment e_1, e_2, \dots, e_n . Each e_j organization ($j \neq i$) acts upon another e_k organization ($k \neq j$), as a result of initial propagated impulse. The mutual impulse among organizations will continue till at least one message returns to the initial organization. This is the first cycle of the reversed connection. Case of received message analysis results, the organization acts again upon the environment of organizations. Therefore multiple cycles occur, constituting the reverberation of organization's acts upon the environment that comprised it. The figure 3 details the nature of organization's acts during these cycles.

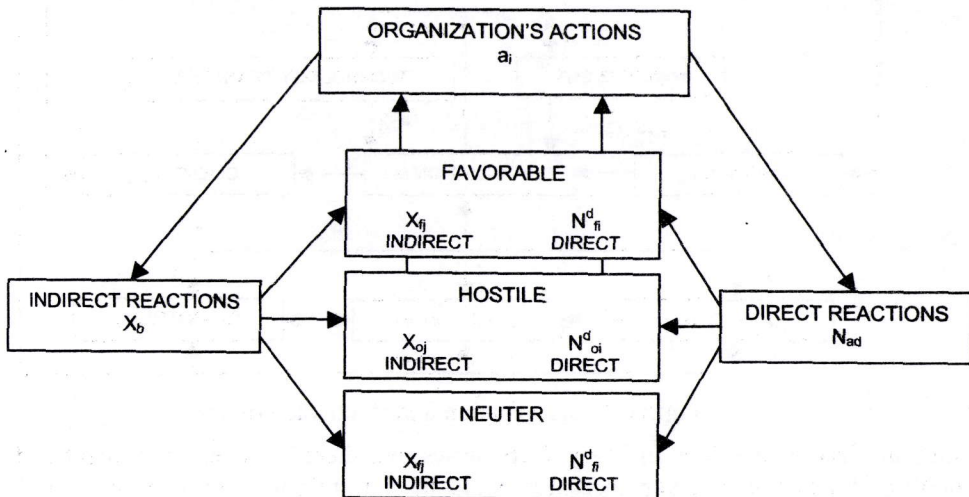


Figure 3: Organization: actions and reactions

No matter if they are direct or indirect, reactions split in favorable, hostile and neuter. As for the reactions recorded by the organization, the following notations might be done:

- P_{ih}^f – mark reflecting the importance of h range environment favorable reaction involvement against a; direct action, regarding the organization's image;
- P_{ih}^o – mark reflecting the importance of k range environment hostile reaction involvement against a; direct action, regarding the organization's image;
- N_{fi}^d – number of (apparently) direct favorable environment reactions related to organization's a; action;
- N_{oi}^d – number of (apparently) direct hostile environment reactions related to organization's a; action;
- N_{ad} – number of (apparently) direct actions of considered organization.

The total weight of direct hostile appreciation within overall direct appreciation is:

$$K = \frac{\sum_{i=1}^{N_{ad}} \sum_{k=1}^{N_{oi}^d} P_{ik}^o}{\sum_{i=1}^{N_{ad}} \sum_{k=1}^{N_{oi}^d} P_{ik}^f} \quad (9)$$

The iceberg effect hypothesis, by which the apparent part means 1/10 of organization's action and the subtle part means the remaining 9/10, appeals to the following variables:

- X_{jk}^o – mark granted by experts and consultants, measuring the importance of hostile reactions of k range, expressed in indirect shape, regarding the organization's image;
- X_{jk}^f – mark granted by experts and consultants, measuring the importance of favorable reactions of k range, expressed in indirect shape, regarding the organization's image.
- X_{fj}^h – number of favorable indirect environment reactions, related to b_j indirect organization's action;
- X_{oj} – number of hostile indirect environment reactions, related to b_j indirect organization's action;
- X_b – number of organization's indirect actions;

$$K' = \frac{\sum_{j=1}^{X_b} \sum_{k=1}^{X_{oj}} X_{jk}^o}{\sum_{j=1}^{X_b} \sum_{k=1}^{X_{fj}} X_{jh}^f} \quad (10)$$

where K' – the hostile indirect appreciation weight within the overall indirect appreciation.

The organization's hostile appreciation, both direct and indirect, are considered to be in a similar to linear dependency relation:

$$K \equiv \lambda * K' \quad (11)$$

It is demonstrated that the above mentioned hypotheses lead to the following results:

- *sympathy degree of organization:*

$$g_s = \frac{K}{1 + K} \quad (12)$$

• *antipathy degree of organization:*

$$g_a = \frac{K'}{1 + K'} \quad (13)$$

The discrepancy between sympathy and antipathy against the organization:

$$\delta = (1 - K) \sum_{i=1}^{N_{ad}} \sum_{k=1}^{N_{oi}^d} P_{ik}^o \quad (14)$$

The effect of an I_i investment in organization's image could be measured by weight loss of K to K' , taking into account the change of favorable mark. A new discrepancy results:

$$\delta' = (1 - K') \sum_{j=1}^{X_b} \sum_{k=1}^{X_{oj}} X_{jk}^o \quad (15)$$

thus the rise of discrepancy results:

$$\delta' - \delta = (1 - K') \sum_{j=1}^{X_b} \sum_{k=1}^{X_{oj}} X_{jk}^o - (1 - K) \sum_{i=1}^{N_{ad}} \sum_{k=1}^{N_{oi}^d} P_{ik}^o \quad (16)$$

While making an I_i investment into organization's image improvement, several economic effectiveness indices could be counted. As a sample, we propose the CMU unit marginal cost of one image mark point, gained by favorable investment's effects, counted as:

$$CMU = \frac{I_i}{\delta' - \delta} = \frac{I_i}{[1 - (1 - \lambda)K'] * \left(\sum_{j=1}^{X_b} \sum_{k=1}^{X_{oj}} X_{jk}^o - \sum_{i=1}^{N_{ad}} \sum_{k=1}^{N_{oi}^d} P_{ik}^o \right)} \quad (17)$$

Similarly, on a certain mark of organization's image it is possible to count the attraction for an interested organization to cooperate in a joint venture.

The main stages of indirect reactions' de-subtling, as an act operator applied by an observer (expert, consultant, auditor a.s.o.) are:

- I. Rumors about considered organization issued on the business environment;
- II. Interception of the first message from the rumors' range;
- III. Notification, by several paths and from different sources, of organization's executive management about the reactions of other organizations belonging to the same business environment;
- IV. Follow-up monitoring of main sources of reaction dissemination, either favorable or hostile;
- V. Recording to the organization's database information related to indirect reactions;
- VI. Verifying the collected information coherence and benchmarking of missing data;

VII. Replacing the missing data with results from experts, auditors and consultants' works;

VIII. Determining the sympathy-antipathy degrees and estimation of economic effectiveness index;

IX. Recounting the iceberg constant, using the formula:

$$K_3 = \frac{Md > 1}{Mi < 10} \quad (18)$$

with Md – measure of direct reactions' influence, Mi – measure of indirect reactions' influence upon the organization.

Case of $\left| K_3 - \frac{1}{10} \right| \leq \varepsilon_a$, with ε_a – admissible error, no corrections will be applied for the intermediary relations, that led to (12) and (13) formulae.

X. Verifying λ value in (11). If $|K - K'| > \varepsilon_a$, relations (12) and (13) are to be correlated.

4 Conclusions

Image improving is essential within the competition among organizations. Each organization should build a database comprising marks from all related business partners reactions', on either direct or indirect relations. Passing through the ten de-subteling stages above shown, databases become acquaintance bases. The continuous cybernetic organization's image improvement must be represented as an act operator based on reverberation phenomena of direct and indirect actions.

The image of organization provides both the possibilities to run for new business targets or blocks this possibility, eventually excluding the organization from its business environment. Organization's competitiveness, according to the new European Union business approach, becomes a measurable parameter by means of comparative advantage of company's own actions against its partners', as well as by means of economic effectiveness in assigning the marginal costs, so necessary during the investment process.

As for the theoretical study further developments, the authors choose to rephrase the mathematical expressions by using Galois and Barbilian approaches for a better phenomena imaging.

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